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Policy Implementation Analysis of District Health System to Improve Health Services: Study in North Central Timor Regency, East Nusa Tenggara Province, Indonesia

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Abstract

Context: Improving degree of public health in a region requires quality health services. For this reason, district health system has been formed which can be implemented comprehensively to the target community. A study is needed to find out the factors that influence policy implementation so that quality of health services can be improved.

This study used quantitative method with structural equation models to find patterns of the relationship between the district health system and health services.

The results showed that there are 7 indicators that are part of the district health system factors, 2 indicators that are part of the resposivensss factor, 8 indicators that are part of the policy implementation factor, and 3 indicators that are part of the health service factor. These indicators have loading factor ≥ 0.5. The district health system consisting of 7 subsystems if properly implemented will have a positive impact on health services by 1.98. Contribution of policy implementation in improving health services will be great if the district health system is implemented together with responsiveness, so that the total effect becomes 2.20.

Keyword: *Health Service, District Health System, Responsiveness, Policy Implementation*

Introduction

Life Expectancy of Birth is indicator that reflects the degree of public health in a region including infrastructure, access, health quality. If this number increases, it means that the community's health status is getting better. In the period 2010 - 2018, life expectancy at birth in Indonesia increased by 1.39 years or by 2%, from 69.81 years to 71.20 years[(1)]. However, when compared to countries in Southeast Asia, in 2015 life expectancy at birth in Indonesia (69.4 years) was lower than in Singapore (83.2 years), Brunei (77.4 years), Viet Nam (76.5 years), Malaysia (75.5 years), Thailand (75.5 years), while higher than Cambodia (69.3 years), Philippines (69.2 years), Laos (67.0 years), Myanmar (66.7 years)[(2)].This provides an initial overview for the Indonesian government to formulate a health system with the aim of: (1) improving public health status; (2) increasing responsiveness; and (3) community protection against social and financial risks in the health

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sector. The health system is made to be use as a reference in making various policies and guidelines that needed to fulfill the health demands of individuals, families, groups and communities. This health system is run by the government, private sector and the community [3].

Policy on the health system must be implemented in order to achieve the desired goals. Policy implementation is an action taken by individuals or groups to carry out decisions to achieve certain goals and objectives desired by certain means and in a certain time sequence. Therefore if properly implementing policies on the health system makes it possible to achieve the goal of a high degree of public health through the efficient use of available resources. Conversely policies will only be in the form of dreams or good plans that are neatly stored in the archive, if not implemented[4].Based on the Health System Improvement Performance assessment in 2000, the achievement and performance of Indonesia's health system is relatively low. Achievement of the health system is measured through indicators: the level of health achieved by the system and the level of system response, placing Indonesia at number 106 of 191 WHO member countries. While the health system performance is measured through indicators: distribution of health status, distribution of system responses, and distribution of health financing, placing Indonesia at number 92 of 191 WHO member countries[5].

In an effort to improve the performance of the health system that aims to prioritize the quality of health services to the community, there needs to be an approach to implementing policies that tend to benefit them. Now, the public can easily give an assessment of the quality of any public service or provide advice and criticism of the bureaucracy. This encourages the bureaucracy to be able to anticipate and develop new policies and services that are more responsive. A more responsive bureaucratic format is characterized by three levels namely, the level of openness, the level of adaptation, and the level of environmental support. The level of openness is characterized by the high responsiveness of health workers in handling and resolving complaints raised by service users, as well as the availability of channels for sending suggestions and complaints [6].Thus researchers want to find out the factors that influence policy implementation so that quality of health services can be improved.

Material and Method

This research was conducted using quantitative method. The stages of the study began with identification of health service problems in the community related to responsiveness and implementation of District Health System policies in the region, then analyzed using structural equation models using AMOS 20.0 program to determine the effect of health system implementation on public health services.

The conceptual model was formed by 4 latent variables, namely: exogenous latent variables were the district health system and responsiveness, while endogen latent variables were policy implementation and health services. The four variables latent were observed through 20 indicators. District health system variable with 7 indicators: information management and health regulation, human resources of health, health financing, pharmaceutical supplies and medical equipment, health efforts, research and development of health, empowerment and community participation. Responsiveness variable with 2 indicators: responsiveness and improvement in efficiency and fairness. Policy implementation variable with 8 indicators: policy standards and targets, resources, inter-organizational relations, implementing agency characteristics, socio-economic and politics, disposition and bureaucratic structure. Health services variable with 3 indicators: access coverage, quality of safety, occurrence of health improvement.

The sample size is calculated using "rule of the thumb" for structural model equation analysis, which is 5-10 samples per indicator, so this study are used 208 health workers in puskesmas and district hospitals in North Central Timor Regency, East Nusa Tenggara Province, who were selected using simple random sampling technique .Data collection was carried out in 2018 using validated questionnaires.

Results

Characteristics of the respondents are shown, majority of respondents were female (72.1%) and aged over 25 years (94.8%), also most respondents (70.2%) had educational background in Diploma-3 and 79.3% have employment status as civil servants with more than 5 years of work.

After tested the normality assumption, then analyzed using the structural equation model, the results of model fit are obtained for the implementation of district health

system policy in health services, with a probability value = 0.073 > 0.05 and other values for the fit index model close to 1(shown in Figure 1)

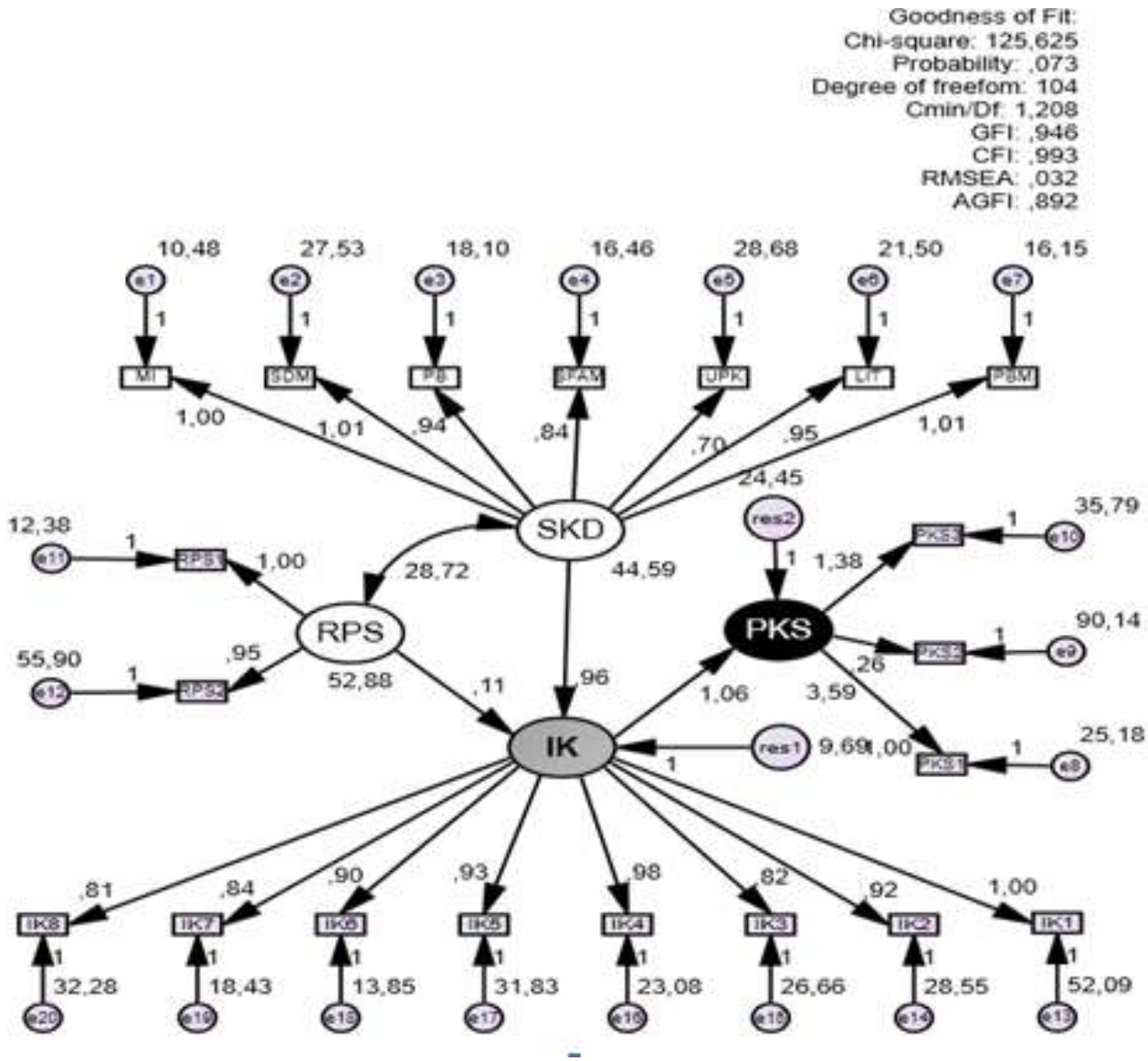

Figure 1: Results from Analysis of the Structural Equation Model for District Health System Policy Implementation on Health Services

Test results from the measurement model for each latent variable obtained 20 indicators are a valid part of each latent variable with a loading factor value ≥ 0.5 (shown in Figure 1), where there are 7 indicators are part of the district health system factors, 2 indicators are part of responsiveness factor, 8 indicators are part of policy implementation factors, and 3 indicators are part of health service factors.

Causality effect analysis based on table 1 shown the Policy Implementation (IK) is a moderator variable of the District Health System (SKD) towards Health Services (PKS). District Health System (SKD) and Responsiveness (RPS) has a direct effect on Policy Implementation (IK) respectively of 0.96 and 0.11, while Policy Implementation (IK) directly affected Health Services (PKS) of 1.06.

The effect of Policy Implementation (IK) from the District Health System (SKD) on Health Services (PKS) has total effect of 1.98.Contribution of Policy Implementation (IK) in improving Health Services (PKS)will be great if the District Health System (SKD) is implemented together with Responsiveness (RPS),so that the total effect becomes 2.20.

Table 1: Results of Effects Calculation on the Structural Equation Model of District Health System Policy Implementation on Health Services

No	Variable	Direct Effects	Indirect Effects	Total Effects
1	District Health System (SKD) → Policy Implementation (IK)	0.96	0.00	0.96
2	Responsiveness (RPS) → Policy Implementation (IK)	0.11	0.00	0.11
3	Policy Implementation (IK) → Health Services (PKS)	1.06	0.00	1.06
4	District Health System (SKD) → Policy Implementation (IK) → Health Services (PKS)	0.96	1.02	1.98
5	Responsiveness (RPS) → Policy Implementation (IK) → Health Service (PKS)	0.11	0.12	0.23

Discussion

This study showed that the policy of district health system consisting of seven subsystems namely: information management and health regulation, human resources of health, health financing, pharmaceutical supplies and medical equipment, health efforts, research and development of health, empowerment and community participation, if properly implemented will have a positive impact on health services by 1.98. The indicators in policy implementation factors that have influenced health services include: policy standards and targets, resources, relationships between organizations, characteristics of implementing agencies, socio-economic conditions, implementor dispositions, communication, and bureaucratic structures, all of these indicators must be considered to produce quality health services. There are essentially three components in the health system that are interconnected, namely: health policy, policy actors and the policy environment [(7)]. It is very likely that the same policy is interpreted and implemented differently by implementing agency in different regions so that the results will not be the same. Often the policies that have been made by the central government, however, their implementation in a region is carried out based on the policies of each regional head therefore the output of implementation also varies. Thus capabilities, interests, and perceptions of regional actors greatly influence the results of implementation[(8)(9)].

Furthermore, from this study it is known that successful implementation of the district health system policy in improving health services is determined among other things: (1) objectives and standards of policy of the district health system are clear,namely breakdown of targets to be achieved through the policies and standards used to measure its achievements; (2) resources (fund and incentives) that can facilitate the implementation effectiveness; (3) quality of inter-organizational relations that allows control from a higher structure so that implementation can proceed according to established goals and standards; (4) characteristics of implementing institutions or organizations including competence and size of implementing agent, level of hierarchical control where there is lowest implementing unit at implementation time, political support from executive and legislative institutions, and formal and informal links with policy-making institutions; (5) political, social and economic environment which includes sufficient economic resources, policy that can affect socio-economic conditions, the government's response to the policy, and political elites that support implementation; (6) the disposition/response/attitude of implementors, including knowledge and understanding of the contents and objectives of the policy, their attitudes related to the policy and intensity of their attitudes; (7) Communication in implementing policy covering three important things, namely transmission, clarity, and consistency. (8) bureaucratic structure is not too long and not complex or simple, consequently it is easy to control.

The results of this study also reinforce the Van Metter and Van Horn policy implementation model which presuppose that policy implementation runs linearly from public policy, implementors and performance. Policy implementation variables that affect performance in the model consist of six variables: policy standards and objectives, policy resources, inter organizational communication and enforcement activities, the characteristics of the implementing agencies, the economic, social, and political environment affecting the implementing jurisdiction or organization, and

the disposition of implementors for the carrying out of policy decision[10][11].In addition, the results of this study also support four factors in the George Edward III policy implementation model that affect the successful policy implementation, namely communication, resources, disposition, and bureaucratic structure[12] [11].Likewise, the implementation of the district health system policy also tends to be top down and suitable to be implemented at the level of bureaucracy that is structured in government institutions, where each level of hierarchy has a role in accordance with the function in the elaboration of policies to be implemented and facilitates the implementation of a policy at each level.

To avoid obstacles in the implementation of district health system policy, it is necessary the ability of policy makers to respond to the community's need for health is the key to the success of health services.The results of this study indicate that if the district health system was implemented simultaneously with responsiveness, the value of health services would increase to 2.02. Responsiveness is a willingness to help customers and provide prompt service, which is a process oriented measure and results of concern to the customer/client. Indicators of responsiveness factors that must be considered include: staff friendliness, physical building, adequate equipment, comfort, personality, privacy, waiting time, skilled and competent officers, appearance of officers and management, working according to standard operating procedures, cleanliness of the service environment, also improvement in efficiency and fairness. Whereas specifically for indicators on responsiveness factors associated with increased efficiency and fairness, the factors that influence it are health financing. If the amount and distribution of health costs do not match the needs of the group and / or work area served, then justice in health financing will not be achieved[13].

If the responsiveness factor is in optimal condition, then it can be ascertained that the performance of health services will be satisfactory. The role of responsiveness factors in the implementation of district health system policy, among others: (1) increasing the achievement of policy standards and objectives; (2) implementing agencies are able to overcome the limitations of human resources, time, and finance so as to improve the smooth administration of policy implementation; (3) persuasive implementors so as to improve communication with the people; (4) bureaucratic structure is able to support reward systems according to hierarchical level. Finally, we emphasize the importance of the local wisdom, cultural, political and socioeconomic context of people-system interaction. Examples of contextual influences include key political priorities[14], available resources and cultural norms and traditions[15][16][14], welfare level [17], and specific interventions such as advocacy measures[18]. These altogether determine the acces coverage of health service, improved health level and equity, social financial risk protection and fairly. In addition, contextual factors influence to shape the nature of organisational and professional service cultures, inform people's expectations and frame the environment within which social relations and interactions occur between the people and their health systems.

Conclusions

Based on the findings of this study, the authors underscores the importance of district health systems are implemented not only itself, but also together with the responsiveness factor. As this study has shown, district health system factor and responsiveness factor, both simultaneously direct effect on policy implementation, which increases health services.

Conflict of Interest: The authors declared that they have no competing interest.

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Ethical Clearance: All procedures performed in studies involving human participants were in accordance with the ethical standards of the Health Research Ethics Committee Faculty of Public Health Airlangga University.

Informed Consent: Informed consent was obtained from all individual participants included in the study.

References

1. Central Bureau of Statistics (Badan Pusat Statistik). Human Development Index (Indeks Pembangunan Manusia) 2018. Jakarta - Indonesia; 2019.
2. The United Nations Development Programme (UNDP). Summary Human Development Indices and Indicators 2018 Statustical Update. The United Nations Development Programme (UNDP). New York - USA; 2018.
3. Departmentof Health Republic of Indonesia (Departemen Kesehatan RI). National Health

System (Sistem Kesehatan Nasional). Jakarta - Indonesia; 2004.

4. Atun R. Health Systems, Systems Thinking and Innovation. Health Policy Plan. 2012; 27(suppl, 4):iv4–8.
5. WHO. Thel World Health Report 2000: Health System: Improving Performance. Geneva, Switzerland; 2000.
6. Balabanova D, McKee M, Mills A. Good Health at Low Cost 25 Years On: What Makes a Successful Health System? London: London School of Hygiene and Tropical Medicine; 2011.
7. Dachi RA. Health Policy Process and Analysis: A Conceptual Approach(Proses dan Analisis Kebijakan Kesehatan: Suatu Pendekatan Konseptual). Sleman, Yogyakarta: Deepublish; 2017. 38 p.
8. Charron N, Dijkstra L, Lapuente V. Regional Governance Matters: v Quality of Government within European Union Member States. Reg Stud. 2014;48(1):68–90.
9. Morisson A, Doussineau M. Regional Innovation Governance and Place-Based Policies: Design, Implementation and Implications. Reg Stud Reg Sci. 2019;6(1):101–16.
10. Van Meter DS, Van Horn CE. The Policy Implementation Process: A Conceptual Framework. Adm Soc. 1975;6(4):445–88.
11. Agustino L. Fundamentals of Public Policy(Dasar-dasar Kebijakan Publik). Revised Edition. Bandung: Alfabeta; 2016.
12. Edward III GC. Implementing Public Policy. Washington DC: Congressional Quarterly Press.; 1980.
13. Trisnantoro L. Health System Financing and Fragmentation Policy(Kebijakan Pembiayaan dan Fragmentasi Sistem Kesehatan). Yogyakarta: Gadjah Mada University Press; 2019.
14. Aday LA, Andersen R. A Framework for the Study of Access to Medical Care. Health Serv Res. 1974;9:208–20.
15. Robone S, Rice N, Smith PC. Health Systems' responsiveness and Its Characteristics: A Cross-Country Comparative Analysis. Health Serv Res. 2011;46(6 PART 2):2079–100.
16. Malhotra C, Do YK. Public Health Expenditure and Health System Responsiveness for Low-Income Individuals: Results from 63 Countries. Health Policy Plan. 2017;32(3):314–9.
17. Malhotra C, Do YK. Socio-economic disparities in health system responsiveness in India. Health Policy Plan. 2013; 28(2):197–205.
18. Yasobant S, Saxena D, Trivedi M, Gaurav K, Patel S, Patel M. Advocacy for a responsive health system to control diabetes: learning from western Indian state Gujarat, India. Int J Med Sci Public Heal. 2016;5(11):2239–43.

Hypertention with Left Atriumabnormalities, Left Ventricular Hypertrophy, Qt Interval and the Smoker

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Abstract

Context: Nicotine in cigarettes Stimulates the release of the hormone adrenaline thereby increasing blood pressure. Hypertension or Increase. blood pressure increases the pressure in the left ventricular muscle roomates Appears as hypertrophy. then an increase is in left atrial pressure Followed by left atrial dilatation space. Hypertensive people who smoke cause disruption of the process of ventricular de polarization and re polarization of the heart. This study aims to analyze hypertension with left atrial abnormalities, left ventricular hypertrophy, and QT interval in smokers at Tower Hanyar Health Center. The observational study design uses descriptive method with cross sectional design. The sample consisted of 60 research subjects and was divided into two groups, namely the group of smokers with hypertension with a total of 30 people and the group of non-hypertensive smokers with the number of 30 people Obtained by consecutive sampling method. In the study found the relationship of hypertension with left atrial abnormalities, left ventricular hypertrophy and QT interval in smokers tested the hypothesis with Chi-square test with a confidence level of 95%, with ap value = 0.00. The results of the analysis of PROVE that there is a relationship of hypertension with left atrial abnormalities, left ventricular hypertrophy and left the QT interval in smokers at Tower Hanyar Health Center. left ventricular hypertrophy and QT interval in smokers tested the hypothesis with Chi-square test with a confidence level of 95%, with ap value = 0.00. The results of the analysis of PROVE that there is a relationship of hypertension with left atrial abnormalities, left ventricular hypertrophy and left the QT interval in smokers at Tower Hanyar Health Center. left ventricular hypertrophy and QT interval in smokers tested the hypothesis with Chi-square test with a confidence level of 95%, with ap value = 0.00. The results of the analysis of PROVE that there is a relationship of hypertension with left atrial abnormalities, left ventricular hypertrophy and left the QT interval in smokers at Tower Hanyar Health Center.

Keywords: *Left atrial abnormality, Left ventricular hypertrophy, QT interval, smoking, hypertension*

Introduction

Based Health Research (Riskesdas) in 2013 showed cardiovascular vascular disease (CVD) was seventh highest for non-communicable diseases (PTM) in Indonesia.1 CVD is most strongly associated with hypertension or high blood pressure is often referred to as a death without symptoms for someone who hypertension who had for years often do not realize it until a fairly severe complications that can lead to death hypertension.[1] largest contributor to the deaths of nearly 9.4 million deaths annually. One of the largest contributor to the province of South Kalimantan hypertension is approximately 44.1% of patients with hypertension in

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London there are 75,556. Patients with hypertension based on data taken as much as 26.5% of the villagers gadang suffer from hypertension. [2] Hypertension increases the pressure on the heart muscle in the left ventricle that looked as stiffness and hypertrophy, which increases atherosclerosis in the coronary arteries. The combination of increased need and decreased ability to increase the incidence of ischemic heart resulting in an increased incidence of myocardial infarction, sudden death, arrhythmias and congestive failure at hypertension.[3]

Based on data from the World Health Organization (WHO), Indonesia is the country with the third largest number of smokers in the world afterChinaandIndia.[4] smoke tar or nicotine yields did not reduce the risk of cardiovascular disease. Although the harmful effects of tobacco exposure on cardiovascular disease and risk factors are clear and well known, important elements found in cigarettes and pathophysiological mechanisms involved are not know.[1]

More recently, the depths of negativity terminal P wave in V1 (DTNPV1) has emerged as the left atrial abnormalities that can predict the occurrence of atrial fibrillation (A-Fib), stroke, and death from CVD. The emergence of DTNPV1 sign indicates left atrium pathophysiological process that forms the substrate for thromboembolism through the addition to dis-rhythm that characterizes A - Fib. Terminal negativity in the P wave in V1, as a marker of left atrial abnormalities, easily assessed on a routine EKG and several studies have shown the depth of deflection down (terminal part) of DTNPV1 associated with fibrosis of left atrial dilation, and increased filling pressure atrium.[5]

Hypertrophy of the heart muscle is a form of chronic left ventricular adaptation to increased cardiac load, both load pressure and volume load, or as a result of the influence of neurohumoral factors. Sanjaya and Soerinata revealed that the most common cause of LVH in the general population is hipertensi.[6] Hypertension increases the pressure on the heart muscle or myocardium on left ventricular hypertrophy appears as stiffness and, that increase atherosclerosis in coroner blood vessels.[3]

Hypertension in people who smoke cause depolarization and ventricular repolarization process of the heart, can be seen on the EKG QT interval prolongasi. The QT interval is the time measured from the beginning of the Q wave to the end of the T wave to see the time taken in the process of ventricular depolarization and repolarization. In people suffering from disorders of the QT interval will cause arrhythmias and long QT sindrome.[7]

This study was conducted to determine the relationship of hypertension with abnormalities of the left atrium,left ventricular hypertrophy and QT intervalin smokers. The advantages of the research conducted has not been studied in South Kalimantan region. Need to do this research because he saw the high prevalence of smoking and the effects of smoking, namely hypertension. One of the effects of hypertension is to the left atrial abnormalities, left ventricular hypertrophy and QT interval abnormalities in the heart. This study was conducted to analyze and prove the relationship of hypertension, smoking, abnormalities of the left atrium, left ventricular hypertrophy and QT interval.

Research Method

The design of this study design using analytical observation with cross-sectional design.

The population in this study is whole smokers in Puskesmas Tower Hanyar Banjarmasin. The research subject can be divided into two groups: smokers who suffer from hypertension and smokers who do not have hypertension. Subjects selected using consecutive sampling technique with the following inclusion criteria:

1. Men aged 35 to 50 years.
2. Cooperative, subject to cooperative research to conduct research procedures.

   The sample size used in theory Gay and Diehl minimal amount to 30 people / groups so that the total sample in this study amounted to 60 people.

Results and Discussion

Research relationship with abnormalities of left atrial hypertension, left ventricular hypertrophy and QT interval in smokers was conducted in October 2019 in the clinic sieve hanyar Banjarmasin research subject as many as 60 people.

Table 1: Distribution of age against hypertension and distribution of smoking duration of hypertension

Age	Hypertension		not Hypertension	
	N	%	N	%
35-39 years	8	26	11	37
40-45 years	7	24	8	26
46-50 years	15	50	11	37
Total	30	100	30	100
Old Smoking	**Hypertension**		**not Hypertension**	
	N	%	N	%
10-15 years	2	7	25	83
16-20 years	21	70	5	17
21-25 years	7	23	0	0
Total	30	100	30	100

In this study conducted in people aged 35-50 years and obtained the results as shown in Table 1. Abnormality incident left atrium, left ventricular hypertrophy and QT interval in smokers age berdasarsarkan significant and continues to increase with increasing age.

Blood pressure will tend to be high as the passage of age thus greater risk of developing hypertension. Increasing age resulted in an increase in blood pressure, because the arterial wall will be thickened causing the buildup of collagen in the muscle layer, so that the blood vessels to constrict slowly and become rigid. Hypertension often does not cause symptoms, while blood pressure is constantly high in the long term can lead to complication.[8]

Table 2: Left Ventricular Hypertrophy incidence in smokers smoke at the health center by the Old Tower Hanyar

old smoke		HVK +	HVK -	p *
10-15.	nonnotensive	0	25	0003
	Hypertension	2	0	
16-20	nonnotensive	1	4	0137
	Hypertension	13	8	
21-25	nonnotensive	0	0	.-
	Hypertension	2	5	

* Fischer Exact Test

Table 3: Characteristics of Respondents Based on the Old Smoking in normotensive and Hypertension at Health Center Tower Hanyar

old smoke		QT interval		P
		Normal	lengthwise	
10- 15 Years	nonnotensive	25	-	0.074
	Hypertension	1	1	
16-20 Years	nonnotensive	5	-	.281
	Hypertension	13	8	
21- 25 Years	nonnotensive	-	-	100%
	Hypertension	4	3	

* Statistical analysis: Fisher's Exact test Test

Based on the results table get the highest smoking duration in patients with hypertension are smokers over 15 years by 70% and in normotensive subjects under 15 years of 83%. In the table showing the old smoke has a statistically significant relationship in> 15 years and an increase in the> 20 years.

old cigarette consumption is one of the results which can significantly affect the increase in blood pressure or hypertension, substances contained in cigarettes can damage the lining of the arterial wall plaques. It cause narrowing of arterial blood vessels to increase blood pressure. Nicotine can cause hormone epinephrine increased and resulted in a narrowing of the arteries. Karbonmooksidanya can cause the heart to work harder to replace the oxygen supply to the body's tissues. Heart work harder Tantu can increase blood pressure. Various studies have shown cigarettes are at risk for heart and blood vessels. With smoke a cigarette it will have a major influence on the increase in blood pressure or hypertension. This can be caused by CO gas generated by cigarette smoke can cause blood vessels "cramp" so that the blood pressure rises, it's due to narrowing of the arteries due to nicotine causing the heart to work hard. As a result of heart rate and increase blood pressure.[9]

Table 4: Results Interpretation Left atrial abnormalities in smokers

		LAA		P
		No (%)	There is (%)	
Hypertension	No	29 (98.4%)	1 (1.6%)	0,00
	there is	11 (33.3%)	19 (66.7%)	

* Test x2 / significance

Table 5: Results Interpretation Left Ventricular Hypertrophy in Smokers

Left Ventricular Hypertrophy	HVK (+)		HVK (-)		Total		P
	N	%	N	%	N	%	
Hypertension	18	60	12	40	30	100	**0.0000 ***
nonnotensive	1	3	29	97	30	100	
amount	19	31.7	41	68.3	60	100	

* Test x^2 / significance

Table 6: Results of the QT interval average QT interval on Hypertension and Non Smokers Hypertension and Analysis Test T Not Pair

Smoker	The number of patients	Average ± SD
not Hypertension	30	411.000 ± 16.942 ms
Hypertension	30	432,433ms ± 31.322

* Significant test T Not Paired = (P = 0.002).

According to the table 9 on the sample consisted of 60 smokers who tebagi be 30 hypertensive patients and 30 non-hypertensive. Obtained 66.7% of hypertensive patients also experience abnormal left atrium.

This is largely attributable due to nicotine, carbon monoxide, and hydrocarbons are the main components of tobacco smoke that increase the arrhythmogenic potential of smoke. Especially nicotine, because simpatomimetiknya effect on cardiac autonomic function and oxidative stress, thus increasing the chances of suffering from systemic hypertension is characterized by increased blood pressure caused by increased peripheral resistance. This leads to increased peripheral resistance after load resulting increase in compensation in the form of left ventricular hypertrophy in order to maintain cardiac output to remain normal. Disruption of left ventricular hypertrophy and left ventricular diastolic function, increased left atrial pressure menyababkan followed by dilation of the left atrium space.So electrocardiographically, it can be seen that there is a change in the shape of the P wave in leads II or V1.[10]

The incidence of left ventricular hypertrophy in smokers by smoking duration in health centers Hanyar Tower can be seen in Table 10. The group had smoked 10-15 years old and 16-20 years of test analysis using the Fischer Exact Test. In the 10-15 year old group smoked, showed a significant ($p < 0.005$). In the group of 16-20 years old smoke, the result that is not related ($p > 0.05$). In the group of 21-25 years old smoke, found 40% had left ventricular hypertrophy.

Hypertension is a risk factor very large for heart and blood vessel disease. Smoking is one of the causes of hypertension and contribute to the development of left ventricular hypertrophy.[11]

In pathological conditions, such as hypertension called insufisuensi aortic pressure load or load volume called, can lead to left ventricular hypertrophy because there is an increase in the volume of cardiac myocytes and increased in size along with changes in the quality of the matrix collagen component.[3]

Cardiomyocytes have ß-adrenergic receptor (ß-AR) and α1-adrenergic (α1-AR).Activation of α1-AR can increase the contractility mediated by the activation of Gq protein. Then, the activation of phospholipase C activates the hydrolysis of phosphatidyl inositol in the membrane, then stir 2 pieces messenger, diacylglycerol and inositol triphosphate. Inositol triphosphate stimulates the release of Ca + 2 from the sarcoplasmic reticulum, where diacylglycerol activates protein kinase C (PKC) and further induces hypertrophy.[3]

In table 11 obtained the average value of the QT interval on smokers Longer hypertension compared to smokers who do not have hypertension. Based on the unpaired t test showed sig. (2-tailed) of 0.002, it can be concluded that the H0 is rejected and Ha accepted therefore concluded that there were significant differences between the QT interval in smokers with hypertension and hypertension. The results show that the QT interval in smokers with hypertension were significantly longer than smokers who were not

hypertensive. In patients with hypertension changes in ion channel Na + (sodium ion), K + (potassium ion) and Ca2 + in the left ventricle, causing prolongation of the duration of the action potential (DPA) and elongation dispersion of repolarization transmural (DRT) of the left ventricle, which would cause a disruption of cardiac relaxation diastolic.[12]

Closing Conclusion

in this study heart defects increased and statistically significant with age and the longer consume cigarettes. There is a significant relationship between hypertension with atrial abnormalities, left ventricular hypertrophy and QT interval in smokers in health centers hanyar banjarmasin sieve with the result p = 0.000001. Suggestion: In patients with hypertension are advised not to smoke and smokers are advised to quit smoking.

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References

1. Kemenkes. Prevalensi Hypertension, Threatening Diseases. Jakarta; Ministry of Health; 2013
2. Banjarmasin city health department. Most diseases 2018.Banjarmasin: Banjarmasin city health office; 2018
3. Yandriani R, Y. Karani pathogenesis of left ventricular hypertrophy. J Kesehat Andalas. 2018; 7: 159-167.
4. MoH RI. smoking behavior of Indonesian society. Jakarta: Ministry of Health; 2015.
5. Irfan affan.Association between serum cotinine levels and electrocardiographic left atrial abnormality. Annals of noninvasive electrocardiologi.2018; 24 (1): 1-6
6. Sanjaya W, Soerinata S. Role of factors hemodynamic and non hemodynamic in the pathogenic mechanisms of left ventricular hypertrophy. World Mirror of Medicine. 2005; 1 (147): 13-5
7. S beautiful kesuma.Relationship between smoking behavior and exercise habits with hypertension in men 18-44 years of age shellac, Observational Study in Puskesmas Big River District of South Banjarbaru. Journal of Public Health Publication Indonesia. 2016; 3 (1): 1-6.
8. Novitaningstyas T. Relationship characteristics (age, sex, level of education) and physical activity and blood pressure in the elderly in urban districts Makamhaji Kartasura sukuharjo subdistrict. (Thesis) .surakarta.universitas Surakarta; 2014
9. Relations N. Old Wisdom Smoking With Hypertension Degrees Rannaloe In the village of the District Bungaya Kab. Gowa. (Thesis) .makasar. uin Alauddin makasar; 2017.
10. Abdul Gani. Criteria for left atrial enlargement in elektrokardiagrafi. (Thesis). Banda Aceh: Department Abidin dr.Zainoel dalam.RSUD disease; 2007.
11. Dwivedi S SS. Interlink between smoking and left ventricular hypertrophy in hypertensive subjects nepali. JIACM. 2005; 5 (1): 93-4.
12. Mozos I, Serban C. The relation between QT interval and T -wave variables in Hypertensive Patients. 2011; 3: 339-45
13. Achmad H, SinggihMF, AndriesS, RamadhanyS, HandayaniH, Sumintarti. Analysis of ascorbic acid in gingival handling of children's mouth cavity. IJPHRD. 2019;10(5)
14. Huldani, Sukmana Bayu I, Rahmiati, Pujiningtyas A, Savitri E, Fauziah, Nihayah U, Achmad H. cellular immunity of river water consumentsand bandarmasih municipal waterworks consuments. IJPHRD.2019;10(7)
15. PutraAminuddin P, Huldani, Sukmana Bayu I, Fauziah, Achmad H.A Dilemma of morality in euthanasia problem.IJPHRD.2019;10(12)
16. Sukmana BayuI. Huldani, Ahmad H, Auliya H,Oktavia C, Hakim Anugrah Q, Salmah Y. The effect of periapical radiography x-ray radiation on Platelets, leukocyte, hemoglobin and mean corpuscular volume (MCV) in mice (Mususculus). IJPHRD.2019;10(11)

Lead Exposure in Community Well Water of Open Dumping Solid Waste Cipayung, Indonesia

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Abstract

Background: Lead is a heavy metal toxic can causes environmental contamination and health problems. It is accumulative and can affect to several body systems. Lead can be sourced from nature and human activities. It is can remain attached to soil particles or sediments in water for a years. The movement of lead from soil particles into groundwater may occur if it is exposed to acid rain. One source of lead exposure is the activity at solid waste treatment (TPA: Tempat Pemrosesan Akhir Sampah), which is to be sourced from waste processing leachates which still use the open dumping system. Leachate can infiltrate into shallow groundwater (well) consumed by nearby residents and potentially pollute the shallow groundwater.

Material and Method: This research aims to calculate the risk (RQ and ECR) of lead exposure in well water consumed by residents living around to Cipayung landfill, uses the EHRA (Environmental Health Risk Assessment) method with a cross-sectional study design. The Respondents was 104 people with a total environmental sample of 49 wells.

Findings: The results of risk quotient (RQ) on 104 respondents is RQ real time ≤ 1, RQ lifespan for 40 years indicates RQ>1 and ECR (Excess Cancer Risk) value for 50 years show smaller than 10^{-4}.

Conclusion: Well water nearby the Cipayung landfill is still safe from lead exposure for the risk of non-carcinogenic health problems. However, in the 40 years later there will be risks if the population continues to consume the well water nearby the Cipayung landfill. While the carcinogenic risk for the 50 years later is still within safe limits.

Keywords: *Lead; Risk Quotient; Cipayung landfill; leachate; open dumping*

Introduction

Landfill (TPA) is the final destination of all waste from all areas. One method of waste management system in TPA is to use an open dumping system. The open dumping system is not a fully comprehensive waste management process. It is causing various kinds of pollution like water, air and soil pollution. Water pollution caused waste generation is mostly organic waste causes the formation of wastewater which can contain various kinds of heavy metals such as Cr (Chromium), Cd (Cadmium), Hg (Mercury), Pb (Lead), Ni (Nickel), As (Arsenic), Ca (Calcium), Mg (Magnesium), Fe (Iron), Mn (Manganese), Na (Natrium), K (Kalium), Zn (Zinc), Al (Aluminum), and other heavy metals(1). Groundwater pollution can affect the quality of the groundwater, primarily if the groundwater is used as a source of drinking water for residents. At high levels of exposure, the lead can damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women,

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can cause miscarriages. Also, it can damage the organs responsible for sperm production; can cause finger, wrist or ankle weakness, anemia, and a slight increase in blood pressure, especially in middle-aged and older people[2].

Lead in the environment can remain attached to soil particles or sediments in water for years. The movement of lead from soil particles into groundwater occurs when rain falls on the soil is acidic. Therefore, lead can enter the human body directly through the ingestion process because it consumes drinking water sourced from groundwater. The increase in population is directly proportional to the amount of waste generated due to human activities. The amount of waste generated in TPA is increasing every day, resulting in an increased concentration of lead in leachate. This certainly causes health problems for residents, especially those exposed to lead through well water that is consumed directly by them. The location of Cipayung landfill in Depok city and accommodates garbage or solid waste from all residents at Depok city. It has been established since 1984 and still operating today in an area of 10.8 Ha. The waste processing method carried out in this landfill is still using an open dumping system, to allow seepage of leachate into the groundwater around the landfill. Therefore, it is necessary to analyze the level of risk (RQ and ECR) of lead exposure in well water consumed by residents living around to Cipayung landfill to know safe or unsafe consumption of lead-exposed well water.

Material and Method

This research using the Environmental Health Risk Assessment (EHRA) method. Risk assessment is the process of estimating the potential impact of a chemical, physical, microbiological or psychosocial hazard on a specified human population or ecological system under a specific set of conditions and for a certain time frame. The scope of EHRA can cover the health impacts of chemical pollutants and contaminants in the air, water, soil, and food; pathogenic microbiological contaminants in food and water; radiation sources; electromagnetic fields (EMFs); climate and climate change. EHRA priority is attached to evaluating the potential human health impacts. The method used in EHRA are inherently conservative and highly protective of public health. This is especially true of screening type risk assessments, which tend to use the most conservative assumptions about exposure and risk[3]. There is 4 step to calculating risk value are identifying hazards from lead exposure, analyzing doses response, calculating lead exposure intake, and calculating the risk value (Risk Quotient/ RQ)[4]

This research was conducted on the residents living around to Cipayung landfill, which is precisely the population at RW 07. The sample was 104 respondents; they are the residents who had settled at that location for at least one year, consumed the groundwater/well water for daily drinking water, adults ≥ 18 years old, not pregnant and have chronic diseases, and willing to become respondents by signing informed consent. There are some data needed to perform risk level calculations, that is the lead concentration (C) data in well water, the lead duration time (Dt) data, the lead frequency of exposure (fE) data, the weight of body (W_b) respondents data, the drinking water rate (R) data and reference dose (Rf D) at the lead ingestion process. The lead concentration data was obtained through measurements made by Laboratorium Kesehatan Daerah DKI Jakarta using the ICP (Inductively Coupled Plasma) method with the APHA 3120B/22/2012 methodological standard. Well water samples were taken from all respondents wells, so that the total number of wells from 104 respondents was 49 wells. The lead duration time data, the lead frequency of exposure data, the weight of body respondents data, the drinking water rate data can be obtained from interviews using questionnaire instruments. All of the data can be used to calculating lead intake with the.

Formula: Lead intake or LADD= $\frac{C \times R \times fE \times Dt}{W_b \times t_{avg}}$

t_{avg} for noncarcinogenic effect is default value 30-year x 365 days/year and for carcinogenic effect is default value 70-year x 365 days/year. After all the data is collected, calculating of lead RQ by dividing the exposure intake of lead with lead Rf D, and calculating of lead ECR by multiply lifetime average daily dose (LADD) or intake for carcinogenic effect with Cancer Slope Factor (CSF) for the lead.

$$\text{RQ for lead} = \frac{\text{Lead Intake}}{\text{Rf D}}$$

$$\text{ECR} = \text{LADD} \times \text{CSF}$$

Rf D and CSF use the values listed in the Integrated Risk Information System (IRIS), which can be accessed on the website www.epa.gov/iris. However, the value of lead Rf D and CSF for ingestion exposure was not found[5], so the lead Rf D can using the calculations

or data from previous research[4]. This research using Rf D from the results of the research by Nukman, 2005 in Pratiwi, 2015[3], which was calculated based on the average anthropometric data of the Indonesian population. Obtained Rf D value of 0.0014 mg/kg/day. The value for lead CSF taken from the Office of Environmental Health Hazard Assessment-California is $8.5x10^{-3}$ mg/kg/day[6]. The RQ calculation value will indicate the conclusion a safe risk or unsafe risk. RQ>1 means that the well water consumed by residents living around to Cipayung landfill is not safe from lead exposure, and if RQ≤1 then the well water is safe from the risk of lead exposure[7]. Estimates of risk can also be calculated for the next few years called lifespan RQ. The ECR calculation value will indicate the amount of risk for carcinogenic effect throughout life[4].

Findings: This research conducted to residents living around to TPA Cipayung, Depok city with characterization which can be seen in Table 1 below.

Table 1: Distribution and Frequency the Characterization of Respondents Living Around to Cipayung Landfill, Depok City, 2019

Variable	Total of Respondents (n)	%
Age (year)		
18-30 year	17	16.3
31-40 year	27	26.0
41-50 year	37	35.6
51-60 year	14	13.5
61-70 year	7	6.7
71-80 year	1	1.0
81-90 year	1	1.0
Gender		
Male	32	30.8
Female	72	69.2
Total	104	100

Source: The results of interviews with a questionnaire which has been processed using computer software

According to table 1, the respondents in this study were at most 41-50 years old, and women. This affects the frequency of exposure because most women in the area are housewives who are in the neighborhood every day. So that more exposure to lead through drinking water compared to other respondents. The first step of the EHRA is to identify hazards by measuring the concentration of lead exposure in well water. The following are the results of the measurement can be seen in Table 2 below. The second step is to do a doses response analysis by determining the value of Rf D and CSF. This value is not yet found in EPA, so the value of Rf D refers to previous research conducted by Nukman (2005) in Pratiwi (2015) that is equal to 0.0014 mg/kg/day. The CSF value refers to the standard used by the Office of Environmental Health Hazard Assessment-California, which is equal to 8.5×10^{-3}. The third step is to do a response dose analysis that is calculating lead exposure intake that enters the respondent's body by previously calculating the rate of drinking water rate (R), frequency of exposure (fE), duration of exposure (Dt) and weight of the respondent (Wb). All of this data can be seen in Table 2 below.

Table 2: Distribution and Frequency of Lead Concentration, Lead Intake, Respondent Consumption Rate, Exposure Time, Exposure Duration, Weight of Body Respondents Living Around to Cipayung Landfill, Depok City, 2019

Variable	Total of Respondents (n)	Mean	SD	Min-max
Lead Concentration (C in mg/L)	104	$6x10^{-3}$	$33x10^{-3}$	$5x10^{-4}$-$1.72x10^{-2}$
Consumed Rate (R in liter/day)	104	2.06	0.77	0.7 – 4.4
Frequency of Exposure (fE in day/year)	104	361.78	7.75	317 – 365
Duration Time (Dt in a year)	104	30.34	15.92	2 – 85
Weight of Body (W_b in kg)	104	59.27	11.26	35-91

Source: The results of the measurement of Laboratorium Kesehatan Daerah DKI and the results of interviews with a questionnaire which has been processed using computer software

The data in the table above are used to calculate the exposure intake of lead in well water consumed by respondents in this study. The fourth step is to perform a risk characterization by calculating the RQ value. The results of calculating the intake and RQ of lead exposure in well water can be seen in Table 3 below.

Table 3: Intake and Value of Risk for Respondents Living Around to Cipayung Landfill, Depok City, 2019

Variable	Total of Respondents (n)	Intake		RQ	
		Mean	Min-max	Mean	Min-max
Rea Time	104	$2x10^{-4}$	$6x10^{-6} – 9.9x10^{-5}$	0.17 (≤1)	$4x10^{-3}$ (≤1) – 0.71(≤1)
Lifespan 30 year	104	$2.24x10^{-5}$	$0 – 1.1x10^{-4}$	0.16 (≤1)	$8.4x10^{-4}$(≤1) – 0.80(≤1)
Lifespan 35 year	104	$2.61x10^{-5}$	$0 – 1.3x10^{-4}$	0.19 (≤1)	$9.8x10^{-4}$(≤1) – 0.94(≤1)
Lifespan 40 year	104	$2.98x10^{-5}$	$0 – 1.5x10^{-4}$	0.21 (≤1)	$1.11 x10^{-2}$ (≤1) – 1.07(>1)
Lifespan 45 year	104	$3.36x10^{-5}$	$0 – 1.7x10^{-4}$	0.24 (≤1)	$1.25 x10^{-2}$ (≤1) – 1.21(>1)
Variable	Total of Respondents (n)	LADD		ECR	
		Mean	Min-max	Mean	Min-max
50 year	104	$1.6x10^{-5}$	$0 – 8x10^{-4}$	$1.36x10^{-7}$	$1x10^{-8} – 6.8x10^{-7}$

Source: The results of data processing using computer software

The RQ value reflects the risk of being safe and unsafe from exposure to the environment. According to the results in table 3, it was found that the average respondent had a safe RQ value, which was located <1. However, the results of the calculation of RQ lifespan 40 years there are already respondents who have the results of unsafe RQ calculation > 1. The results of further observations showed that the respondents were women who had been exposed for 25 years to consume well water that had the highest lead concentration based on the measurement of lead levels in well water. The location of the well is 130 meters from the open dumping TPA Cipayung. The condition around the house that has the well is a field that allows the entry of acid rain and helps absorb lead into the groundwater and pollutes the well water of the population. So that if the respondent is exposed to lead through drinking water for 40 years, then in the next 15 years there is a risk of non-carcinogenic health problems. If children consume the well water, in the next 40 years there is a risk that it will not be safe to consume water exposed to lead and is also at risk of developing health problems that are non-carcinogenic. There was a similar study conducted by Pratiwi, 2015 on populations living in industrial and non-industrial areas in Gresik, East Java, Indonesia obtaining real-time RQ, but with a duration of exposure for 30 years for the age of RQ is > 1[8]. Other studies by Tias, 2017 for people who live in TPA Namo Bintang, North Sumatera, Indonesia, obtaining the maximum real-time RQ is 12.5, it means RQ> 1, so people who live around TPA Namo Bintang risk being unsafe to consume water from wells[9]. The ECR calculation for 50 years the maximum value is smaller than 10^{-4}[4]. It means that in the next 50 years of exposure, residents who consume lead-exposed well water are still safe from the risk of health problems that have carcinogenic effects. There are not many studies that calculate environmental health risks due to exposure to lead in drinking water, so it is hoped that this study can illustrate that although current conditions do not create unsafe risks, the potential for unsafe risks can occur at any time. Especially if the main exposure source is not immediately stopped.

Based on this, risk management is needed to protect residents from unsafe risks when consuming well water containing high lead exposure. One effort is to improve the waste management system in the landfill so that leachate does not pollute shallow water or community well water and look for alternative drinking water sources that are free of heavy metals, especially tin, and for the government to look for other method for better waste management systems other than open dumping or moving landfill to new areas with a better waste management system.

Conclusion

Well water nearby the Cipayung landfill is still safe from lead exposure for the risk of non-carcinogenic health problems. However, in the 40 years later there will be risks if the population continues to consume the well water nearby the Cipayung landfill. While the carcinogenic risk for the 50 years later is still within safe limits.

Conflict of Interest: No conflicting interest

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Ethical Clearance: This research was conducted with a number code of ethics 166/UN2.F10/PPM/00.02/2019

References

1. Nadali Alavi, Akbar Eslami MHS. Measurement and Monitoring of Anions, Cations, and Metals in Landfill Leachate in Iranian Metropolises. Elsevier. 2018; 21:1818–22.
2. ATSDR. Toxicological Profile for Lead. August 200. U.S. Departement of Health and Human Services, editor. Atlanta, Georgia: Public Health Service; 2007. 1–528 p.
3. Environmental Health Risk Management. Environmental Health Risk Assessment - Guidelines for Assessing Human Health Risks from Environmental Hazards [Internet]. Australia: Commonwealth of Australia; 2012. Available from: https://www.health.gov.au/internet/main/publishing.nsf/content/A12B57E41EC9F326CA257BF0001F9E7D/$File/Environmental-health-Risk-Assessment.pdf
4. Rahman A. Buku Rancangan Pengajaran (BRP) untuk Mahasiswa Mata Ajar Analisis Risiko Kesehatan Lingkungan (ARKL). Depok: Fakultas Kesehatan Masyarakat Universitas Indonesia; 2017.
5. U.S. EPA. Integrated Risk Information System: Lead and Compounds (Inorganic); CASRN 7439-92-1 [Internet]. United States Environmental Protection Agency (EPA) - National Center for Environmental Assessment. 2004 [cited 2019 Jun 30]. p. 1–15. Available from: https://cfpub.epa.gov/ncea/iris/iris_documents/documents/subst/0277_summary.pdf
6. Office of Environmental Health Hazard Assessment-California. Appendix A : Hot Spots Unit Risk and Cancer Potency Values [Internet]. Oehha. 2019 [cited 2019 Jun 30]. p. 1–5. Available from: http://www.oehha.ca.gov/air/hot_spots/tsd052909.html
7. Direktur Jendral PP dan PL Kementerian Kesehatan. Pedoman Analisis Risiko Kesehatan Lingkungan (ARKL). Jakarta; 2012.
8. Pratiwi OA. Analisis Pajanan Timbal di Air Minum dan Makanan terhadap Kejadian Hipertensi Penduduk Kawasan Industri dan Non Industri Kabupaten Gresik Jawa Timur. Universitas Indonesia; 2015.
9. Tias DAN. Analisis Risiko Kesehatan Lingkungan Pajanan Kadmium dan Timbal Melalui Air Minum pada Masyarakat di Sekitar Tempat Pembuangan Akhir (TPA) Sampah Namo Bintang Kabupaten Deli Serdang Sumatera Utara Tahun 2017. Universitas Indonesia; 2017.

Does Parent's Gender Shape Adolescent's Behavior? a Study among Indonesian Migrant Worker Families Left Behind

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Abstract

Background: Migration is known of its contribution to overcome poverty. Despite the benefits, migrated parent(s) who leave their children behind, create a new shape of public health problem: adolescent problem behavior, i.e smoking, early sexual activities, unhealthy diet, poor physical activity, violence and criminal.

Purpose: Thisresearch aims to define the relationship of parent's gender and the length of working period of parent overseas, to adolescent behavior.

Method: This observational survey use cross-sectional design, involves 65 repsondents of adolescent in Gumelar sub-district, part of Banyumas District in Central Java, Indonesia. Four villages are choosen to represent the sub-district situation. Data collected is analysed in univariate, bivariate and multivariate.

Results: Multivariate analysis result shows the Odds Ratio (OR) value of the variable parents who work abroad is 16.5. It means that mothers who work abroad will cause teens to have risk behaviors by 16.5 times higher than teens who were left by fathers for working overseas.

Conclusion: Mothers who work abroad increase the potential for adolescents 16.5 times more likely to have risky behavior, compared to if fathers left overseas.

Keywords: *Children left behind, risk-behavior, Indonesian migrant workers*

Introduction

Parents who migrate to other countries to work, despite getting remittances and other benefits, simultaneously also have a negative impact on health, change ties in the family and social environment and increase the burden on the health system[1]. Migration becomes an event that can cause problems for families and children, because the separation of children from parents is the worst consequence of parental migration. Children in migrant worker families are the group most vulnerable to emotional and psychological stress, feelings of neglect, and low self-confidence. These three things have a very strong potential to undermine children's overall development and socialization patterns[2]. The international organization, UNICEF - UNDP, in 2006 specifically conducted a review of the impact of remittances on children and women in migrant households in the countries of origin of migrant workers,

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which shows that parental migration poses a risk to children and impacts on children's rights that cannot be resolved only by remittance[3].

Adolescent is a phase where a person experiences big changes in social interactions and relationships with others. This period is a phase in an individual's life, and not a permanent period, a phase in which the individual is no longer a child, but also has not yet reached adulthood[4]. During adolescence also changes the relationship between children (adolescents) with parents[5]. The child's relationship with the family, especially the child's relationship with the mother, will affect the child's early emotional development[6].

Method

Research Design: This research is a cross sectional study conducted in 4 villages in Gumelar District, Banyumas Regency, Central Java, Indonesia. The study were conducted from May to August 2019. The independent variables were parents who work abroad (father or mother), length period of parents working, and peer influence. The dependent variable is risk behavior in adolescent migrant worker children.

Population and Samples: The population in this study was 96 adolescentsaged 11-18 years who were left behind by one of their parents working abroad. The sample selection is done by inclusion and exclusion criteria. The inclusion criterion is a parent has been working abroad for at least 6 months, the exclusion criterion is that when the research was carried out parent who worked abroad hadbeen returned to Indonesia.

Sample Size: Total sampling technique was used and recruited 65 adolescents who meet the inclusion criteria.

Instruments: This study used a questionnaire of adolescent's risk behavior and factors that influence it. The questionnaire was compiled based on the main references from (1) Indonesian Demographic and Health Survey 2012 on Adolescent Reproductive Health, compiled by the Central Statistics Agency, National Population and Family Planning Agency, Ministry of Health and ICF International, (2) 2017 Youth Risk Behavior Survey compiled by the Center for Disease Control (CDC) Division of Adolescent and School Health, and (3) Global School-based Student Health Survey (GSHS), compiled by WHO and the Center for Disease Control (CDC) in collaboration with UNICEF, UNESCO, and UNAIDS

Data Collection: Structured interview was applied to collect data, done by interviewing respondents using the questionnaire.

Statistical Analysis: Data was analysed in (1) univariate, to describe each variable, (2) bivariate with Chi square test, carried out to select variables to be tested in the multivariate stage, and (3) multivariate, to analyze the variables that had the most influence on risk behavior in adolescent migrant worker children.

Result

Total of 65 respondents in this study were left behind adolescent aged between 11-18 years. The risk factors to their risky behavior analysed were (1) parent working abroad (migrant parent), (2) length of parent's working, and (3) influence of peers. Bivariate analysis was carried outto selsct variables to be included in multivariate analysis.The result of bivariate test isshown in Table 1.

Tabel 1: Risk Factors of Adolescent Risky Behavior

No	Variables	n	%	p - value
1.	Parent working abroad (migrant parent)			0,022*
	Mother	60	92.3	
	Father	5	7.7	
2.	Length of parent's working			0,259
	>3 yrs	45	69.2	
	≤3 yrs	20	30.8	
3.	Influence of peers			0,002*
	Risky	32	49.2	
	Not risky	33	50.8	

The variables included in the multivariate analysis stage were the variables with p value <0.25. The results of the bivariate analysis showed that the variable with a p value <0.25 were the variable of parents working abroad (0.022) and the peer influence (0.002). The variable of length of parent's working abroad had a p value of 0.259 so that was not included in the multivariate analysis. Multivariate analysis used multiple logistic regression prediction models. The result of multivariate analysis is shown in Tabel 2 as follows:

Tabel 2: Final Result of Multivariate Analysis

Variables	B	p-value	OR	95% CI
Parent working abroad (migrant parent)	2,806	0,033	16,5	1,2-215,7
Influence of peers	2,900	0,018	18,1	1,6-199,8

The result of multivariate analysis showed that variables significantly related to adolescent behavior were variables of parents who worked abroad and peers. The analysis results obtained Odds Ratio (OR) from the variable of parents who work abroad is 16.5, meaning that motherswho work abroad,as the risky category, will cause adolescent to be engaged in risky behavior by 16.5 times higher than those who were left by fathers who work abroad. Odds Ratio (OR) value of influence of peer variable is 18.1, meaning that peers who have risk behaviors will cause adolescent behavior to engage risky behavior by 18.1 higher than peers with no risk behaviors. The results of this initial modeling show that the two variables have a p value <0.05 so that the model is accepted as a model of relation between parent working abroad and influenace of peers to adolescents behavior.

Discussion

One of negative effect of parent migration is changing ties in the family[1]. It becomes an event that can cause problems for families and children, because the separation of children from parents is the worst consequence of parental migration. Children left behind (CLB) is the most vulnerable group to emotional and psychological pressure, feelings of neglect, and low self-confidence. These three things have a very strong potential to undermine children's overall development and socialization patterns[2].

UNICEF[7] summarized effects of migration on children left behind. It differs fathers to mothers leaving overseas. When mothers migrate, it will affect children psycho social health, education, risk to be abused, domestic gender division and family break up. While the children left by fathers are more likely to be affected by poverty in female headed household which leads to a households vulnerability.

Adolescent, in particular, is also affected by parental migration. They often experience difficulties in social relationships and put themselves close in small groups with peers who have the same situation. They are also often left together with responsibilities that are not resolved by their parents, regardless the mother or father migrate[2].

This study found that parent working overseas related to adolescent behavior. In particular, adolescent who are left by migrated mothers have higher potential to be engaged to risky behavior. Regarding the family structure, a research showed that family structure influences the experience of sexual intercourse in adolescents[8]. Smoking, alcohol consumption, and sexual behavior were found higher amongadolescent in single parent families[9].

Previous studies on children left behind are in line. It is foundin South Chinathe problems of risk behavior and suicidal ideation in CLB in rural areas[10]. The problem of mental disorders in CLB is also a problem in Sri Lanka[11]. Other studies showed that migrating mothers are risk factors for the mental condition of their children[12, 13]. A study in Italy concerning mothers and children who had been physically separated as mothers worked in other countries, and then reunited, showed that the length of time separated was relevant, because it led to changethe meaning and family life between countries, which also change the role of children in the family[14].

Parents, especially mothers, who work, are a threat to the relationship between parents and children. If the child is entrusted to the caregiver and the child feels happy, then the mother will feel unhappy. Meanwhile, if the child feels unhappy and happy with the caregiver, the child will hate the mother or parents who do not care for him[15].

Other finding of this study is the influence of peers on adolescent risky behavior.Risk behavior is a type of behavior that endangers health and tends to increase in adolescence[5]. Increased involvement in health risk behaviors is a marker of adolescence. Factors that encourage adolescents to take risks on themselves are social and cultural factors, including changes in family, poverty and racism[16].Include in risky behaviors are: tobacco consumption, poor diet, low physical activity,

alcohol consumption, drug abuse, sexual behavior and risky behavior in accidents. These risky behaviors are the biggest causes of adolescent death which generally begin early in adolescence and peak at the end of adolescence and early twenties[17].

Although it against the norm, some risky behaviors are behaviors that adolescents learn from their social environment, supported by their social environment, and can be controlled both individually and by their social environment. These behaviors also have a special function for adolescents in achieving normal development goals: to show the independence of their parents, to be accepted by their peers, reject conventional values in their environment, and perhaps the most important thing is to be a marker of changing to become more mature[18].

Understanding the impact of risky behaviors during adolescence to their future, it needs to highlight that family is always the most important social influence for children, although they have developed relationships with the environment outside the home. Close relationships infamily will have more influence on children than other social influences. Children are also more dependent on parents for safety and happiness. If the child's relationship with parents deteriorates, the consequences will be bad, too. In particular, the relationship between mother and child has a stronger influence. This is because to most mothers the child is very dependent[15].

Study Limitations: This study did not analyse the age of respondents when they were left behind, so that the study cannot explain wether the behavior among respondents is a natural expression due to a lifespan development or caused by migrated parent in particular. It is suggested to next studies to search further of the impact of migrated parent to the behavior of children left behind in every stage of age. This study then expected to recommend community how to respond the needs of children left behind of affection from family, caregiver, or community.

Conclusion

Parent, in particular mothers, who work abroad, and influence of peer increase the potential for adolescents to have risky behavior. When migrating is inevitable, it is importantto maintain the family relationship eventhough there is a distance between parent overseas and the children in home country. Adolescent, especially, needs to be supportted to undergoing their journey of lifespan. So that they can get through the conflicts and achieve the highest standar of weall-being.

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Ethical Clearance: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

References

1. IOM. Health of Families Left Behind [Internet]. 2018. Available from: https://www.iom.int/health-families-left-behind
2. Garza RD La. 10. Migration, development and children left behind: A multidimensional perspective. Soc Econ Policy Work Pap New York UNICEF. 2010
3. Cortes R. CHILDREN AND WOMEN LEFT BEHIND IN LABOUR SENDING COUNTRIES: AN APPRAISAL OF SOCIAL RISKS [Internet]. 2008. Available from: https://www.unicef.org/policyanalysis/files/Children_and_women_left_behind%282%29.pdf
4. WHO. Making Health Services Adolescent Friendly: Developing National Quality Standards for Adolescent Friendly Health Services [Internet]. 2012. Available from: https://apps.who.int/iris/bitstream/handle/10665/75217/9789241503594_eng.pdf;jsessionid=85CAAA7D6647ECD4CB3F2AA49C583BC5?sequence=1
5. Santrock JW. Adolescence: perkembangan remaja. 2nd Editio. Jakarta: Erlangga; 2007.
6. Upton P. Psikologi Perkembangan. Jakarta: Erlangga; 2012.
7. UNICEF. Children and Migration [Internet]. 2016. Available from: https://www.gfmd.org/files/documents/gfmd_brussels07_contribution_unicef_children_and_migration_en.pdf
8. Santelli JS, Lowry R, Brener ND, Robin L. The

association of sexual behaviors with socioeconomic status, family structure, and race/ethnicity among US adolescents. Am J Public Health. 2000;90(10):1582–8.

9. Blum RW, Beuhring T, Shew ML, Bearinger LH, Sieving RE, Resnick MD. The effects of race/ethnicity, income, and family structure on adolescent risk behaviors. Am J Public Health. 2000;90(12):1879–84.
10. Gao Y, Li LP, Kim JH, Congdon N, Lau J, Griffiths S. The impact of parental migration on health status and health behaviours among left behind adolescent school children in China. BMC Public Health. 2010;10.
11. Wickramage K, Siriwardhana C, Vidanapathirana P, Weerawarna S, Jayasekara B, Pannala G, et al. Risk of mental health and nutritional problems for left-behind children of international labor migrants. BMC Psychiatry. 2015;15(1):1–12.
12. Cortes P. The Feminization of International Migration and its Effects on the Children Left Behind: Evidence from the Philippines. World Dev [Internet]. 2015;65:62–78. Available from: http://dx.doi.org/10.1016/j.worlddev.2013.10.021
13. Adhikari R, Jampaklay A, Chamratrithirong A, Richter K, Pattaravanich U, Vapattanawong P. The Impact of Parental Migration on the Mental Health of Children Left Behind. J Immigr Minor Heal. 2014;16(5):781–9.
14. Bonizzoni P. Here or There? Shifting Meanings and Practices in Mother-Child Relationships across Time and Space. Int Migr. 2015;53(6):166–82.
15. Hurlock E. Psikologi Perkembangan Suatu Pendekatan Sepanjang Rentang Kehidupan. Jakarta: Erlangga; 1996.
16. Crosby RA, Santelli JS, DiClemente R. Adolescent at Risk: A Generation in Jeopardy, in Adolescent Health: Understanding and Preventing Risk Behaviors. DiClemente RJ, Santelli JS, Crosby R., editors. San Francisco: Jossey-Bass A Wiley Imprint; 2009.
17. Rivara FP, Park MJ, Irwin Jr C. Trends in Adolescent and Young Adult Morbidity and Mortality in Adolescent Health: Understanding and Preventing Risk Behaviors. DiClemente RJ, Santelli JS, Crosby RA, editors. San Francisco: Jossey-Bass A Wiley Imprint; 2009.
18. Jessor R. The Origins and Development of Problem Behavior Theory: The Collected Works of Richard Jessor. 2016. 215

Kurdish Women's Experiences of Health Care Needs with Breast Cancer: A Qualitative Interview Study From the Kurdistanregion of Iraq

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Abstract

Purpose: Poor accessibility to health services, lack of sufficient health-related information, and problems related to socioeconomic, infrastructural, geographical, and ethnic variations may lead to delayed diagnosis and treatment of breast cancer. Through real experiences of women patients admitted in an oncology department, we aimed to identify and better understand the health care needs that women with breast cancer face during their treatment journey.

Method: The present qualitative study was carried out using inductive content analysis. Data was obtained from 12 women in oncology departments in two different hospitals in the city of Erbil, in the Kurdistan Region of Iraq. In-depth semi-structured interviews were conducted and thematic analysis of the collected data resulted in the extraction of themes and subthemes.

Results: Analyzing the transcripts of the interviews revealed four main themes: Emotional, spiritual, and psychological needs; Physical and body image change needs and Information needs

Conclusions: During their search for health care services, patients with breast cancer in the Kurdistan Region of Iraq are faced with Understanding the phenomenon of 'living with breast cancer' seems to be crucial for nurses to help women with breast cancer to find themselves in confronting the consequences of the changes associated with the illness. That needs to be resolved in order to enable delivering of a higher quality of health care to these patients.

Keywords: *Breast neoplasm; qualitative research; oncology women; Kurdistan; Iraq.*

Introduction

A diagnosis of breast cancer becomes one of the most dreadful events to occur in a women's life, and coping with it can be psychologically exhausting. The word "cancer" alone, can cause much dread. The global statistics in 2012 revealed 14.1 million new cases of cancer annually resulting in 8.2 million deaths. These figures are expected to double by 2032.[1] According to the most recent reports by the World Health Organization, the breast cancer prevalence rate is one per eight women.[2] Since breast cancer is the most common type of cancer in women; it is the second leading cause of cancer deaths among females. In 2006, a total number of 191,400 cases of breast cancer were diagnosed among women in the USA leading to the death of 40,800.[3]

The rapid changes in lifestyle and geopolitics over recent years have resulted in an increase in prevalence of breast cancer in the Kurdistan Region of Iraq; such that

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breast cancer is currently one of the most prevalent types of malignancy among the Iraqi population, resulting in about one-third of the registered cancers in females and almost one quarter of female deaths from cancer. [4, 5] Affecting all age groups, breast cancer had a prevalence rate of 26.6 per 100,000 Iraqi women in 2000, which rose to 31.5 per 100,000 in 2009.[6] Breast cancer is now considered one of the major threats to health among Iraqi women. It is more prevalent among middle-aged women and is characterized by advanced stages and aggressive pathology with a high rate of mortality. [4, 7]

There is very little known about the needs that oncology patients with cancer face while trying to access the health care system in the Kurdistan region of Iraq. A qualitative study was conducted, aiming to identify and better understand the health care needs that women with breast cancer face during their treatment journey.

Method

Study Design: In the present qualitative study Kurdish women's experiences of health care needs about breast cancer were investigated through an inductive content analysis method. [8]

Participants: The sample consisted of 12 oncology women who willingly participated in the study. All interviews were conducted among in-patients, at a participant-chosen time and location within hospital settings, from July 2018 to January 2019. The participants were selected from among women with breast cancer based on the following inclusion criteria: diagnosed above six months; admitted in oncology department in the city of Erbil; having experience of providing health care services; being residents of the Kurdistan Region; and having begun chemotherapy. The study participants comprised 12 Kurdish-speaking women with a median age of 37 years (range 24-50 years). Regarding their educational degree, three were illiterate, five were primary and high school graduates and four were college graduates. Exclusion criteria included women aged less than 18 years, and those who had difficulty with understanding and answering the interview questions for data collection.

Data Collection: In-depth semi-structured interviews were conducted by the principle investigator. All of the interviews were conducted in Kurdish and were carried out in the oncology departments of N. Hospital and R. Hospital located the Erbil, in Iraqi Kurdistan. Data collection continued until data saturation was obtained and no new concepts emerged. Individual answers provided were used to shape subsequent follow questions which were aimed at eliciting more detailed explanations. The subsequent questions included "Could you please give me an example?", "Could you please explain more?", "What do you mean?", "How was it?", and "How did you feel about that?" To give the participants more time to think and give better explanations and remember more details of their experiences, the researcher kept silent from time to time. The duration of each interview was from 33 to 70 minutes. All of the interviews were recorded, and were subsequently transcribed and analyzed.

Data analysis of the Study: Data analysis was carried out using the qualitative content analysis method.[13] Recorded interviews were transcribed verbatim, and then the transcriptions were translated into English by an experienced translator familiar with medical texts and issues. After that, the transcribed interviews were analyzed via inductive content analysis method. To depict all aspects of the content, the codes and themes were produced freely. Afterwards, during the second stage of creating themes, the transcripts were reread several times, which led to merging of similar headings, a decrease in the number of themes, and the production of broader themes. During the last stage, which was abstraction, a hierarchy for the developed themes was formulized. Finally, all themes and their subthemes were labeled with a proper name according to their content, which resulted in the highest possible level of abstraction.[9]

Trustworthiness: The level of soundness or adequacy of studies carried out through qualitative approaches such as content analysis method is called trustworthiness, requiring an accurate description of the data analysis procedure and justification of the reliability of the results. [9, 10] In the present study, trustworthiness was ensured by conducting the interviews at appropriate times and places, winning the participants' trust and establishing good relationships with them, benefiting from the complementary opinions of experts, and reviewing the transcripts. Therefore, two professors were requested to reconsider the transcriptions and the extracted codes.

Ethical Considerations: The present research study was ethically approved by the Ethics Committee of College of Nursing, Hawler Medical University (Project No. 3, approval date: 16th March 2016. Before

selecting the final participants, the researcher provided the potential participants with a thorough explanation of the study objectives, data collection method, and confidentiality of the information they provided, and their right to quit the study whenever they wished to.

Results

Emotional, Spiritual, and Psychological Needs:

Emotional and Spiritual Needs: Breast cancer has profound emotional impacts on patients and their families. Women with this illness have to face a disease fraught with fatalistic meanings, which gives rise to a series of negative emotions (fear, anger, pessimism, anxiety, and suffering), externalized in their state of mind. Oncology women in general experience spiritual loneliness due to the loss of hope, belief, and faith. Often it is difficult for patients to find meaning in their illness.

"I believe that God does not love me, and that is why I got afflicted by the disease in the first place." (Participant 11)

Psychological Needs: Participants did not initially accept having cancer, but gradually had to. Some perceived being anxious about their future, and being irritated and apprehensive about health. Participants thought that it would be difficult for them to live with the disease, and that it was an additional burden for themselves and their families due to treatment expense and care giving burdens.

"There is a feeling of being an outsider, it feels that the illness and near death isolates them from the healthy world." (Participant 5)

"Not knowing how illness will treat me, will there be pain, how death will happen? Many patients like me have also expressed that in the end I am alone with my diagnosis." (Participant 3)

Physical and Body Image Change Needs: Breast cancer treatments with chemotherapy, radiotherapy, and surgery are associated with numerous side effects including pain, fatigue, vomiting, disabilities, edema, and hair fall. These side effects greatly influence patients' general conditions and outlook. Women acknowledged their needs, and continued to hope for life-saving interventions, but their quality of life was negatively affected by the side-effects of their cancer treatment, especially pain, fatigue, lack of energy, muscle weakness, nausea, infections, and lymphedema, which placed limitations on their level of functioning and participation in daily life.

"I am tired of the strength of chemotherapy and complain about the side effects, so I refuse receiving the treatment." (Participant 12)

"With after radiotherapy effects, you can get very tired… it becomes a collected thing, and you suddenly feel dreadful, you feel nauseous." (Participant 2)

Information Needs: Participants discussed how they obtained information about their cancer, how they checked whether their symptoms were normal, and ways to manage side-effects. However, women who did not want to be reminded of the negativity of metastatic disease were sometimes fearful about accessing information about breast cancer because they wished to avoid negative messages.

"I only see the patients when they are referred to the hospital, and since patients need guidance most of the time, there should be some centers in the city to help them outside the hospital." (Participant 7)

Discussion

Throughout the last 16 years and due to complex political affairs in the Middle East, the Kurdistan Region of Iraq has been a hot spot for increased growth and comparatively quick economic advancement. Within the same period of time, the region has been affected by nearby wars and immigration waves from inside and outside Iraq. It is important and interesting to map the oncology care of breast cancer patients in this region.

It was noted that many patients experienced having strong negative spiritual and social needs.

Fear, depression, anxiety, and social roles instabilities are among psychological challenges that women experienced.[11, 13]One of the stressful at the same time genuine worries that these women had even after years of the treatment completion was fear of the future. In addition, the jeopardy of shortened life following on cancer recurrence was another concern.[14, 15]The most repeatedly stated concern in every phase of experiencing breast cancer is fear. Physical symptoms as pain, invasive treatments, the likelihood of cancer reappearance, and the possibility of death are causing patients to experience fear. [12] Fear of recurrence and symptom distress are predictive of the appraisal of cancer as stressful.[16]

Another theme emergent from the reported life experiences was the negative impact of physical complications of cancer treatment such as pain, fatigue, nausea, hair fall, and other disabilities. This finding is in accordance with those reported by Heydarnejad and colleagues who reported the negative and side effects of cancer therapy that had on the patients' quality of life.[17]

Breast cancer experience is a complex experience of affected women; it has an impact on all the life aspects throughout and even after the treatment. Even though each woman experiences breast cancer in a unique way, the common views they share is linked to the functional and physical adverse impacts of cancer treatment. The most well-known concerns of survivors of breast cancer are restriction of upper extremity motion, limitation of activity, fatigue, pain, lymphedema, and "chemotherapy-induced peripheral neuropathy (CIPN)" [18,22]

Other important themes and subthemes acknowledged in our study include patient education/ information/communication needs. Patients and caregivers also identified a lack of education and knowledge about lung cancer diagnosis and treatment as a barrier to their care. Patients and caregivers were not always fully knowledgeable about breast cancer, treatment options, or the duration of treatments. They relied on the health care provider to disclose such information or direct them to credible sources. In many instances, patients were misinformed about the causes of breast cancer. Post-treatment care, for example, exercise, diet, and follow-up are that information that the survivors felt in need for it. Comparable findings were noted in the previous studies. [23] Information about signs and symptoms of recurrence of cancer was a need .[24]

Conclusion

During their search for healthcare services, patients with breast cancer in the Kurdistan Region of Iraq provided insight into their experiences and needs as breast cancer survivors. The participants have undergone traumatic experiences during diagnosis, treatment, and post- treatment phases. The study findings throw light on the fact that the breast cancer survivors have major psychosocial, information, physical and family support needs. Recognizing the experiences and needs of the breast cancer women, their family members, health care workers, community members, and policy makers after the end of treatment is important to facilitate optimal delivery of health care at the community settings to improve the quality of life of breast cancer survivors.

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References

1. World Health Organization. Global cancer facts and figures [Internet]. 3rd ed. Geneva, Switzerland: WHO; 2012 [cited 2018 Jun 9]. Available from: https://www.cancer.org/content/dam/cancer-org/research/cancerfacts-and-statistics/global-cancer-facts-and-figures/global-cancer-facts-and-figures-4thedition.pdf
2. Ferlay J, Soerjomataram I, Dikshit R, Eser S, Mathers C, Rebelo M. et al. Cancer incidence and mortality worldwide: sources, method and major patterns in GLOBOCAN 2012. Int. J. Cancer 2014; 136(5):359-86. Available from: https://doi.org/10.1002/ijc.29210
3. Centers for Disease Control and Prevention [Internet]. Atlanta, GA: CDC. 2010 breast cancer statistics. Available from: https://www.moh.gov.iq/upload/upfile/ar/833.pdf
4. Centers Alwan NA. Breast cancer among Iraqi women: preliminary findings from a regional comparative Breast Cancer Research Project. J Glob Oncol. 2016; 2(5):255-58. Available from: https://doi.org/10.1200%2FJGO.2015.003087
5. Globocan. World cancer statistics [Internet]. Lyon, France: IARC Press; 2018 [cited 2018 Jun 9]. Available from: https://gco.iarc.fr/today/data/factsheets/cancers/20-Breast-fact-sheet.pdf
6. Al-Hashimi MM, Wang XJ. Breast cancer in Iraq, incidence trends from 2000-2009. Asian Pac J Cancer Pre. 2014; 15(1):281-86. Available from: https://europepmc.org/abstract/MED/24528040
7. Alwan N. Breast cancer: demographic characteristics and clinic-pathological presentation of patients in Iraq. East Mediterr Health J. 2010; 16:1073-78. [Internet]. 2010 [cited 2018 June 09]. Available from: https://apps.who.int/iris/handle/10665/118047

8. Lichtman M. Qualitative research in education: a user's guide. 3rd ed. Thousand Oaks, CA: SAGE Publications, 2012.
9. Mayring P. Qualitative content analysis: theoretical foundation, basic procedures and software solution. Social Science Open Access Repository [Internet]. 2014. [cited 2018 Jan 8]. Available from: https://nbn-resolving.org/urn:nbn:de:0168-ssoar-395173
10. Holloway I, Wheeler S. Qualitative research in nursing and healthcare. Oxford, UK: Wiley Blackwell, 2010.
11. Gore M, Russell D. Cancer in primary c Figure 15-8. The cancer pain algorithm (highest-level view) is a decision-tree model for pain treatment. Redrawn with permission from DuPen, A. R., DuPen, S., Hansberry, J., et al. (2000). An educational implementation of a cancer pain algorithm for ambulatory care. Pain Management Nursing, 1(4), and 118. Are [G]. London: Martin Dunitz, 2003.
12. AukstMargetic B, Jakovljevic M, Margetic B, Biscan M, Samija M. Religiosity, depression and pain in patients with breast cancer. Gen Hosp Psychiatry 2005; 27(4):250-5.
13. Lebel S, Rosberger Z, Edgar L, Devins GM. Comparison of four common stressors across the breast cancer trajectory. J Psychosom Res 2007; 63(3):225-32.
14. McPhail G, Wilson S. Women's experience of breast conserving treatment for breast cancer. Eur J Cancer Care (Engl) 2000; 9(3):144-50.
15. McPhail G, Smith LN. Acute menopause symptoms during adjuvant systemic treatment for breast cancer: a case control study. Cancer Nurs 2000; 23(6):430-43.
16. Purnell JQ, Andersen BL, Wilmot JP. Religious practice and spirituality in the psychological adjustment of survivors of breast cancer. Couns Values 2009; 53(3):165.
17. Heydarnejad MS, Hassanpour DA, Solati DK. Factors affecting quality of life in cancer patients undergoing chemotherapy. African Health Sciences 2011; 11(2). Available from: https://www.ajol.info/index.php/ahs/article/view/68456.
18. Tofthagen C. Patient perceptions associated with chemotherapy-induced peripheral neuropathy. Clin J Oncol Nurs. 2010; 14(3):E22-E28.
19. Fu MR, Rosedale M. Breast cancer survivors' experiences of lymphedema-related symptoms. J Pain Symptom Manage. 2009; 38(6):849-859.
20. Rosedale M, Fu MR. Confronting the unexpected: temporal, situational, and attributive dimensions of distressing symptom experience for breast cancer survivors. Oncol Nurs Forum 2010; 37(1):E28-E33.
21. Levangie PK, Santasier AM, Stout NL, Pfalzer L. A qualitative assessment of upper quarter dysfunction reported by physical therapists treated for breast cancer or treating breast cancer squeal. Support Care Cancer 2010; 19(9):1367-1378.22. Sagen A, Karesen R, Sandvik L, Risberg MA. Changes in arm morbidities and health-related quality of life after breast cancer surgery: a five-year follow-up study. Acta Oncol. 2009; 48(8):1111-1118.
23. Cappiello M, Cunningham RS, Knobf MT, Erdos D. Breast cancer survivors' information and support after treatment. Clin Nurs Res. 2007; 16(4):278-293.
24. Kwok C, White K. Perceived information needs and social support of Chinese- Australian breast cancer survivor. Support Care Cancer. 2014; 22(10):2651-2659.

Translation, Cross-Cultural Adaptation, Validity and Reliability of the Malay Version of the Rosenbaum Concussion Knowledge and Attitude Survey-Student Version (Rockas-St-M)

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Abstract

Objective: To translate and culturally adapt the Rosenbaum Concussion Knowledge and Attitude Survey-Student Version (RoCKAS-ST) into Malay and evaluate the reliability of the Malay version of the survey (RoCKAS-ST-M) in high school-age athletes age under 18 year old.

Study Design and Setting: The RoCKAS-ST was forward and backward translated, and culturally adapted into Malay language on 32 high-school athletes (contact and non-contact sports) under age 18 years old and participated at various level of sports competitions. All participants completed the translated RoCKAS-ST-M (Malay) that was administered twice at 14 days interval after first attempt. The internal consistency, face validity and test-retest reliability were calculated using Cronbach's alpha value, discussion and intraclass correlation coefficient (ICC), accordingly for RoCKAS-ST-M.

Results: The RoCKAS-ST-M showconsiderable acceptable moderate internal consistency with CKI and CAI score range between 0.40 and 0.66 of Cronbach's alpha. The reliability of CKI and CAI shows a good reliability value exceed 0.60 of ICC. The RoCKAS-ST-M scale was valid, and reliable among high school athletes that involved in various sports participation.

Conclusion: This study showed that the cross-cultural adaptation of the English version of RoCKAS-ST was successful and this score could be useful to evaluate the level of knowledge and attitude of high school athlete toward sports concussion.

Keywords: *Concussion, concussion knowledge, concussion attitude, high-school athletes, reliability*

Introduction

High school-age athlete that involve in sports especially in contact sports are at greater risk exposed to sports related concussion and more vulnerable to experience second impact syndrome (SIS) that may lead to catastrophic condition if not treated early[1,2]. It estimated that the incidence of sports related concussion among youth is between 1.3 to 3.8 million per year in United State of America and not representing any specific age group[3].To date, the overall estimate of the incidence of sports concussion at young athletes is not available due to several reasons. This include variation of definition use, inability to identify the sign and symptom of this condition, and underreporting behaviour among athletes in high school setting which lead to assumption of the occurrence of sports related concussion may be under estimate in this population[2,3].

Nowadays, more information is available about sports related concussion regarding it aetiology, signs and symptoms, early management and return to sports criteria that has been made available and distributed to the sports personnel, coach and parents[4-6]. There is alsomore action taken by authorities to distribute, create an awareness program and preventive measure regarding sports related concussion management among high-school athletes. However, it is unclear whether the program is effective to increase the knowledge, awareness and to modify the unsafe behaviour about concussion among high school athletes[7-8].

In addition, little has been done to examine the knowledge and attitude toward sports related concussion among high school athletes population[9] particularly in Malaysian context.A systematic review warranted the need of further study to examine the sports related concussion knowledge and safe reporting behaviour among sports administrative team and high school athletes[2].Rosenbaum and it colleagues[7]developed and validated a Rosenbaum Concussion Knowledge and Attitude Survey-Student Version (RoCKAS-ST) which evaluate the Concussion Knowledge Index (CKI) and Concussion Attitude Index (CAI) of the high school athletes. The result of the survey aims to provide information for potential education intervention program specific for this athlete's population. As consequence, a Malay version of (RoCKAS-ST-M) would be very useful for evaluating the concussion knowledge and attitude the high school athletes in the Malay-speaking population. Therefore, the primary aim of this study was to translate, cross-culturally adapt and establish the face validity and reliability of the RoCKAS-ST-M within Malaysian context.

Materials and Method

Study Design: This study was conducted in two stages. At the first stage, the translation and cross-cultural adaptation of the RoCKAS-ST into Malay version was performed according to the five stages proposed in the Guidelines for the Cross-Cultural Adaptation Process[10]. In the second stage, the measurement of RoCKAS-ST-M properties was performed following a purposive sampling model. This study was conducted at selected high school, which consists of 32 high-school athletes (contact and non-contact sports) under 18 year old and participated at various level of sports competition. The sample size was determined following minimal requirement to pre-testing the complete questionnaire that may provide some quality improvement in content validity[10].Each participant was informed about the study procedure and all participants are recruited based on volunteer basis. Informed consent form from each participant was obtained prior the conduction of the study.

Translation and Cross-Cultural Adaptation: The translation and cross-cultural adaptation procedure of RoCKAS-ST followed an international guidelinesthat consist of five stages[10].At the first stage, forward translation of original RoCKAS-ST into Malay language by two independent translators with a command of English. The informed translator (T1) was a physiotherapist and the non-informed translator (T2) was a language teacher. Both translator have a good English command and spoke fluent Malay language as their mother tongue. In the second stage, both the original RoCKAS-ST and Malay version (T1 & T2) were compared and reviewed by both translators with the third independent observer. Any issues or inconsistencies in translation were resolved through consensus in order to establish the first version of RoCKAS-ST-M (T-12). In the third stage, the backward translation of T-12 were establish by two independent translators that were asked separately to translate back the RoCKAS-ST-M (T-12) into English version (BT-1 & BT-2) as a process of validity check in recognizing any inconsistencies of conceptual error in the first version translation of RoCKAS-ST-M. In the fourth stage, a group of discussion were made between the expert in the methodological, physiotherapist and all four translators including language expert. These group experts compared and reviewed all four versions of the survey and establish the new RoCKAS-ST-M for field-testing. In the final stage, the test of pre-final version of the RoCKAS-ST-M survey was performed in n =32 high-school athletes that involved in contact or non-contact sports.The COSMIN checklistwereused for further assessment on the measurement properties of the RoCKAS-ST-M[11].

Participants: Participants of this study are all high school athletes. The eligibility criteria were as follows: (i) age must be under 18 year, (ii) involved in contact or non-contact sports, and (iii) each individual were recruited under volunteer basis. The final version of the RoCKAS-ST-M were administered twice by appoint researcher at 14 days interval after the first attempt. Before collection of the survey, each participant were reminded to complete the survey at their best effort.

Statistical Analysis: Descriptive analyses were presented as mean, standard deviations and percentages. The internal consistency was measured using Cronbach's alpha with value ranging from 0.70 to 0.90 that considered as good to greater indicator. The value exceeding 0.90 was considered as high correlation[12]. The face validity were established through discussion, judgement and agreement between expert group and participant's feedback session. The test-retest reliability of RoCKAS-ST-M were calculated using the intraclass correlation coefficient (ICC) with corresponding of 95% of confidence interval usingtwo-way random effects model in order to determine the intersession repeatability between measurements[12,13]. The value of reliability were rated as poor (r = 0.00 – 0.20), fair (0.21 -0.41), good (0.41 -0.60), very good (0.61 – 0.80) and excellent reliability (0.81-1.0)[14].Feasibility of the RoCKAS-ST-M were estimated using the time to fill up the questionnaire. Statistical significant p value were pre-set at 0.05. Data were analysed using IBM SPSS Statistics 21.0 software.

Results

Cross-Cultural Adaptation And Face Validity: The expert group and five high school athletes that involved in contact and non-contact sports were interviewed in separate group discussion. Feedback from each group discussion reached a similar consensus that the questionnaire was easy to understandand there is no specific cultural adaptation required. Furthermore, based on discussion in expert group, it concluded that the construct of the RoCKAS-ST-M questionnaire were pertinent for the purpose of questionnaire and intended population.

Study Participants: Total of 38 participants were included in this study, but 6 participants provided invalid answers on the RoCKAS-ST-M questionnaire. Therefore, only 32 questionnaires were evaluated in this study. From 32 participants (19 males and 13 females) were aged between 16 and 17 year old. In total, twenty-four participants were involved in contact sports and eightwere from non-contact sports.

Internal Consistency: Analysis of internal consistency for the translated CKI score compromising of 37 items presented with the Cronbach's alpha, $\alpha = 0.40$. Analysis of the internal consistency of the translated CAI score compromising of 18 items considered as having a good reliability with Cronbach's alpha, $\alpha = 0.66$. Most items needed to be preserve, except for item in section 4, question number 2, where the deletion of this item would increase the alpha value to $\alpha = 0.71$. Therefore, the elimination of this item should be considered.

Test-retest Reliability: Mean score of CKI is 16.09 (±2.25) and 14.41(±2.15) for first and second attempt, respectively. The test retest reliability indicated good reliability of CKI score with ICC of 0.64 (95% CI 0.26 – 0.83), $p < 0.05$. Mean score of CAI is 59.4 (±5.21) and 58.4 (±6.02) for first and second occasion, respectively. The result of test-retest reliability revealed a similar result with a good reliability of CAI score presented with ICC of 0.69 (95% CI 0.37 – 0.85), $p < 0.05$.

Discussion

The purpose of this study was to establish the face validity and reliability of the RoCKAS-ST-M within Malaysian context in a sample of high school athlete that involve in contact and non-contact sports. The qualitative analyses of measure of RoCKAS-ST-M resulted in acceptable and good reliability and suggest this questionnaire is a stable and acceptable measure of concussion knowledge and attitude among high school athletes involved in contact and non-contact sports.The mean score of CKI is slightly differ from first measurement and this could reflects the facts that some athletes providing a different responses from first measurement and second measurement. The reason probably the athlete does not know the correct answers to the given questions and start guessing on both measurements[7]. In addition, the analysis of internal consistency using Cronbach's alpha showed a good consistency between both measurements.

Therefore, this study has successfully translated and validates the Malay version of RoCKAS-ST-M. This is an important procedure in order to improve understanding on the question and increase the relevancy of the provided answers. Moreover, the level of English proficiency among Malaysians was still considered low[15]. In fact, this is a global problematic in various fields include higher institutions and industrials especially for non-English native[15-17].Therefore, by translating to own native language, lower misunderstanding and higher accuracy of the answer could be achieved. In addition to that, the relevant answers enhance the quality of intervention framework in future.

The intervention of sports concussion education program requires an accurate assessment of current population knowledge gaps before development of

specific educational strategies[1]. The goals of educational program are two-fold; to improve the individual concussion knowledge and to change the unsafe attitude by encouraging self-reporting behaviour among athletes with self - suspected concussion during training or competition. Athlete that receive a formal education program related to sports concussion were more likely to report concussion-related symptoms[7]. Previous studies also suggested the important of the role of the coach, teammates and parents were encouraging the reporting behaviour[18]. Therefore, the intervention of education program should not focus entirely to high school athlete but also consider including both coach and parents altogether. The sports concussion risk factor were graded as high among athlete with history of previous concussion and increased risk high impact collision in matched play compared to training, with age, gender, playing position and player level are indicated as low risk of sports concussion[19]. The future education program should consider these factors for targeted intervention to the athlete with high risk of sports concussion. According to Consensus statement on Sports Related Concussion that was held in Berlin[4], schools are encouraged to imply the SRC policy which include the education, prevention and management for sports concussion for coach, teachers, staff and parents in providing appropriate supports to athletes recovering from SRC.

Conclusion

The RoCKAS-ST-M was found to be reliable and valid tools to measure concussion knowledge and attitude level among high school athletes in Malaysia setting. Most importantly, it allows the evaluation of knowledge and attitude on sports concussion which essential in examination of the effectiveness of concussion education program, reporting behaviour and sports concussion management. Future researcher will be able to use this questionnaire to assess the athletes understanding on sports concussion on a large scale and identify athlete with high-risk behaviour. It is important for early detection of unsafe attitude toward sports concussion in this young athlete particularly those who involved in contact sports.

Ethical Clearance: This study was approved by the university research committee (Code Project: 2017-0241-107-01) and Educational Planning and Research Division Ministry of Education Malaysia (Ref. No.: KPM.600-3/2/3-eras (130)).

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Declarations of Interest: Nul.

Reference

1. Williams JM, Langdon JL, McMillan JL, Buckley TA. English professional football players concussion knowledge and attitude. Journal of sport and health science. 2016;5(2):197-204.
2. King D, Brughelli M, Hume P, Gissane C. Assessment, management and knowledge of sport-related concussion: systematic review. Sports medicine. 2014;44(4):449-71.
3. Jinguji TM, Krabak BJ, Satchell EK. Epidemiology of youth sports concussion. Physical Medicine and Rehabilitation Clinics. 2011; 22(4):565-75.
4. McCrory P, Meeuwisse W, Dvorak J, Aubry M, Bailes J, Broglio S, et al. Consensus statement on concussion in sport—the 5th international conference on concussion in sport held in Berlin, October 2016. Br J Sports Med. 2017;51(11):838-47.
5. Rivara FP, Schiff MA, Chrisman SP, Chung SK, Ellenbogen RG, Herring SA. The effect of coach education on reporting of concussions among high school athletes after passage of a concussion law. The American journal of sports medicine. 2014;42(5):1197-203.
6. Echlin PS, Johnson AM, Holmes JD, Tichenoff A, Gray S, Gatavackas H, et al. The Sport Concussion Education Project. A brief report on an educational initiative: from concept to curriculum. Journal of neurosurgery. 2014;121(6):1331-6.
7. Rosenbaum AM, Arnett PA. The development of a survey to examine knowledge about and attitudes toward concussion in high-school students. Journal of Clinical and Experimental Neuropsychology. 2010;32(1):44-55.
8. Kroshus E, Daneshvar DH, Baugh CM, Nowinski CJ, Cantu RC. NCAA concussion education in ice hockey: an ineffective mandate. Br J Sports Med. 2014;48(2):135-40.
9. Torres DM, Galetta KM, Phillips HW, Dziemianowicz EMS, Wilson JA, Dorman ES, et al. Sports-related concussion: anonymous survey of a collegiate cohort. Neurology: Clinical Practice.

2013;3(4):279-87.

10. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. Spine. 2000; 25(24):3186-91.
11. Mokkink LB, Terwee CB, Patrick DL, Alonso J, Stratford PW, Knol DL, et al. The COSMIN checklist for assessing the methodological quality of studies on measurement properties of health status measurement instruments: an international Delphi study. Quality of life research. 2010;19(4):539-49.
12. Terwee CB, Bot SD, de Boer MR, van der Windt DA, Knol DL, Dekker J, et al. Quality criteria were proposed for measurement properties of health status questionnaires. Journal of clinical epidemiology. 2007;60(1):34-42.
13. Fairus FZ, Joseph LH, Omar B, Ahmad J, Sulaiman R. Intra-rater reliability and minimal detectable change of vertical ground reaction force measurement during gait and half-squat tasks on healthy male adults. The Malaysian journal of medical sciences: MJMS. 2016; 23(2):21.
14. Harput G, Tok D, Ulusoy B, Eraslan L, Yildiz TI, Turgut E, et al. Translation and cross-cultural adaptation of the anterior cruciate ligament-return to sport after injury (ACL-RSI) scale into Turkish. Knee Surgery, Sports Traumatology, Arthroscopy. 2017; 25(1):159-64.
15. Arifin A, Abuisaac S, editors. Barriers of Cross-Cultural Communication among Foreign Managers and Staff in Interacting with Malaysian Counterparts. International Conference on Culture and Language in Southeast Asia (ICCLAS 2017); 2017: Atlantis Press.
16. Karliner LS, Auerbach A, Nápoles A, Schillinger D, Nickleach D, Pérez-Stable EJ. Language barriers and understanding of hospital discharge instructions. Medical care. 2012;50(4):283.
17. Abrahams S, Mc Fie S, Patricios J, Posthumus M, September AV. Risk factors for sports concussion: an evidence-based systematic review. Br J Sports Med. 2014;48(2):91-7.
18. O'Connell E, Molloy M. Concussion in rugby: knowledge and attitudes of players. Irish Journal of Medical Science (1971-). 2016;185(2):521-8.
19. Taylor ME, Sanner JE. The relationship between concussion knowledge and the high school athlete's intention to report traumatic brain injury symptoms: a systematic review of the literature. The Journal of School Nursing. 2017;33(1):73-81.

Changes in Blood Serum Levels of IGFI in Type 2 Diabetes and Alzheimer's Disease in Saudi Population: An Observational Study

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Abstract

Context: The prevalence of Alzheimer's disease (AD) in the Middle East including Saudi Arabia is increasing rapidly, heightening the importance of finding effective preventive therapies and identifying the possibility risk factors such as Type 2 Diabetes (T2DM). Over the lastfew years is has been suggested that T2DM and AD are linked. Many researchers suggested insulin growth factor (IGF1) and insulin signaling could be the relation between the two pathologies. To gain insights onthis relation, an observational study was initiated. We recruited and interviewed 300 research participants (age ≥ 65 years): 100 controls, 100 T2DM and 100 AD. We assessed the association between glycated hemoglobin (HbA1c) and MiniMental State Examination(MMSE) with IGF1 for all groups. No Significant differences between groups were observed for age and body mass index (BMI) ($p < 0.0001$).AD patients have significant decrease in MMSE among other groups.T2DM group had the highest level of HbA1c% (7.83) among other groups. The highest level of IGF1 were found in control group. MMSE score was negatively related with HbA1c% while positively correlated with IGF1. Negative relation was found between HbA1c score and IGF1. These results suggest that blood serum levels of IGF1 decreased in patients with T2DM and AD and this may be the shared cellular and molecular connections between T2DM and AD in Saudi population. AD was associated with poor glycemic control, blood serum levels of IGF1. Further investigation into this area may unravel important clues to the nature of this diseases to improve public health worldwide.

Keywords: *Type 2 diabetes, Alzheimer's disease, IGF1,insulin, Saudi Arabia.*

Introduction

Dementia, including AD, is one of the most global public health problems especially in Middle East. The World Health Organization dementia report expect 125% increase in patients by 2050 in the Middle East and North Africa (Abyad 2015[1]). According to Basheikh 2014[2] the estimated number of patients with AD in Saudi Arabia is more than 50 thousand and most of them are women. AD is a gradual neurodegenerative disease identified by the progressive decline of memory, cognitive functions and changes in behavior and personality (Kandimalla *et al.* 2017[3]).

Substantial epidemiological evidence and studies such as Talbot *et al* 2012[4] and Bomfim *et al* 2012[5] suggest that T2DM are strongly correlated with AD and insulin resistance and IGF1 signaling could be the association between them. Insulin works as a growth factor in the brain (Holscher 2011[6]). IGF1 is mainly secreted by the liver but could synthesized in the brain(Bassil *et al.* 2014[7]). Insulin and IGF improve neuronal growth, survival, differentiation, migration, metabolism, gene expression, protein synthesis, cytoskeletal assembly, synapse formation, plasticity and myelin production (De la Monte 2009[8]).

The realization that AD is associated with both insulin/IGF1 deficiency and insulin/IGF1 signaling which led us to the conclusion that AD represents a brain-specific or brain-restricted form of diabetes mellitus (De la Monte 2009[8]). Numerous studies in targeting insulin/IGF1 signaling has showed that they are actually anti-diabeticsand administration of insulin and IGF1 agonists

reverses signaling abnormalities and has positive effects on replacement markers of neurodegeneration and behavioral outcomes (Craft *et al.* 2011[9]).

Objectives:

1. To investigate the relation between MMSE and HbA1c in normal, T2DM and AD elderly people in Saudi population.
2. To determine the serum levels of IGF1 in elderly patients and examine its associations with MMSE and HbA1c in T2DM and AD in Saudi population.

Material and Method

Selection of Participants: An observational population study was conducted among selected 300 elders (168 women) who attended outpatient clinics at King Abdulaziz Hospital and Mental health hospital in Jeddah, Kingdom of Saudi Arabia. The targeted sample was all patients aged ≥ 65 without cognitive or perceptual disabilities during the period from July 5, 2018 and January 27, 2019.The sample was divided into 3 groups: the control group comprised of (100) healthy individuals (75% females) were selected from the staff of the hospitals and attendances. They had no history of T2DM or AD. The T2DM group comprised of (100) patients suffering from T2DM (50% females). The T2DM patients were diagnosed on the basis of World Health Organization criteria (with a target HbA1c of ≥ 7%). The AD group comprised of (100) patients suffering from AD (67% females). Diagnosis of probable AD was according to standard clinical procedures and followed the National Institute of Neurological and Communicative Disorders and Strokeand the Alzheimer's Disease and Related Disorders Association criteria. Cognitive performance and alterations were evaluated according to Arabic version of MMSE.

All subjects included in the study were Saudi Nationality and none of them was taking any medication or had any sign of metabolic disease other than obesity.

Anthropometric Measurements: Demographic data, including age, sex and duration of diabetes were recorded. Weight was measured using a digital scale (803, Seca Clara, Germany) in light clothing without shoes with an accuracy of 100 g. Height was measured without shoes using a stadiometer (206, Seca, Germany) with an accuracy of 0.1 cm. All subjects were evaluated by BMI; weight in kilograms divided by the square of height in meters.

Mini-mental State Examination: Participants were screened using the Arabic version of Folstein MMSE, which is a brief 30-point questionnaire test that is used to screen for cognitive impairment. The total score of the exam ranges from 0–30 points. Subjects showing scores of 25-30 out of 30 are considered normal (no cognitive impairment); 21-24 as mild cognitive impairment; 10-20 as moderate cognitive impairment and <10 as severe impairment.

Biochemical Measurements: About 5 ml of the blood was drawn from a forearm vein of subjects between 10 AM and 2 PM after 10–12 h overnight fasting for all groups. The blood samples were allowed to clot for 10 minutes at room temperature, and then centrifuged at (at 2000*g* at a temperature of 4 °C for 20 minutes). The separated serum was drawn, divided into aliquots and stored in a deep freezing (-40°C) until time of use. All biochemical measurements were performed in the biochemistry lab at King Abdulaziz University Hospital, Jeddah, Kingdom of Saudi Arabia.

HbA1c% were taken from the subjects hospital files'. Spectrophotometric assays were performed in duplicate using a Lambda EZ 210 spectrometer (Perkin-Elmer, Foster City, CA, USA). IGF1 (ng/ml) were determined by quantitative human immunoassay ELISA kit (Cat # ELH-IGF1, RayBio, Norcross, Ga, USA). Detection limit of the assay was 0.1 ng/ml for IGF1. The percentage coefficients of variation ranged from 12% (inter-assay) and 10% (intra-assay).

Ethical Considerations: Our study protocol was approved by Researches unit in Directorate of Health Affairs in Jeddah (document number 00914/A00580). The researchers were worked on this study had a certificate from The National Institutes of Health, Office of Extramural Research certifies (document number 2664385).

Statistical Analysis: A *Statistical Package for the Social Sciences*Software (SPSS) for Windows (version 13.0, SPSS Inc., Chicago, IL, USA) was used for statistical analysis of data.z-Test: two-Sample for means was used for comparing the means of quantitative variables in two groups. Data are expressed as means ± standard deviation.The strength of association between pairs of variables was assessed using Pearson's correlation coefficient. The level of $P \leq 0.01$ was considered significant and highly" significant at$P \leq$ 0.005.

Results

Anthropocentric and Biochemical Results: The mean age was (73 ± 6.9). The female percentage was 64% and the mean of T2DM duration was 14±8.48 in T2DM group. There were no significant differences in age and BMI among the 3 studied groups (Table 1).

HbA1c% levels were significantly higher in T2DM than in control and AD groups. MMSE levels were significantly lower in AD comparing with control and T2DM groups($p < 0.001$). IGF1 levels were significantly higher in control group comparing with T2DM and AD groups ($p < 0.001$).

Table 1: Anthropometric and Biochemical Variables of the 3 Studied Groups.

Parameter	Control Group	T2DM Group	AD Group	P-Value (P< 0.001)
No.	100	100	100	-
Female [n (%)]	75	50	67	-
Age (yr)	72 ± 8.49	72 ± 4.52	75 ± 7.79	-
BMI (kg/m2)	27.6 ± 6.07	27.67 ± 2.65	27.9 ± 3.28	-
Diabetes Duration (yr)	-	14 ± 8.48	-	-
HbA1c %	5.57 ± 0.79	7.83 ± 1.27	5.86 ± 0.74	a, c
MMSE	29 ± 0.8	26 ± 1.93	14 ± 4.63	b, c
IGF1 (ng/ml)	177.7 ± 26.14	127.8 ± 26.75	44.4 ± 14.20	a,b,c

Abbreviations; BMI: body mass index, MMSE: Mini-Mental State Examination, HbA1c (%): glycosylated hemoglobin, IGF1; Insulin Like Growth Factor 1, z-Test: Two-Sample for Mean, Numbers represent Mean± Standard deviation, P value "highly" significant at < 0.001, a – comparing: control group– T2DM group, b – comparing: control group – AD group, c – comparing: T2DM group – AD group

The Correlations of HbA1c with MMSE and IGF1: There was a significant negative correlation between HbA1c and MMSE level in 3 studied groups. A significant inverse relation between HbA1c and IGF1 was in AD group and T2DM groups while no correlation in control group(Table 2).

Table 2: The Correlations of HbA1c with MMSE and IGF1 in 3 studied groups

Parameter	Control group	T2DM group	AD group
MMSE	-0.461*	-0.343*	-0.711**
HbA1c	1	1	1
IGF1	-0.191	-0.355*	-0.529*

**P* significant at 0.01, ** *P* is highly significant at 0.005

The Correlations of MMSE with HbA1c and IGF1: IGF1 score was found to be significant positive correlated with MMSE in AD and T2DM groups and no such correlation in control group (Table 3).

Table 3: The Correlations of MMSE with HbA1c and IGF1 in 3 studied groups

Parameter	Control group	T2D group	AD group
MMSE	1	1	1
HbA1c	-0.461*	-0.343*	-0.711**
IGF1	0.098	0.365*	0.517*

**P* significant at 0.01, ** *P* is highly significant at 0.005

Discussion

HbA1c% levels were significantly higher in T2DM than in control and AD groups. No significant difference in HbA1c% levels between control group and AD group. These results are in agreement with the previously studies by Harten *et al.* 2007[10], Ragy and Kamal 2017[11] and Noreen *et al.* 2018[12] and in contrast of Razay *et al.* 2007[13]. This differences in results between studies due to life style or diet habits that effect on HbA1c% levels in blood.

Our findings was suggested that MMSE levels were significantly lower in AD comparing with control and T2DM groups. No significant difference in MMSE levels between control group and T2DM group. These results are same as studies by Ragy and Kamal 2017[11], Razay *et al.* 2007[13]and Hazari *et al.* 2010[14].

HbA1c%were negatively correlated with MMSE level in 3 studied groups. These findings are supported by the findings of Munshi *et al.* 2006[14] and Harten *et al.*2007[10]studies and opposite of Huang *et al.* 2016[15]. Differences in results because of advanced age, education level and duration of T2DM.

It is well recognized that T2DM can influence the circulating levels and activity of IGF1. Our study results similar to findings of Watanabe *et al.* 2005[16], Suda *et al.* 2016[17] and Álvarez *et al.* 2007[18]that found adecrease in IGF1 levels in serum of AD patients. Mutation of IGF1 and its receptor gene could be the reason for decreasing IGF1 level in AD group of our study.On other hand, Clauson *et al.*1998[19] and Hertze *et al.* 2014[20] found that mean IGF1 levels did not differ. However, in the same study IGF1 was inversely correlated with HbA1c% in T2DM group. These differences could be due to variability in insulin levels because of different treatments and/or because of variability in insulin sensitivity encountered in T2DM patients. IGF1 score was found to be significant positive correlated with MMSE in AD and T2DM groups and no such correlation in control group. Our data are consistent with many studies such as Al-Delaimy *et al.* 2009[21], Westwood *et al.* 2014[22]and Kimoto *et al.* 2016[23]. In contrast of our findings, Vardy *et al.* 2007[24]study were found no correlation between MMSE and IGF1 in the AD group.

Conclusion

The demographic changes and social and economic developments in Saudi Arabia have to create new realities in an unprecedented growth of the elderly population. So more elderly population that means more AD and T2DM patients. As this study is the first to investigate the relationship between IGF1 in T2DM and ADin Saudi population. In conclusion for our study, blood serum levels of IGF1 decreased in patients with T2DM and AD and this may be the shared cellular and molecular connections between T2DM and AD in Saudi population. AD was associated with poor glycemic control, blood serum levels of IGF1. Further investigation into this area may unravel important clues to the nature of this diseases.

Limitations of the Study: Small sample size, small number of subgroup subjects. Our subjects were Saudi elderly so these results may not be generalized to other populations of different nationalities or ages.

Strength of the Study: This is first one which investigated the relationship between IGF1 and AD and T2DMin a developing country especially Saudi Arabia.

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Conflict of Interest: Nil

References

1. Abyad A.Alzheimer's in the Middle East. J Alzheimers Dis Parkinsonism. 2015 January; 6(3):241-2.
2. Mohammed A. Basheikh (2014): 2nd International Alzheimer's Disease Conference.
3. Kandimalla R, Thirumala V, Reddy PH. Is Alzheimer's disease a type 3 diabetes?. a critical appraisal, Biochimica et Biophysica Acta, 2017 May;1863(5):1078-1089.
4. Talbot K, Wang HY, Kazi H, Han LY, Bakshi KP, Stucky A, Fuino RL, Kawaguchi KR, Samoyedny AJ, Wilson RS, Arvanitakis Z, Schneider JA, Wolf BA, Bennett DA, Trojanowski JQ, Arnold SE. Demonstrated brain insulin resistance in Alzheimer's disease patients is associated with IGF-1 resistance, IRS-1 dysregulation, and cognitive decline. J Clin Invest.2012 Apr;122(4):1316-38.
5. Bomfim TR, Forny-Germano L, Sathler LB, Brito-Moreira J, Houzel JC, Decker H, Silverman MA, Kazi H, Melo HM, McClean PL, Holscher C, Arnold SE, Talbot K, Klein WL, Munoz DP, Ferreira ST, De Felice FG. An anti-diabetes agent protects the mouse brain from defective insulin signaling caused by Alzheimer's disease-associated Aβ oligomers. J Clin Invest. 2012 Apr;122(4):1339-53.
6. Holscher C. Diabetes as a risk factor for Alzheimer's disease: insulin signalling impairment in the brain as an alternative model of Alzheimer's disease. Biochem Soc Trans. 2011 Aug;39(4):891-7.

7. Bassil F, Fernagut PO, Bezard E, Meissner WG. Insulin, IGF-1 and GLP-1 signaling in neurodegenerative disorders: targets for disease modification?. Prog Neurobiol. 2014 Jul;118:1-18.
8. De la Monte SM. insulin resistance and Alzheimer's disease. BMB Reort. 2009 Aug 31;42(8):475-81.
9. Craft S, Baker LD, Montine TJ, Minoshima, Watson GS, Claxton A, Arbuckle M, Callaghan M, Tsai E, Plymate SR, Green PS, Leverenz J, Cross D, Gerton B. Intranasal insulin therapy for Alzheimer disease and amnestic mild cognitive impairment: a pilot critical trail. Arch Neurol.2012 Jan;69(1):29-38.
10. van Harten B, Oosterman J, Muslimovic D, Van loon BJ, Scheltens P, Weinstein HC. Cognitive impairment and MRI correlates in the elderly patients with type 2 diabetes mellitus. Age Ageing. 2007 Mar;36(2):164-70.
11. Ragy MM, Kamal NN. Linking senile dementia to type 2 diabetes: role of oxidative stress markers, C-reactive protein and tumor necrosis factor-α. Neurol Res. 2017 Jul;39(7):587-595.
12. Noreen Z, DeJesus J, Bhatti A, Loffredo CA, John P, Khan, Gail JS, Nunlee-Bland G, Ghosh S. Epidemiological investigation of type 2 diabetes and Alzheimer's disease in a Pakistani population, Int J Environ Res Public Health.2018 Jul 26;15(8).
13. Razay G, Vreugdenhil A, Wilcock G. The metabolic syndrome and Alzheimer disease.Arch Neurol.2005 Oct;53(10):1748-53.
14. Hazari MA, Reddy BR, Uzma N, Kumar BS. Cognitive impairment in type 2 diabetes mellitus. Int. J of diabetes. 2015May;3(1):19-24.
15. Huang L, Yang L, Shen X, Yan S. Relationship between glycated hemoglobin A1c and cognitive function in nondemented elderly patients with type 2 diabetes. Metab Brain Dis. 2016 Apr;31(2):347-53.
16. Watanabe T, Miyazaki A, Katagiri T, Yamamoto H, Idei T,Iguchi T. Relationship between serum in sulinlike growth factor 1 levels and Alzheimer's disease and vascular dementia. J Am Geriatr Soc. 2005 Oct;53(10):1748-53.
17. Suda K, Matsumoto R, Fukuoka H, Iguchi G, Hirota Y, Nishizawa H, Bando H, Yoshida K, Odake Y, Takahashi M, Sakaguchi K, Ogawa W, Takahashi Y. The influence of type 2 diabetes on serum GH and IGF-I levels in hospitalized Japanese patients. Growth Horm IGF Res. 2016 Aug; 29:4-10.
18. Alvarez A, Cacabelos R, Sanpedro C, García-Fantini M, Aleixandre M. Serum TNF-alpha levels are increased and correlate negatively with free IGF-I in Alzheimer disease. Neurobiol Aging.2007 Apr; 28(4):533-6.
19. Clauson P G, Brismar K, Hall K, Linnarsson R, Grill V. Insulin-like growth factor-I and insulin-like growth factor binding protein-1 in a pepresentative population of type 2 diabetic patients in Sweden. Scand J Clin Lab Invest. 1998 Jul;58(4):353-60.
20. Hertze J, Nägga K, Minthon L, Hansson O. Changes in cerebrospinal fluid and blood plasma levels of IGF-II and its binding proteins in Alzheimer's disease: an observational study. BMC Neurol.2014 Apr 1;14:64.
21. Al-Delaimy WK, Muhlen DV, Barrett-Connor E. IGF-1 and IGFBP-1 and cognitive function in older men and women. J Am Geriatr Soc.2009 Aug; 57(8): 1441–1446.
22. Westwood AJ, Beiser A, DeCarli C, Harris TB, Chen TC, He XM, Roubenoff R, Pikula A, Au R, Braverman LE, Wolf PA, Vasan RS, Seshadri S. Insulin-like growth factor-1 and risk of Alzheimer dementia and brain atrophy.Neurology. 2014 May 6;82(18):1613-9.
23. Kimoto A, Kasanuki K, Kumagai R, Shibata N, Ichimiya Y, Arai H. Serum insulin-like growth factor-I and amyloid beta protein in Alzheimer's disease: relationship with cognitive function. Psychogeriatrics. 2016 Jul;16(4):247-54
24. Vardy ER, Rice PJ, Bowie PC, JD, GrantPJ, Hooper NM. increased circulating insulin-like growth factor-1 in late-onset Alzheimer's disease. J Alzheimers Dis. 2007 Dec;12(4):285-90.

Effect of Acupressure Pain and Fatigue among Patients with Multiple Sclerosis

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Abstract

Context: Pain and fatigue are common symptoms that correlated with multiple sclerosis patents, which disrupts physical, cognitive, emotional, and social functioning. Aim: evaluate the effect of acupressure on pain and fatigue among patients with multiple sclerosis. Design**:** Non-equivalent interrupted quasi-experimental. Sample: 60 adult male and female patients were randomly selected and divided equally into study and controls groups study was conducted at Multiple Sclerosis Research Unit affiliated with one of the biggest teaching hospital in Cairo, Egypt. Tools: Semi-Structured Interview Questionnaire, Pain Quality Assessment Scale, and Fatigue Severity Scale. Results: There was statistical significant decrease of pain and fatigue mean scores among the study group who received acupressure when compared to control group who received routine hospital care. Conclusion: Applying acupressure could be effective in reducing severity of pain and fatigue among patients with multiple sclerosis. Therefore it is recommended to endorse acupressure as a nursing practice for patients with multiple sclerosis in the early course of the disease.

Keywords: *Multiple sclerosis**,** Acupressure, pain and fatigue*

Introduction

Multiple sclerosis (MS) is a neuroinflammatory and neurodegenerative demye linating disease of the central nervous system defined by a wide range of symptoms and signs that disrupt physical, cognitive, emotional, and social functioning[1]. Multiple sclerosis resulting from a complex interaction between genetic, lifestyle and environmental risk factors[2] · Approximately 2.5 million individuals are affected worldwide;females aged between 20- 40 years are mainly affected[3]. The prevalence of MS in Egypt was found to be 14.1/100,000[4].

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Multiple sclerosis patients suffer from various symptoms; among these symptoms pain and fatigue are the most significant symptoms[5]. Pain represents one of the most disabling symptoms of MS, in that it adversely affects most aspects of health-relatedQOL and not affecting only patients' lives but also their families, health care providers, and health care systems[6]. The overall prevalence of pain syndromes in MS patients is 63%with a higher risk associated with older age, longer disease duration, and greater disease severity[7].

Fatigue is one of the most disabling MS symptoms, significantly impacting on patients' daily life activities and quality of life and affecting up to 80% of MS patients. The main characteristic of MS-related fatigue is enhanced perception of effort and limited endurance of sustained physical and mental activities and is described by patients as their worst symptom[8].

The currently approved treatments for MS are pharmacological as disease-modifying agents and

non-pharmacological as acupuncture, aromatherapy, reflexology, guided imagery, yoga and acupressurehas become more popular. The use of these method not only reduces the overall side effects of drugs due to less consumption, but also prevents the conversion of acute pain to chronic pain[9].

Acupressure therapy works on the principle of stimulating specific reflex points located along the lines of energy which run through the body, called meridians. There are 14 meridian lines, each of which corresponds to an individual organ of the body. When the vital energies are able to flow through the meridians in a balanced and even way, the result is good health. When you experience pain or illness, it is an indication that there is a block or leak in the bio magnetic energy or vital life force Energy or Chi energy flow within the body[10].

Acupressure is a type of touch therapy by using fingers, palms, elbows, or special bands to apply pressure to exact points on the body that provides the energy circulation and balance in the body, applying pressure to these points creates a slightly painful muscle spasm. Acupressure therapy aims to maintain homeostasis by increasing the blood and oxygen flow in the affected body area, resulting in relief and suppression of various symptoms by reducing pain[11].

Significance of the Study: Most of MS patients experienced pain and fatigue, which could affect their ability to perform activities of daily living. Patients are turning to complementary therapy due to dissatisfaction with conventional treatments[12] there is growing interest regarding using acupressure for such patients as it is safe, suitable for almost all people, no side effects, noninvasive treatment, reduce dependence on medications and self-administered.It is hoped that the findings of this study might provide health care providers and decision makers with evidence based data to be utilized in planning and providing treatment regimens for MS patients. As well, such data might have an impact on the provided care in a cost effective way and decrease the load upon personal and hospital resources.

Method

Aim of the Study: The aim of this study was to evaluate the effect of acupressure on pain and fatigue among patients with MS.

Research Hypotheses:

H1: The pain mean scores of patients with MS who subjected to acupressure will be significantly less than the pain mean scores of a control group who received routine hospital care.

H2: The fatigue mean scores of patients with MS who subjected to acupressure will be significantly less than the fatigue mean scores of a control group who received routine hospital care.

Research Design: Non-equivalent interrupted quasi-experimental (pre–post) control design was utilized in the current study.

Setting: This study was conducted at Multiple Sclerosis Research Unit affiliated with one of the biggest teaching hospitalin Cairo, Egypt.

Sample: A convenient sample of 60 adult male and female patients over a period of six months consistuded the study sample who were diagnosed as having RRMS, able to read and write, hadno psychiatric disorder and had no history of addiction were recreated equallyrandomly divided into study and control groups.

Tools for Data Collection:

(a). Demographic and medical related data sheet: demographic data covering questions related to age, gender, level of education, occupation, marital status ……...etc. Medical related data which includes questions related to duration of illness, duration of hospitalization……...etc.

(b). Pain Quality Assessment Scale (PQAS)developed by[13]**:**used to assess quality of pain. The PQAS asks respondents to rate the severity of each of 20 pain descriptors by using 0 to 10 numeric rating scales, in which "0" means no pain while "10" is the worsening pain sensation imaginable. The reliability test of the scale is (Cronbach's $\alpha = 0.859$).

(c). Fatigue Severity Scale (FSS)developed by[14]**:**used to assessseverity of fatigue; FSS is containing 9 statements with sub score ranged from (1) indicates strongly disagree to (7) indicates strongly agreement. Internal consistency of the FSS is excellent (Cronbach's $\alpha = 0.89$).

Procedure: The study was conducted through four phases.

Preparatory Phase: Once official permission was granted, the subjects who met the inclusion criteria

were interviewed individually to explain the nature and purpose of the study, then written consent were obtained from them; every patient was asked to fill out the demographic and medical related data sheet, PQAS and FSS to assess pain and fatigue, then subjects were assigned to either control or study groups randomly as 1st patient included in the control group and the 2nd patient included in the study group and so on.

Implementation Phase: The researchers applied acupressure technique for the study group through three sessions/week for two weeks.Each patient was provided with a brochure that includes the sites of acupoints and step by step instruction on how to perform the acupressure technique and also contact with them by what's app.

Acupressure Technique:

1. Acupressure was applied by pressing in circular movements on the acupoint with the thumb finger first in clock wise and then anti-clock wise direction. The finger must remain at the same point on the skin and be moved in small circles.
2. The patient was asked to perform breathing exercise during acupressure session
3. The duration of each session ranged between 30–45 min \ sessions, massage for each acupressure points it takes 3-5 min.
4. Nine acupoints were used in the current study which were: He Gu (LI 4), Shen Men (HT 7), Nei Guan (PC6), Quze (PC3), Jian Jing (GB21), Feng Chi (GB20),Zusanli (St 36), Bigger Rushing (LV3) and Governor vessel (GV24.5).

Evaluation Phase: The researchers assessed pain using PQAS and fatigue using FSS for all patients either in study or control group by the end of the 1stand 2ndweeks of conducting the intervention.

Statistical Analysis: The collected data were scored, tabulated and analyzed by personal computer using statistical package for the social science (SPSS) program version 20. Level of significance was adopted at $p \leq 0.05$.

Results

Regarding age, 43.3%, 36.7% had age ranged between 18 to less than 30 years in the control and study groups respectively. In relation to gender, 80% and 83.3% respectively of both control and study group were females, regarding to marital status, 53.3% were married in both groups. In relation to educational level, 46.7%, 36.7% had secondary education in both control and study groups respectively. With reference to occupation, 76.6% and 80% were house wife in both control and study groups respectively. There were no statistically significant differences between the two groups regarding demographic variables.

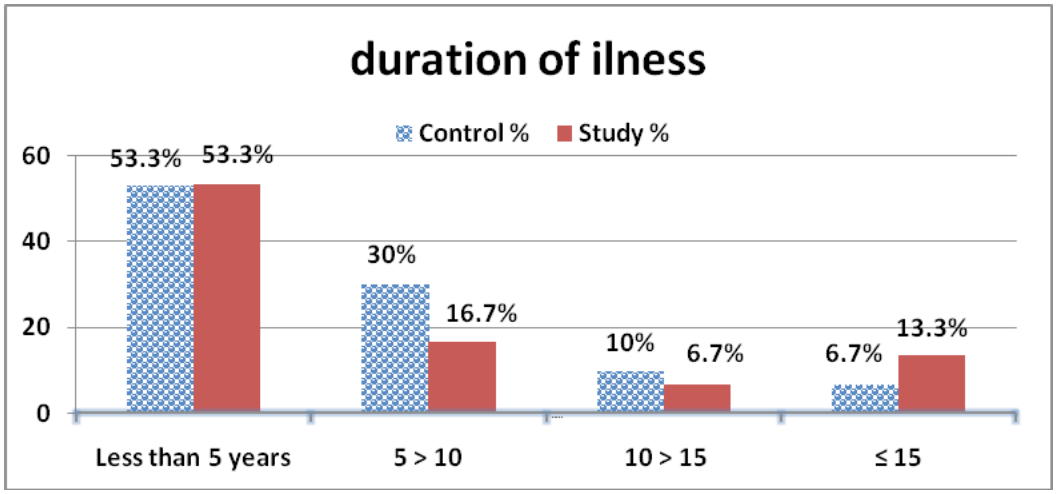

Figure (1): Percentage distribution of duration of illness among the studied sample (N=60).

Figure (1) in relation to duration of illness, 53.3% of both control and study groups had MS for less than five years additionally there was no statistically significant difference between the two groups regarding medical back ground variables.

Table 1: Comparison of pain total mean scores between control and study groups along the study period (N= 60).

Study periods	Mean ± SD	t-test	p-value
Pre intervention Control Study	96.7 ± 42.3 85.9 ± 45	0.955	0.344
After one week Control Study	99.5 ± 42.3 66.1 ± 36.8	3.268*	0.002
After two week Control Study	103.3 ± 42.6 57.1 ± 34.1	4.643*	0.000

It was significant at*$p \leq 0.05$

Table (1) shows thatthere was no statistically significant difference between control and study groups (t = 0.955, p = 0.344) regarding the total mean scores of painat the pre intervention reading.While there was statistically significant difference between control and study groups after oneand two weeks from acupressure application (t = 3.268, p = 0.002), (t = 4.643, p = 0.000) respectively.

Table 2: Comparison of fatigue total mean scores between control and study groups along study period (N = 60).

Study periods	Mean ± SD	t-test	p-value
Pre intervention Control Study	41 ± 12.8 37.9 ± 13.8	0.927	0.358
After one week Control Study	43.2 ± 12.6 27.4 ± 11.9	5.014*	0.000
After two week Control Study	45.6 ± 11.9 21.9 ± 9.3	8.598*	0.000

It was significant at*$p \leq 0.05$

Table (2) shows that there was no statistically significant difference between control and study groups (t = 0.927, p = 0.358) regarding the mean fatigue scorers in pre intervention reading. While there was statistically significant difference between control and study groups by the end of 1st and 2nd weeks of interventions(t = 5.014, p = 0.000) and (t = 8.598, p = 0.000) respectively.

Discussion

The Mean ±SD age of the studied sample was32.7 ± 8.6, 3. This result is linked with a study[15]who mentioned that the mean age among the sample was 33.9±10.8. While it opposed with study[16]who reported that theX±SD age is 56 ± 11.2.

The majority of study sample was female, this go in accordance with study done by [15]and [16]who founded that more than three fourthof the sample were females in addition, the current study results revealed that half of the sample were married and had either secondary or higher education, while the majority of the sample were house wives. The results was congruent with a study[17]found that approximately three fourth of the study sample were married, approximately three fourth had higher and secondary education and more than half housewives.

In relation to duration of illness more than half had MS for less than five years this result matched with[18]showed that mean duration of disease were 5.9±4 years and the resultopposed with[19] who reported that the mean ±SD of duration of illness since onset of MS symptoms was 8.3 ± 6.7 years;

The current study result shows that there was statistical significant decrease in pain mean scores of the study group after application of acupressure when compared to control group by the end of the 1st and 2nd weeks,indicating that application of acupressure may contribute in decreasing severity of pain. The result is consistent with study[20]who reported that the level of pain before the acupressure application decreased significantly following the last acupressure application on the 3rd day (P < 0.001).

The current study result shows that there was statistical significant decrease in fatigue mean scores of the study

group after application of acupressure when compared to control group by the end of the 1st and 2nd weeks, indicating that application of acupressure may contribute in decreasing severity of fatigue. The result is consistent with study done by[21]who reported significantly decrease of the mean scores of fatigue in both acupressure and sham acupressure groups. However, the decrease in the acupressure group was significantly greater than in the sham acupressure group.

Conclusion

Implications: It can be concluded that applying acupressure could be effective in reducing severity of pain and fatigue among patients with multiple sclerosis.

Recommendations:

1. Endorse acupressure as a nursing practice for patients with multiple sclerosis in the early course of the disease.
2. Replication of the study on a larger probability sample selected from different geographical areas in Egypt to obtain more generalized results.

Ethical Clearance: An approval was obtained from the Research and Ethical committee at Faculty of Nursing-Cairo University and official permission was obtained from the administrators at study setting. Written informed consent was obtained from each patient.

Conflict of Interest: The authors declare that there is no conflict of interest.

Source of Funding: Self-funding.

References

1. Sakkas, G. K., Giannaki, C. D., Karatzaferi, C., & Manconi, M. Sleep abnormalities in multiple sclerosis. Current Treatment Options in Neurology. 2019; 21(1),4.
2. Serafini, B., Zandee, S., Rosicarelli, B., Scorsi, E., Veroni, C., Larochelle, C., ... & Aloisi, F. Epstein-Barr virus-associated immune reconstitution inflammatory syndrome as possible cause of fulminant multiple sclerosis relapse after natalizumab interruption. Journal of neuroimmunology. 2018; 319, 9-12.
3. Daltrozzo, T., Hapfelmeier, A., Donnachie, E., Schneider, A., & Hemmer, B. A systematic assessment of prevalence, incidence and regional distribution of multiple sclerosis in Bavaria from 2006 to 2015. Frontiers in neurology. 2018; 9.
4. El-Tallawy, H. N., Farghaly, W. M., Badry, R., Metwally, N. A., Shehata, G. A., Rageh, T. A., …. & Kandil, M. R. Prevalence of multiple sclerosis in al Quseir city, Red Sea governorate, Egypt. Neuropsychiatric disease and treatment. 2016;12, 155.
5. Gilmour H, Ramage-Morin PL, Wong SL. Multiple sclerosis: prevalence and impact. Health Rep. 2018; 29(1):3–8.
6. Gromisch, E. S., Kerns, R. D., Czlapinski, R., Beenken, B., Otis, J., Lo, A. C., & Beauvais, J.Cognitive behavioral therapy for the management of multiple sclerosis–related pain: a randomized clinical trial. International Journal of MS Care. 2019.
7. Berra, E., Bergamaschi, R., De Icco, R., Dagna, C., Perrotta, A., Rovaris, M., ... & Tamburin, S. The Effects of Transcutaneous Spinal Direct Current Stimulation on Neuropathic Pain in Multiple Sclerosis: Clinical and Neurophysiological Assessment. Frontiers in human neuroscience. 2019; 13.
8. Bisecco, A., Nardo, F. D., Docimo, R., Caiazzo, G., d'Ambrosio, A., Bonavita, S., ... & Tedeschi, G. Fatigue in multiple sclerosis: the contribution of resting-state functional connectivity reorganization. Multiple Sclerosis Journal. 2018; 24(13), 1696-1705.
9. You, E., Kim, D., Harris, R., & D›Alonzo, K. Effects of auricular acupressure on pain management: A systematic review. Pain Management Nursing.2018.
10. Vijayalakshmi, C., & Devarajan, V. Role of Swamiji VethathiriMaharishi'S Acupressure 14 Points Exercise Therapy in the Effective Management of Neurological Disorders (Seizures) Found on A 16-Year-Old Male Student—A Case Report.2019; e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 8, Issue 2 Ser. X. (Mar. - Apr .2019), PP 18-26 www.iosrjournals.org
11. Sen, S., & Aygin, D. A randomized trial of acupressure on pain management after cardiac surgery. Int J Clin Exp Med. 2019; 12(2), 1731-1738.
12. Pouy, S., Nabi, B. N., & Yaghobi, Y. Comparison of parental satisfaction with posttonsillectomy pain management with two method of acupressure and

pharmacological analgesics in children: A clinical trial study. Indian Journal of Forensic Medicine & Toxicology. 2018; 12(3), 223-228.

13. Galer, Gammaitoni & Jensen. Pain assessment in clinical trials. In D. Carr & H. Wittink (Eds.), Evidence, outcomes, and quality of life in pain treatment. Amsterdam: Elsevier.2010.
14. Shahid, A., Wilkinson, K., Marcu, S., & Shapiro, C. M. Fatigue Severity Scale (FSS). In STOP, THAT and One Hundred Other Sleep Scales (pp. 167-168). Springer New York.2011.
15. Gascoyne, C. R., Simpson Jr, S., Chen, J., van der Mei, I., & Marck, C. H. Modifiable factors associated with depression and anxiety in multiple sclerosis. ActaNeurologicaScandinavica.2019.
16. Chen, J., Taylor, B., Winzenberg, T., Palmer, A. J., Kirk-Brown, A., van Dijk, P., ... & van der Mei, I. Comorbidities are prevalent and detrimental for employment outcomes in people of working age with multiple sclerosis. Multiple Sclerosis Journal.2019; 1352458519872644.
17. Valiani, M., Mansourian, M., & Ashtari, F. (). The effect of auriculotherapy on stress, anxiety, and depression in MS patients: A double blind randomized clinical control trial (Parallel Design). ACTA MEDICA MEDITERRANEA. 2018; 34, 561-567.
18. Ghajarzadeh, M., Jalilian, R., Sahraian, M. A., Moghadasi, A. N., Azimi, A., Mohammadifar, M., & Azizi, S. Pain in patients with multiple sclerosis. Maedica. 2018; 13(2), 125.
19. Schiess, N., Huether, K., Holroyd, K. B., Aziz, F., Emam, E., Shahrour, T., ... & Alsaadi, T. Multiple sclerosis, anxiety, and depression in the United Arab Emirates: Does social stigma prevent treatment? International journal of MS care. 2019; 21(1), 29.
20. Sen, S., & Aygin, D. (). A randomized trial of acupressure on pain management after cardiac surgery. Int J ClinExp Med. 2019; 12(2), 1731-1738.
21. Vagharseyyedin, S. A., Salmabadi, M., BahramiTaghanaki, H., & Riyasi, H. The impact of self-administered acupressure on sleep quality and fatigue among patients with migraine: A randomized controlled trial. Complementary Therapies in Clinical Practice. 2019; 35, 374-380.

Effect of Hydrotherapy Warm Red Ginger to Reduce Blood Pressure on Elderly at Panti Werdha Budi Luhur, Jambi

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Abstract

Context: The process that every human being in the world will experience is aging. In this process, a person will undergo changes and decreased the function of the body's organs, one of which is the cardiovascular system. Disorders of the cardiovascular system can be hypertension. Hypertension can cause several types of complications, such as stroke, kidney failure, and heart disease. Pharmacological and non-pharmacological ways can overcome hypertension. Management of non-pharmacological hypertension can be with complementary therapy, one of which is foot hydrotherapy (soaking warm feet). This study conducted hydrotherapy warm red ginger on the feet of hypertensive sufferers. The purpose of this study was to see a picture of blood pressure before and after hydrotherapy therapy of warm red ginger and its effect on reducing blood pressure — research method with pre-post test one group design. The intervention was carried out six times for two weeks. The data analysis with univariate analysis resulted in average systole before the intervention was 153.1 mmHg, and after was 138.85 mmHg. Besides, the average diastole before the intervention was 86.8 mmHg and after was 83.0 mmHg. Bivariate analysis with pre-post systole resulted in a p-value of 0,000 and pre-post diastole with a p-value of 0.041, which means p-value <0.05. There was an effect of hydrotherapy in warm red ginger with a decrease in blood pressure at the elderly with hypertension. It could be an alternative treatment in patients with hypertension in health services.

Keywords: *Hypertension, hydroxyurea red ginger, blood pressure, old age*

Introduction

Every human being in the world will experience aging. In this process, a person will change and decreased the organs' function. Its reduced function of one organ most often experienced by the elderly. Diseases that mostly affect them include hypertension[1]. WHO data in 2012 reported that as many as 74 million people in the world experienced hypertension, which resulted in around 51% of elderly deaths due to stroke and 45% of coroner heart diseases. In 2025, it is about 29% of the world population will be affected by hypertension, and the biggest sufferers will be the elderly[2]. The elderly often affected by hypertension caused by stiffness in arteries, so that blood pressure tends to increase. In 2015, hypertension was in the third rank, 13.89%[3]. The results of Riskesdas, the prevalence of hypertension rationally reached 8.4% of the measurement of blood pressure at the age of 18 years and over, the incidence of hypertension in Jambi Province ranked 23rd with a case of 5.1% of people[1].

Hypertension can cause several types of complications, such as stroke, kidney failure, and heart disease[4]. WHO data in 2012 reported that as many as 74 million people in the world experienced hypertension, which resulted in around 51% of elderly deaths due to stroke and 45% of coronary heart disease. Management of hypertension can be in the form of taking antihypertensive drugs, managing diet, exercising, reducing stress, avoiding alcohol, and smoking[5]. Another method of treatment can use a holistic nursing approach that is complementary therapy[6].

Complementary therapies are massage, herbal, aromatherapy, and foot hydrotherapy[7]. One of the complementary therapies used for independent and natural intervention is foot hydrotherapy (soaking warm feet)[8]. Foot Hydrotherapy that soaks the foot in warm water will provide a local response to heat through this stimulation will send impulses from the periphery to the hypothalamus[9]. Other herbal ingredients, one of which is ginger, are better added in soaking foot[10]. Ginger that widely used for medicine is red because red ginger has a higher essential oil content compared to other ginger[11]. The warmth and spicy aroma of ginger because of its content of essential oils (volatile) and oleoresin compounds (gingerol). Warm feeling in ginger can widen blood vessels, so that blood flow is smooth[12].

Research by Nurahmandani, A.R, et al. (2016) on the effectiveness of giving warm ginger foot bath therapy to the decrease in blood pressure in the elderly with hypertension in Semarang ivory Semarang Werdha, it was found that there was an effect of giving warm ginger foot soak therapy to a decrease in blood pressure in elderly with hypertension at Pucang Gading Nursing Home in Semarang[13]

Nursing Home is a social welfare institution established to improve the quality of life and welfare of the elderly[14]. TresnaWerda Social Institution Budi Luhur Jambi City has 67 older people with more than 40% suffering from hypertension, and some are dependent on the use of pharmacological drugs.

The specific purpose of the study was to determine the effect of hydrotherapy, by Soaking feet in Ginger Warm Water against the Decrease in Blood Pressure in the Elderly at Budi Luhur PSTW Jambi The incidence of hypertension continues to increase every year with the increasing number of older adults due to increased life expectancy. The elderly with hypertension continues to depend on pharmacological drugs to overcome the disease. The problem in this study is if hypertension is not immediately above, then it will continue to cause complications such as heart problems, blood vessel disorders to death. Therefore, it is necessary to prevent complications of the elderly with hypertension using hydrangeas red ginger.

Methodology

This research method uses pre-post-test one group design. The analysis was carried out in the form of univariate analysis, which was to see a picture of blood pressure before and after the treatment of warm red ginger foot soak. As well as bivariate analysis to see the effect of hydrangea red, warm ginger on blood pressure reduction in the elderly with paired test with pre-post sistole results with p-value 0,000 and pre-post diastole with p-value 0.041, which means p-value <0, 05.

Material and Tool: Materials and equipment used in this study include hot water with temperatures ranging from 39-42ºC, hot water flask, red ginger, basin, water thermometer, towels, cold water, digital tension. And research instruments in the form of observation sheets.

A. Research Procedure: The research procedure was out several stages, first carried out a pretest (a measurement of respondent's blood pressure), then the process of soaking the feet with warm ginger water, including:

a. Give the patient a sitting position with dependent feet.

b. Fill the bucket with cold water and hot water until it is half full then measure the temperature of the water (39-42ºC) with a thermometer.

c. If the feet look dirty, wash first.

d. Dip and soak feet for 10-15 cm above the ankles then leave for 15 minutes.

e. Take a temperature measurement every 5 minutes, if the temperature drops, spill hot water (feet lifted from the bucket) again, and measure the temperature of the thermometer again.

f. Cover the bucket with a towel to maintain the temperature.

g. When finished (15 minutes), lift the leg and dry it with a towel.

h. Tidy up the Tool: After retaking action, the measurement of blood pressure (post-test) and recorded in the observation sheet. The pre-test is done every time before giving an intervention and after that post-test. The response was carried out for two weeks, with six interventions for each respondent.

Research Result

Responden Characteristic:

1. Age:

Table 1: Frequency distribution based on age at Tresna Werdha Budi Luhur Social Home in Jambi City in 2019

No	Age	f	(%)
1.	Elderly (60-74 years old)	14	70
2.	Old (75-90 years old)	6	30
	Total	20	100

Based on the table above, the distribution of respondents based on age 70% (14) respondents were elderly (60-74 years). Patients aged over 60 years have a risk of suffering from hypertension. Triyanti (2014) conveyed that the age factor is very influential on the incidence of hypertension because with increasing age, the higher the risk of hypertension.

2. Sex:

Table 2: Frequency distribution of respondents by sex at Tresna Werdha Budi Luhur Social Home Jambi City in 2019

No	Sex	f	(%)
1.	Male	14	70
2.	Female	6	30
	Total	20	100

Based on the table above, the distribution of respondents based on gender 70% (14) respondents were male. Gender is very carefully related to the occurrence of hypertension in young people, and middle age is higher suffering from hypertension in men[15].

Bood Pressure before and after Hydrotherapy Warm Red Ginger in the Elderly with Hypertension:

Table 3: Frequency Distribution of Respondents Based on Blood Pressure Before and After Hydrotherapy Warm Red Ginger in the Elderly with Hypertension

Variable	Mean	SD	SE	n
Sistole Pre	153.10	13.780	3.081	20
Sistole Post	138.85	13.417	3.000	20
Diastole Pre	86.80	9.105	2.036	20
Diastole Post	83.00	10.443	2.335	20

Based on the table above shows that the average systole before the intervention was 153.1 mmHg, while the average systole after the intervention was 138.85 mmHg with a standard deviation before 153.1 and after 138.85. Meanwhile, the average diastole before being given response was 86.8 mmHg and after being given 83.0 mmHg with a standard deviation before 9.105 and after 10.44.

Respondents in this study are all elderly who suffer from essential hypertension. Hypertension often occurs in the elderly due to changes in the cardiovascular system. For example, an elasticity decreased in the aortic wall, heart valves thickened and stiff, the ability to pump blood decreased as much as 1% every year, loss of elasticity in blood vessels, and its increase in blood pressure because of its resistance from peripheral blood vessels[16].

Effects of Warm Red Ginger Hydrotherapy on Reducing Blood Pressure in the Elderly at Pstw Budi Luhur, Jambi City in 2019

Variable	Mean	SD	df	P-Value	n
Siastole Pre -Siastole Post	153.10 138.85	14.581	19	.000	20
Diastole Pre - Diastole Post	86.80 83.00	7.750	19	.041	20

Based on the results of the bivariate analysis above, it showed that the pre-post test systole with a p-value of 0,000, while the pre-post diastole with a p-value of 0.041, which means p-value <0.05. It means that there was an effect of hydrotherapy with warm red ginger with a decrease in blood pressure in the elderly with hypertension at PSTW Budi Luhur Kota Jambi.

Discussion

Effects of Warm Red Ginger Hydrotherapy on Reducing Blood Pressure in the Elderly at Pstw Budi Luhur, Jambi City in 2019

Based on the results of the study showed that the average decrease in systolic blood pressure before and after 14.25 mmHg, and the average decrease in blood

pressure of 3.8 mmHg. These results indicate that there was a decrease in blood pressure, both systole, and diastole, after administration of the red ginger hydrotherapy intervention. However, the results of blood pressure measurements found only one respondent (5%) who experienced stable blood pressure and one person (5%) respondents who experienced an increase in blood pressure after being given hydrotherapy red ginger. It because respondents are in a state of anxiety and emotion. Stress conditions experienced by respondents can affect the blood pressure of respondents. According to the literature explained that terms of anxiety, fear, pain, and emotional stress could result in sympathetic stimulation, which can increase the frequency of heart rate, cardiac output, and vascular resistance. It was also evidenced by Sasmalinda research through multiple linear regression tests showing that age and stress factors affect the increase in blood pressure in patients at the Malalo Batipuh Selatan health center. Women's research results (2019) indicates that there is a relationship between stress (p-value = 0.003) and physical activity (p-value = 0.018) with a blood pressure of patients with essential hypertension.

Several national and international research findings on the benefits of red ginger for hypertension show different results. The results of the study by Nurahmandani et al. (2016) showed that there was an effect between giving foot bath therapy with warm ginger water on decreasing blood pressure in the elderly with hypertension in panning Semarang with p-value systole = 0,0001 and p-value diastole = 0,0001. Soak the warm feet of ginger water to provide therapy that relaxes the muscles. Sanghal's research results (2012) showed that red ginger is effective in preventing hypertension. The results of the study showed a statistically significant difference in the study group after consuming ginger for one month, whereas the control group did not[17].

The results of this study and previous research studies strongly recommend ginger as an herbal therapy program to support conservative therapy for chronic diseases, especially hypertension. For this reason[15], the Puskesmas should recommend providing ginger hydrotherapy for herbal-based nursing interventions for families with hypertension.

Conclusion

The conclusion in this study was the average blood pressure after hydrolyzing warm red ginger has decreased, and there is a hydrotherapy effect of warm red ginger on reducing blood pressure in the elderly with hypertension.

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Ethical Approval: This study was approved by the Health Research Ethics Committee (KEPK) University Andalas University, Padang. All participants were providede with a participant information sheet written in Bahasa Indonesia, and they signed the consnt from prior to participating in the study

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Reference

1. Riskesdas. Prevalensi lansia dengan hipertensi. Riset Kesehatan Daerah. 2013.
2. Erlina Marfianti. GW29-e1926 Hypertension, Hyperinsulinemia, and Cognitive Function Decline of Elderly Population in Yogyakarta Indonesia. J Am Coll Cardiol. 2018;72(12):C119.
3. Dinas kesehatan Provinsi Jambi. Profil Kesehatan Provinsi Jambi [Internet]. Bidang Pelayanan Kesehatan. 2015 [cited 2019 Feb 28]. Available from: https://www.kemkes.go.id/resources/download/profil/PROFIL_KES_PROVINSI_2015/05_JAMBI_2015.pdf
4. Anggi Lukman Wicaksana S-T. Psychometric Testing of the Indonesian Version of Dietary Sodium Restriction Questionnaire Among Patients with Hypertension. Asian Nurs Res (Korean Soc Nurs Sci). 2018;12(4):279–85.
5. Kowalski R. Terapi hipertensi. Bandung: Qonita; 2010.

6. M.Flacka BA. Blood pressure and the new ACC/ AHA hypertension guidelines. Trends Cardiovasc Med. 2019; 29(3).
7. Setyoadi & kushariyadi. Terapi Modalitas Keperawatan pada Klien Psikogeritrik. Jakarta: Salemba Medika; 2011.
8. Yang Shen PhD, Xin WangMD, Zengwu Wang MD, PhD, Linfeng Zhang PhD, ZuoChen PhD, Manlu Zhu BS Chun Chang MD, PhD RGM. Prevalence, awareness, treatment, and control of hypertension among Chinese working population: results of a workplace-based study. J Am Soc Hypertens. 2018;12(4):311-322.e2.
9. Nasrullah D WA. Efektifitas Terapi Muscong (Musik Keroncong) Untuk Menurunkan Intensitas Nyeri Pada Pasien Arthitis Rhemathoid (Studi Kasus Panti Werdha Surabaya Timur). J Keperawatan Muhammadiyah [Internet]. 2016;1(2):115–21. Available from: http://journal.um-surabaya.ac.id/index.php/JKM/article/view/913
10. Supa Pengpid KP. Utilization of traditional and complementary medicine in Indonesia: Results of a national survey in 2014–15. Complement Ther Clin Pract. 2018;33:156–63.
11. Setyaningrum, H.D., & Saparinto C. Jahe. Jakarta: Penebar Swadaya; 2013.
12. Kurniawati N. Sehat dan Cantik Alami Berka Khasiat Bumbu Dapur. Jakarta: Qonita; 2010.
13. Nurahmandani, A. R., Hartati, E., & Supriyono M. Efektivitas Pemberian Terapi Rendam Kaki Air Jahe Hangat Terhadap Penurunan Tekanan Darah Pada Lansia dengan Hipertensi Di Panti Werdha Pucang Gading Semarang. 2016.
14. Kementrian Sosial RI. Glosarium Penyelenggaraan KesejahteraanSosial. 2009.
15. Shaban, Ibrahim, Mohamed et A. Ginger: its's effect on blood pressure among hypertensive Patients. IOSR J Nurs Heal Sci. 2017;6(5).
16. Muhith abdul dan SS. Pendidikan Keperawatan Gerontik. Yogyakarta: Andi Offset; 2016.
17. Sanghal A et all. An experimental study to evaluate the preventive effect of Zingiber officinale (ginger) on hypertension and hyperlipidaemia and its comparison with Allium sativum (garlic) in rats. J Med Plants Res. 2012;6(25).

Consistency of Condom Use Associated with HIV among Transgender in Indonesia: Secondary Data Analysis of IBBS 2015

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Abstract

Backgrounds: Transgender has been identified as engaging in receptive anal sex with men. Unprotected anal sex is undoubtedly an important risk factor, therefore consistency of condom use is a fundamental measure to prevent HIV transmission. This study was aimed to investigate association between condom use consistency and HIV among transgender in several provinces in Indonesia.

Method: This study was done as secondary data analysis from a national cross-sectional study, namely the Integrated Biological and Behavioral Surveillance (IBBS) 2015, done by the Ministry of Health of Republic of Indonesia. In this IBBS survey, multistage cluster sampling was used. Condom use and sexual behaviors was assessed through guided interview, while HIV infection was determined by series of rapid serologic test. Association, between consistency of condom use and HIV, using PR (prevalent ratio), was analyzed using chi-square test and cox regression model.

Result: Transgender who did not consistently use condom when having commercial sex transaction were 1.7 times (PR=1.7; 95% CI:0.4-6.3) after adjustable several confounders. Transgender who did not consistently use condom use when having casual sex were 1.2 times (95% CI 0.1 -13.3) more likely to be infected with HIV than transgender who consistently use condom after adjusted by several confounders. Transgender who did not consistently use condom in both commercial and casual sex intercourses was 2.1 times (95% CI: 0.6 - 7.1) more likely to have HIV infection than transgender who consistently used condom after adjusted by several confounders.

Conclusions: There were increased risks of not consistently using condom in each type of sexual intercourse, commercial or casual, among transgenders. Condom inconsistency showed its higher effect when related to both commercial and casual sexual intercourses.

Keywords: *HIV, Condom, Consistency, Transgender, Indonesia*

Introduction

Transgender whose gender identity does not conform to gender norms are known to be at high risk for HIV infection.[1,9] Among 11,066 transgenders worldwide the HIV prevalence was 19.1% (95% CI 17.4–20.7). A global systematic review from 15 countries in 2013 found that the odds ratio of being infected with HIV among transgender as compared to all adults of reproductive age was 48.8 (95% CI 21.2–76.3).[1]

The most important risk factor as a primary driver of HIV infection in transgender population is the unprotected receptive anal intercourse since transgender had been

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consistently identified as engaging in receptive anal sex with men.[1,2,3,6] Indonesian Integrated Biological Behavior Survey (IBBS) in 2007 showed that HIV prevalence among transgender population was 24.4%. [12]Study about HIV risk behaviors among transgender in San Francisco showed that HIV-positive participants were 3.8 (95% CI 1.1 - 12.4) times more likely to have recently engaged in unprotected receptive anal sex with casual partners than HIV-negative participants, after controlling for other variables.[8]

Results from the few studies conducted on condom use among transgender in Southeast Asia were consistent with the global findings. HIV study among transgender in Cambodia showed that respondents inconsistently used condom during last anal sex had 3.84 times odds of HIV infection (adjusted OR = 3.84; 95%CI 1.58 - 9.33).[16] Having a higher perceived risk of HIV was also associated with inconsistent condom use among transgender in Thailand (OR= 1.8; 95%CI 1.1 -2.9).[11] HIV occurrence among 748 transgenders in three cities in Indonesia in 2007,was associated with inconsistent condom use during anal sex with clients last month (OR =1.38; 95% CI 0.95–2.00).[12]The above studies, however, did not differentiate factors based on type of sexual partners (commercial vs. casual vs. combination). Partnership characteristics have been found to be important predictors of unprotected intercourse.[10]This study was aimed to explore associations between 3 types of inconsistent condom use among transgender sex partner (commercial, casual and it's combinations) and the HIV occurrence.

Method

This was a study done by analyzing secondary data from the previous national wide survey in Indonesia namely The Integrated Biological and Behavioral Surveillance (IBBS) in 2015. Status of HIV infection was determined by 3 series of serological rapid test. Knowledge and behavioral aspects of condom use was obtained through a comprehensive interview by trained interviewers using a standardized structured questionnaire. In the IBBS survey, as many as 1003 eligible transgenders were selected randomly from 5 big cities (i.e. Jakarta, Bandung, Semarang, Surabaya and Malang), through a multistage cluster sampling with PPS (probability proportional to size) approach. The inclusion criteria of the transgender for this study (of secondary data analysis) were transgender (biologically male but psychologically female individual) aged ≥ 15 years old, never been tested with HIV test and have lived in the selected city for at least one month. There were totally 113 transgenders meeting the criteria for this particular study (of secondary data analysis).

Data analysis was done using statistical software, elaborating descriptive estimates and applying inferential statistical tests, such as chi-square test in bivariate and stratification analysis and also Cox regression in multivariate analysis to determine the most valid causal regression model after controlling the potential confounders. The strength of associations between condom consistency and the HIV status were measured using prevalence ratio (PR) and adjusted prevalence ratio (a-PR) after controlling the potential confounders. The precision of association was assessed using the 95% confidence interval of adjusted PR and the corresponding p-value (which significance were determined at level of 0.05).

Results

The HIV prevalence rate among transgender was 17.7%. The prevalence rates of Syphilis among transgender was 13.3%, while the prevalence rate of Gonorrhea and Chlamydia was 25% (data not shown). Majority of transgender were below 30 years of age (59%).About 66% of the transgender had moderate education level. Majority of transgender (88.5%) were single. About 18% of transgender sold sex as their main occupation. About 45% of transgenders were living alone. About one third (30%) of transgender had no perception of HIV susceptibility. Almost half (49%) of transgender had low knowledge about HIV and its transmission. About 25% of them reported rupture of the condom. Most of respondents (78%) used lubricant when they had anal-sex. No one of transgenders had ever used drugs injection since one year ago(data not shown).

Within the last past month, the proportions of HIV infected transgenders who were not consistent in using condom with commercial sex partner, casual sex partner and the combination (of the two types of sex partner), were 30.4%, 20%, 31.82% respectively (Table 1).

The estimates of strength of associations (i.e. the PRs) between HIV infection and consistency of condom use with sex partner, casual sex partner and the combination of the two types of sex partner were 1.52 (95% CI 0.6-4.1); 1.27 (95% CI 0.3-6.4); 1.5 (95% CI 0.8 - 2.9) respectively (Table 1).

Table 1: Crude Association Between Three Types of Condom Use Consistency and HIV Infection.

Variable	HIV				Total	PR	95% CI	P-value
	Positive		Negative		n (%)			
	n	(%)	n	(%)				
Consistency of condom use in commercial sex								
No	7	(30.4)	16	(69.6)	23 (48)	1.5	0.6 - 4.1	0.4
Yes	5	(20)	20	(80)	25 (52)	1.0		
Consistency of condom use in casual sex								
No	2	(20)	8	(80)	10 (34)	1.3	0.3 - 6.4	0.7
Yes	3	(15.8)	16	(84.2)	19 (66)	1.0		
Consistency of condom use inboth, the two types of sex (casual and commercial)								
Inconsistent	7	(31.82)	15	(68.18)	22 (37)	1.5	0.8 - 2.9	0.2
Sometimes/ Always Consistent	7	(18.92)	30	(81.08)	37 (63)	1.0		

Stratification by age showed that there were no sharp differences of strength of associations (i.e. the PRs) between age strata in all types of sexual intercourses except incommercial sexual intercourse (2,3 in age group<30 years, versus 1,1 in age group ≥30 years). However, all differences of PRs between strata were not significant **(Table 2).**

Similarly, the stratification by main occupation showed that there were no sharp differences of strength of associations (i.e. the PRs) between occupation strata in all types of sexual intercourses except in commercial sexual intercourse (2,5 in group of "selling sex", versus 0,8 in group of "others") were opposite associations appeared. However, all differences of PRs between strata were not significant either.

Table 2: Stratification Analysis of Associations between Each Type of Condom Use Consistency and HIV Infection According to Strata of Age and Main Occupation.

Stratification By			Condom use consistency in commercial sex	Condom use consistency in casual sex	Condom use consistency in the two types of sex
Age	PR Strata (95%CI)	<30 years	2.3 (0.5 -10.7)	1.6 (0.1 - 21.3)	1.6 (0.7 - 3.6)
		≥30 years	1.1 (0.3 - 4.3)	1.2 (0.2 - 8.5)	1.3 (0.3 - 5.9)
	Adjusted PR (95%CI)		1.6 (0.6 - 4.5)	1.3 (0.3 - 6.5)	1.5 (0.7 - 3.1)
	PR Crude (95%CI)		1.5 (0.6 - 4.1)	1.3 (0.3 - 6.4)	1.5 (0.8 - 2.9)
	P-value Homogeneity Test		0.5	0.8	0.8
	ΔPR (%)		5	7.4	1.3
Main Occupation	PR Strata (95%CI)	Selling Sex	2.5 (1.2 - 5.3)	1.1 (0.5 - 2.5)	1.6 (0.7 - 3.9)
		Others	0.8 (0.1 - 5.8)	1.7 (0.6 - 4.4)	1.4 (0.51 - 4.2)
	Adjusted PR (95%CI)		1.4 (0.4 - 4.1)	1.3 (0.7 - 2.4)	1.6 (0.8 - 3.1)
	PR Crude (95%CI)		1.2 (0.4 - 4.0)	1.31 (0.7 - 2.4)	1.5 (0.7 - 2.9)
	P-value Homogeneity Test		0.09	0.5	0.8
	ΔPR (%)		1.1	2.2	3.8

The three different models of multivariate analysis adjusting for relevant potential confounders showed consistent positive associations between condom use consistency in all types of sexual intercourses and the occurrence of HIV infection. The adjusted PRs of the three models of associations for the corresponding three types of sexual intercourse were 1.7 (95% CI: 0.4 - 6.3), 1.2 (95% CI: 0.1 -13.3) and 2.1 (95% CI: 0.6 - 7.1) respectively

Table 3: The Adjusted Associations Between Each Type of Condom Use Consistency and the HIV Infection Using Cox Regression Model

	Model 1: The Cox model of association between condom use consistency in commercial sex and the HIV infection[a]	Model 2: The Cox model of association between condom use consistency in casual sex and the HIV infection[b]	Model 3: Cox model of association between condom use consistency in both commercial and casual sex and the HIV infection[c]
Adjusted PR (95%CI)	1.7 (0.4 - 6.3)	1.2 (0.1 -13.3)	2.1 (0.6 - 7.1)
P Value	0.7	0.1	0.6

a. Model 1 was adjusted for current living with, recieved printed material about HIV prevention and transmission, condom rupture.
b. Model 2was adjusted for age, main occupation, current living with, received printed material(booklets, brochures, calendars, leaflets)about HIV prevention and transmission, syphilis infection, chlamydia, gonorrhea infection.
c. Model 3was adjusted for education, received printed material about HIV prevention and transmission, current living with, syphilis infection.

Discussion

In this study, the proportion of HIV infected transgenders who were not consistent in using condom when having intercourses with commercial sex partner, casual sex partner and both(two) types of sex partners in 5 cities in Indonesia (2015) last past month were 30.4%, 20%, 31.82% respectively. In previous study by Prabawanti, 2011, prevalence of HIV among transgenders who inconsistently used condom during anal sex with clients last months in three cities in Indonesia (2007) were 28.4%.[12] Chhim S, 2017 found that prevalence of HIV among transgender who inconsistently used condom within past three months with casual sexual partner in Cambodia (2016) were 7.2%.[4] Study of Murliani E., 2014 based on IBBS 2011 found that the prevalence of HIV among transgenders who were not consistent in using condom when having intercourses with all types of sex partner in Indonesia were 20.6%.[15] These variations may indicate that some transgenders were better able to negotiate condom use with sex partner. In commercial sexual transaction, condom use consistency might be more difficult to achieve than the casual sex intercourse, because the clients in commercial sexual transaction might more powerful to dictate the conditions related to the intercourse. Transgenders living in different location of sexual transaction might have different attitude towards condom use.[5,14,16]

Our finding, inconsistency of condom use with commercial sex partner and HIV was 1.7 times (95% CI 0.4 - 6.3) more likely to be infected with HIV after adjusted by several confounders. This finding was supported by previous study showing that inconsistent condom use during anal sex with clients last month increased the risk of HIV infection by 1.38 times (95% CI 0.95–2.00).[12] Our study also found that transgenders who were inconsistent using condom with casual sex partner was 1.2 times (95% CI 0.1 -13.3) more likely to get HIV infection as compared to transgender who consistently used condom. Study in Thailand showed that inconsistent condom use during intercourse with male casual partner (past 3 months) was 1.67 times (95% CI 0.80–3.45) more likely to be infected with HIV.[7] According to Reis RK et.al, 2019, who analyzed the predictors of inconsistent condom use among male HIV-positive individuals in Cambodia, having multiple partnership were independently associated with inconsistent condom use (5.0; 95% CI 1.3 - 19.6).[13]The effect of inconsistency of condom use in both commercial sex and casual sex activities, on the occurrence of HIV infection, was stronger (2.1; 95% CI 0.6 - 7.1) than condom use inconsistency in only one type of sexual activities.

The data analyzed in this study was limited for only 113 transgenders since transgenders who had taken HIV test before the survey of IBBS 2015 were excluded. This exclusion was done to minimize selection bias due to behavioral changes of condom use after they have known their HIV status and thus to assure the temporal sequence between the behaviors as the risk factors and the HIV status as the outcome. Limited number of participants might have also affected the precision of study associations. The result of the study may not sufficiently be generalized to all population of transgender national wide since transgenders participating the study were recruited in only 5 cities.

Conclusions

We found evidence of associations between HIV status and inconsistencies of condom use with various types of sexual activities (or with different types of sexual partners) among transgender population. Effect of inconsistency of condom use in both commercial sex and casual sex activities, on the occurrence of HIV infection was stronger than condom use inconsistency in only one type of sexual activities. Based on this finding, we suggest to encourage transgender population to persistently be always consistent in using condom in any type of sexual activities being involved.

Ethical Consideration: Ethical clearance was obtained from The Research Ethical Committee Faculty of Public Health Universitas Indonesia (No. 129/H2.F10/PPM.00.02/2014)

Competing Interests: None declared

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References

1. Baral SD, Poteat T, Strömdahl S, Wirtz AL, Guadamuz TE, Beyrer C. Worldwide burden of HIV in transgender women: A systematic review and meta-analysis. Lancet Infect Dis. 2013;13(3):214–22.
2. Baggaley RF, White RG, Boily MC. HIV transmission risk through anal intercourse: Systematic review, meta-analysis and implications for HIV prevention. Int J Epidemiol. 2010;39(4):1048–63.
3. Beyrer C, Baral SD, Griensven F V, Al. E. Global Epidemiology of HIV infection on men who have sex with men. Natl Helath Institutes Public Accsess, Lancet. 2012;380(9839):367–77.
4. Chhim S, Ngin C, Chhoun P, Tuot S, Ly C, Mun P, et al. HIV prevalence and factors associated with HIV infection among transgender women in Cambodia: Results from a National Integrated Biological and Behavioral Survey. BMJ Open. 2017;7(8):1–12.
5. Clements-Nolle K, Guzman R, Harris SG. Sex trade in a male-to-female transgender population: Psychosocial correlates of inconsistent condom use. Sex Health. 2008;5(1):49–54.
6. Garofalo R, Kuhns LM, Reisner SL, Mimiaga MJ. Behavioral Interventions to Prevent HIV Transmission and Acquisition for Transgender Women: A Critical Review. J Acquir Immune Defic Syndr. 2016;72: S220–5.
7. Guadamuz TE, Wimonsate W., Varangrat A,et al., HIV Prevalence, Risk Behaviour, Hormone Use and Surgical History Among Transgender Persons in Thailand. Natl Helath Institutes Public Accsess, Lancet, 2011;15(3):650–8.
8. Nemoto T, Operario D, Keatley JA, Han L, Soma T. HIV risk behaviors among male-to-female transgender persons of color in San Francisco. Am J Public Health. 2004;94(7):1193–9.
9. Neumann MS, Finlayson TJ, Pitts NL, Keatley JA. Comprehensive HIV prevention for transgender persons. Am J Public Health. 2017;107(2):207–12.
10. Niccolai LM, D'Entremont D, Pritchett EN, Wagner K. Unprotected intercourse among people living with HIV/AIDS: The importance of partnership characteristics. AIDS Care - Psychol Socio-Medical Asp AIDS/HIV. 2006;18(7):801–7.
11. Plotzker R, Seekaew P, Jantarapakde J, Pengnonyang S, Trachunthong D, Linjongrat D, et al. Importance of risk perception: Predictors of PrEP acceptance among Thai MSM and TG women at a community-based health service. J Acquir Immune Defic Syndr. 2017;76(5):473–81.
12. Prabawanti C, Bollen L, Palupy R, Morineau G, Girault P, Mustikawati DE, et al. HIV, sexually transmitted infections, and sexual risk behavior among transgenders in Indonesia. AIDS Behav. 2011;15(3):663–73.
13. Reis RK. Inconsistent condom use between serodifferent sexual partnerships to the human immunodeficiency virus. Rev Latino-AM Enferm. 2019; 27(3222).
14. Weissman A, Ngak S, Srean C, Sansothy N, Mills S, Ferradini L. HIV Prevalence and Risks Associated with HIV Infection among Transgender Individuals in Cambodia. PLoS One. 2016;11(4):1–16.

15. Wati E. Murliani, Correlation of Consistent Condom Use and HIV (+) among Transgender in 5 Big Cities in Indonesia 2011 (Secondary Data Analysis of IBBS 2011).Thesis. Universitas Indonesia; 2014, p. 77

16. Yi S, Plant A, Tuot S, Mun P, Chhim S, Chann N, et al. Factors associated with condom use with non-commercial partners among sexually-active transgender women in Cambodia: Findings from a national survey using respondent-driven sampling. BMC Public Health. 2019;19(1).

Depression and Generativity of the Middle Aged: Mediating Effect of Social Support

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Abstract

Purpose: This study aims to examine the mediated effect of social support in the relationship between the depression and the generativity of the middle aged.

Method: The data was collected from a total of 128 middleaged in 40 to 59 years old. The data were analyzed using descriptive statistics, Pearson's correlation coefficient, and stepwise multiple regression using the SPSS 22.0 program.

Results: The generativity was shown a negative correlation with depression($r=-.40$, $p<.001$) and a positive correlation with social support($r=.68$, $p<.001$). In the relation between depression and generativity, social support was the significant mediating variable.

Conclusion: The mediated effect of social support on the relationship between depression and generativity in middle aged were verified and based on it, it will be used as basic data for developing integrated nursing intervention programs to help establish a sense of generativity, a task of middle age development.

Keywords: *Middle aged, Depression, Social support, Generativity*

Introduction

Erikson[1], who looked at human development from a full-life perspective before, expressed the middle aged as generativity versus stagnation, and said that the crisis at each stage is a task to solve at each stage of development and it can be a new turning point when overcoming the crisis at each stage.

The generativity begins to develop from the early adulthood, but the realization and achievement of it increases greatly in the middle age. The generativity is the degree of individual internal development that is important for having identity as a middle-aged adult, and it means the maturity of psychosocial adaptation in the middle aged.[2]

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Middle age is a kind of transition period from adulthood to old age, it is an important and meaningful step in the life cycle that ruminate the whole life and thinks about the future life with the decrease of physical function, change of family life cycle, loss of social role. Also, as a result of social and economic activities, people in this period will have a desire for a high-quality life, and resources to realize it.[3] The most common emotional change experienced in middle age is depression, which is caused not only by the effects of hormones, but also by the interaction of such as worries about the future, emotional crisis and anxiety, and a change in presence in family relationships.

Depression is associated with when people reach the middle of life, a question about what life means and who they really are, and along with one's own life goals and achievements level amid emotional turmoil and wandering, such as the futility of life, emptiness, despair, stagnation, and lethargy.[4]In particular, if the generativity is not acquired in middle age, it may fall one's into

depression and self-righteousness, and sometimes it caused experience psychological difficulties such as shrinking relationships with couples and others, anxiety, depression, and low self-esteem.[5] Therefore, it can be confirmed that the generativity in middle aged is closely related to negative emotions such as depression.

On the other hand, the generativity is a key factor in making people feel positive about themselves and evaluate their lives as meaningful and valuable. And it makes them emphasize positive aspects with optimistic attitudes toward the changes that occur to them.[6] Also, the generativity is a concept that exists within an individual, but it is formed as a result of continuous interaction between the social environment and the individual,[7] and the individual can enhance psychological well-being and enhance by perceiving the support of the social support system or resources, and it can enhance the generativity.[8]

Therefore, based on the preceding study[7] that social support increases psychological well-being, quality of life, and psychological well-being and quality of life are related to the generativity of middle-aged, social support in relation to depression and the generativity are judging as it will act as a mediating variable between these two variables. Hence, in this study aims to provide basic data for developing nursing intervention programs that can improve the generativity in the middle aged by confirming the mediating effect of social support in the relationship between depression and generativity in the middle aged.

Method

Subjects: The subjects of this study were convenience sampling the middle-aged men and women aged 40 to 59 who live in four cities in including Seoul, Gyeonggido, Gangwondo, and Chungcheongnamdo. The minimum number of samples in this study was calculated to be 119 when the medium level of effect size .15, significance level .05, and predictors were set to 3 to secure a statistical power of 95%, which is for correlation and regression analysis using G*Power 3.12 program. Hence, in this study, a questionnaire was distributed to 140 people, and 128 questionnaires were included in the final analysis.

Instruments:

Depression: The Korean version of Center for Epidemiologic Studies Depression Scale-Revised, (K-CESD-R), which is verified the validity and reliability by Lee et al.[9] was used.The tool consists of the five-point scale from 0 to 4 of 20 items, and it means the higher the score, the higher the degree of depression. The Cronbach's alpha value in this study was .97.

Social Support: The Korean version measurement tool[10] of the Multipledimensional Scale of Perceived Social Support(MSPSS), which is developed by Zimet et al.[11] was used. The tool consists of the five-point scale of 12 items, and it means the higher the score, the higher the degree of social support. The Cronbach's alpha value in this study was .94.

Generativity: The middle-aged generativity scale developed by Lee & Lee[7],was used. The tool consists of the five-point scale of 27 items, and it means the higher the score, the higher the degree of social support. The Cronbach's alpha value in this study was .93.

Data Collection: The data collection was implemented from the period of November 2019 to December 2019. The data collection was conducted on middle-aged men and women who visited once or twice the community social gatherings, sports centers, and shopping centers by this researcher. Also, the purpose and intent of the research were explained and then let them voluntarily participated in the research and wrote a written consent form.

Ethical Consideration: The selected subjects were assured anonymity and confidentiality after explaining the purpose and intent of the study and explained in advance that the subjects do not have to respond if they were reluctant to expose personal information.Also, they got explained that they could suspend or withdrawn if they do not wish to participate in the research at any time. Collected data will be stored in a locked private locker for three years after the study is completed, and will be discarded.

Data Analysis: The collected data were processed by computerized statistics using SPSS/WIN 22.0 program. The general characteristics of the subject, the depression in middle age, the generativity and the degree of social support were obtained by frequency and percentage, average and standard deviation, and the correlation between the variables was analyzed by the Pearson's correlation coefficients. Also, to understand the mediating effect of social support in the relationship between depression and the generativity in middle age, regression analysis was conducted following the method suggested by Baron and Kenny[12], and the significance of mediating effect was confirmed by Sobel test.

Results

General Characteristics of Subjects: The general characteristics of the subjects in this study are as follows (Table 1). The distributions of the gender were 59 men (46.1%), 69 women (53.9 %), and the age was 76 women between 40 and 49 (59.4%) and 52 people between 50 and 59 (40.6%). The education level was the highest in 104 students (81.2%) with college or higher. And the subject who had spouses was 98(76.6%). In terms of marital satisfaction was the highest in 48 (37.5%) with who answered as 'satisfied'. And 66 (51.6%) answered as 'yes' on whether they have religion, and 105 (82.0%) had a job. In economic status, 85 (66.4%) answered 'middle' and in health status, 53 (41.4%) of subjects answered as 'hHealthy' (Table 1).

Table 1: General characteristicsof subjects(N=128)

Characteristics	Categories	n(%)
Gender	Male	59(46.1)
	Female	69(53.9)
Age(years)	40~49	76(59.4)
	50~59	52(40.6)
Education	≤High school	24(18.8)
	≥College	104(81.2)
Spouse	Yes	98(76.6)
	No	30(23.4)
Marital satisfaction	Very Satisfied	14(10.9)
	Satisfied	48(37.5)
	Common	22(17.2)
	Dissatisfied	8(6.3)
	Very dissatisfied	6(4.7)
Religion	Yes	66(51.6)
	No	62(48.4)
Occupation	Yes	105(82.0)
	No	23(18.0)
Economic status	High	3(2.3)
	Middle	85(66.4)
	Low	40(31.3)
Healthstatus	Very healthy	2(1.6)
	Healthy	53(41.4)
	Common	39(30.5)
	Unhealthy	29(22.7)
	Very unhealthy	5(3.9)

The Degree of Depression, Social Support and Generativity in Subjects: The subjects' average score of depression was .66(±.82), social support was 3.38(±.75), and generativity was 3.21(±.54).

Table 2: The degree of depression, social support and generativity in subjects

Variables	M±SD	Min	Max
Depression	.66±.82	.00	3.60
Social support	3.38±.75	1.00	5.00
Generativity	3.21±.54	1.48	4.30

Correlations between depression, social support and generativity in subjects: The generativity was shown that is has a significant negative correlation with depression(r=-.40, p<.001) and a positive correlation with social support(r=.68, p<.001). In other words, it showed that the lower the score of depression, and the higher the level of social support, the higher the generativity (Table 3).

Table 3: Correlations between depression, social support and generativity in subjects

Variables	Depression r(p)	Social support r(p)	Generativity r(p)
Depression	1		
Social support	-.32(<.001)	1	
Generativity	-.40 (<.001)	.68 (<.001)	1

The mediating effect of social support in the relations between depression and generativity in subjects: As a result of testing assumptions of the regression model for diagnosing whether the data in this study are suitable for regression analysis before testing the mediated effect, the Durbin-Watson index for self-correlation was 1.898, that it satisfied the independence test. For the multicollinearityamong independent variables, there was no multicollinearity, as the variance inflation factors (VIF) was between 1,000~1.116. Therefore, all the assumptions for regression analysis were met. Firstly, the results of Baron and Kenny's three-step mediated effect verification to test the mediated effect of social support in the relationship between depression and the generativity in middle age are as follows (Table 4).

Step one, the independent variable depression had a statistically significant effect on the mediating variable social support (β=-.323, *p*<.001), and the explanation power of social support was 9.7%. Step two, the independent variable depression had a significant effect on the dependent variable generativity (β=-.400, *p*<.001), and the explanation power of the generativity was 15.3%. Step three, in order to understand the effect

of the social support which is the independent variable on the generativity which is the dependent variable, the result of regression analysis by set the depression and social support as a predictor and the generativity as the dependent variable, depression (β=-.203, *p*=.003) and social support(β=.609, *p*<.001) was shown as a significant predictor of generativity. In step three, when the social support mediated variable, depression was shown as significant for the generativity, and the non-standardized regression coefficient was reduced from the absolute value .264 of Step two to the absolute value .134 of Step three that it shown the social support was partially mediated. The explanation power of these variables explaining the generativity was shown as 48%. In order to significance test of the scale of the mediating effect of social support conducted the Sobel test, and the result showed that social support is a significant mediating variable in the relationship between depression and generativity (Z=-3.522, *p*<.001).

Table 4: Mediating Effect of Social support in the Relations between Depression and Generativity in subjects

Step	Variables	B	β	t	p	R^2	Adj. R^2	F	p
Step 1	Depression → Social support	-.298	-.323	-3.829	<.001	.104	.097	14.661	<.001
Step 2	Depression → Generativity	-.264	-.400	-4.892	<.001	.160	.153	23.931	<.001
Step 3	Depression, Social support→Generativity					.492	.484	60.533	<.001
	1) Depression	-.134	-.203	-3.012	.003				
	2) Social support	.437	.609	9.044	<.001				
Sobel test : Z=-3.522, p<.001									

Discussion

The cut point for this depression tool was 13 points, and the depression level of subjects for this study was an average score of .66 points (average of 13.2 points). The optimal cut point of CESD-R tool in foreign countries is 16 points, which is higher than this tool. This may be a result of reflecting the sociocultural background of Korea, so it is emphasized that the management of middle-aged depression is necessary even if the score of this tool is relatively low.[13] The level of social support average score of 3.38 points, which was lower than 3.75 points in a result of a study of middle aged people using the same tools.[14] However, the social support in the middle age when the support system from family members and social networks was reduced, was shown to buffer the depression.[14]The average score of the generativity was 3.21, and the study of Ji[15] was higher with 3.59 than this study. These results are considered it is because the subjects of the study of Ji15 are older than this study's subjects. And this is consistent with the results of Oh[16], which reported that the generativity of middle-aged is higher than young people and lower than old age.

In the correlation between depression, social support, and the generativity, the generativity was a significant negative correlation with depression, and a positive correlation with social support. These results are consistent with the study that reported that middle-aged women's depression is correlated with social support[14] and that depression has a negative correlation.[7] Thus, it supports this study as social support can be inferred that it is related to the generativity.

Social support has been shown to have a partial mediating effect in the relationship between depression and generativity. In other words, middle-aged depression directly affects the generativity, and it can positively affect the generativity by social support that has mediated effect. In the study of Kim and An[17] also shown that the key factors related to the generativity of old age were family relations, and it is emphasized that the development task of life should be completed through social activities until middle age. Therefore, it supports the results of this study that the generativity improves through social support, and social support acts as an important mediating effect.

Hence, in this study, it is necessary to seek a physically and psychologically integrated nursing intervention strategy to establish the generativity

of middle aged by proving that social support has a mediating effect in the relationship between depression and generativity of middle aged.

Conclusions

In this study, social support has been identified as a mediating variable that significantly affects the generativity, which is a dependent variable, in the relationship between depression and generativity in middle aged. As a result, the quality of life after middle age can be determined by how successful they are adapting to changes and losses caused by physical aging. Therefore, the re-examination is needed to establish the generativity, a development task in middle age, by enhancing the ability to manage depression through social support.In addition, since this study was conducted on middle aged men and women in some parts of the country, it is difficult to generalize the results of the study. Therefore, it is suggested that further studies on the generativity that added various subjects and other new mediating variables to be conducted.

Ethical Clearance: Not required

Source of Funding: Self

Conflict of Interest: Nil

References

1. Erikson EH. Child and Society. 2nd ed. New York: Norton; 1963.
2. Stewart AJ, Ostrove JM, Helson R. Middle aging in women: patterns of personality change from the 30s to the 50s. Journal of Adult Development, 2001, 8(1), 23-37.
3. Chang HK, Sohn JN. Factors related to meaning of life in middle adults. Asia-pacific Journal of Multimedia Services Convergent with Art, Humanities, and Sociology, 2017, 7(7), 609-21. http://dx.doi.org/10.14257/ajmahs.2017.07.90
4. Bosworth HB, Bastian LA, Kuchibhatla MN, Steffens DC, Mcbride CM, Skinner CS, et al. Depressive symptoms, menopausal status, and climacteric symptoms in women at midlife. Psychosomatic Medicine, 2001, 63(4), 603-8.
5. Schoklitsch A. Generativity and aging: A promising future research topic? Journal of Aging Studies, 2012, 26(3), 262-272.
6. Oh KS. Generativity among young, midlife, and older adults. Journal of Korea Gerontological Society, 2001, 21(1), 59-71.
7. Lee OH, Lee JY. Construct exploration and validation of mid-life generativity scale. Korean Journal of Counseling, 2012, 13(2), 665-688.
8. Lent RW, Singley D, Sheu HB, Gainor KA, Brenner BR. Social cognitive predictors of domain and life satisfaction: exploring the theoretical predictors of subjective well-being. Journal of Counseling Psychology, 2005, 52(3), 429-442.
9. Lee S, Oh ST, Ryu SY, Jun YJ, Lee K, Lee E, et al. Validation of the Korean version of center for epidemiologic studies depression scale-revised(K-CESD-R). Korean Journal of Psychosomatic Medicine, 2016, 24(1), 83-93.
10. Shin JS, Lee YB. The effects of social supports on psychosocial well-being of unemployed. Korean Journal of Social Welfare, 1999, 37(2), 241-269.
11. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. Journal of Personality Assessment, 1988, 52(1), 30-41.
12. Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology, 1986, 51(6), 1173-1182.
13. Lee S, Oh ST, Ryu SY, Jun YJ, Lee K, Lee E, et al. Validation of the Korean version of center for epidemiologic studies depression scale-revised(K-CESD-R). Korean Journal of Psychosomatic Medicine, 2016, 24(1), 83-93.
14. Chang HK. Influencing factors on mid-life crisis. Korean Journal of Adult Nursing, 2018, 30(1), 98-105. https://doi.org/10.7475/kjan.2018.30.1.98
15. Ji EJ. The effect of search for meaning on subjective well-being in middle-aged adult: mediating role of generativity, meaning presence, spirituality. The Korean Journal of Developmental Psychology, 2018, 31(4), 199-224.
16. Oh KS. Generativity among young, midlife, and older adults. Journal of the Korea Gerontological Society, 2001, 21(1), 59-71.
17. Kim DH, An JS. The relationship among wisdom, family relationship, generativity, and ego-integrity of Korean elderly. Journal of the Korea Gerontological Society, 2013, 33(2), 381-395.

Quality of Life Evaluation in Titanium/Peek Andtitanium/ Co-Crdouble Crown Systemin Implant-Retained Mandibular Overdenture (Randomized Controlled Trial)

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Abstract

Background and Objective: This study was designed to evaluate the impact of double crown system with either titanium/PEEKor titanium/Co-Cr combination on oral and general health related quality of life (OHRQoL) in patients with completely edentulous mandible.

Materials and Method: Participating patients received new complete dentures and then received two mandibular interforaminal implants. Patients were randomly dividedinto two equal groups. For patients of group (A) the secondary crowns of the telescopic overdenture were made of PEEK material, while those of group (B) the secondary were made of Co-Cr material. Questionnaires were used to assess OHRQoL (OHIP-EDENT).

Results: The study was conducted on 18 healthy completely edentulous patients. Patients were recalled two weeks after final dentures insertion, 3m, 6m, 9m and 12m. The results showed that both materials have improved the oral health related quality of life, however there was a non-significant difference between the two groups.

Conclusion: Double crown systems, with either titanium/Peek combination or titanium/Co-Cr combination, have the same impact on oral and general health related quality of life when used for treating patients with completely edentulous mandibles.

Keywords: *Double crown, telescopic overdenture, PEEK*

Introduction

The standard treatment for completely edentulous patients is a complete maxillary denture opposed by mandibular overdenture on two implants. Various attachment systems have been introduced for retaining implant supported overdentures. One of the most popular attachments is the double crown system or the telescopic attachment.(1,2)

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For proper functioning of telescopic retained overdentures, proper retentive force must exist. This is particularly important because of the direct relation between retention of the prosthesis and patient's satisfaction. For the success of double-crown systems it is very important to reach an optimum retentive force, which necessitates technical skills and experience.(3)The double crown retention is associated with the problem of the frictional wear during their functional period.(4) In addition,as reported by **Ohkawa et al**, it is hard to predict the long-term denture retention. Retentive force can decline, remain unchanged, or even increase.(5) The material used for double crown system fabrication is one of the parameters in its retention.(6) Metal alloys, precious and non-precious, are the most commonly

approved materials in prosthodontics owing to their excellent physical and mechanical properties. Double crown systems are presented in different material combinations. Those different materials have different retention forces and different long-term retention behavior.[7]

Gold either casted or electroplated, has been the standard material in double crown system for years. However, gold has many disadvantages being expensive, heavy, and its electroplating technique requires highly skilled technicians.[8] Base metals alloys and titanium are also used for double crown system fabrication. Some of these metals reported allergic reaction, discrepancies due their casting procedure, as well as galvanic current between the primary and secondary copings. All that previously mentioned, evokes the need of new material combination of double crown system being non-metallic, of low cost, and with satisfactory retention values.

New metal free materials have been introduced to substitute metals. One of them is a thermoplastic composite polymer known as PolyEtherEtherKetone or PEEK which is already used in telescopic crown manufacturing and other prosthetic treatment modalities. Studies that are available about the suitability of PEEK as double crown material are scarce and only in vitro.

Those materials are claimed to have many clinical advantages and reported to have high retention values. [9] They have mechanical properties that are definitely different from that of metal and reported to have a highly successful result. Therefore, when used in double crown system, enough evidence must exist to ensure that their properties will cope with the fundamentals and prosthetic advantages of double crown system in completely edentulous mandible taking into account the value and stability of their retentive force, prosthetic technical complications, and patient perception.

The patients' expectation in terms of function, esthetic, psychological, and social aspectsis very important factor.[10]The Oral Health Impact Profile for Edentulous OHIP-DENT is short questionnaireand relevant to prosthodontics treatments outcome. Ita 19-question survey and was suggested to be the most appropriate for edentulous patients, as it includes a set of specific questions relevant to edentulous patients.This tool evaluates the impact of oral health on the quality of life of patients with complete dentures before and after prosthodontics intervention.[11]

The aim of the study was to evaluate the impact of double crown system with titanium/Peek combination versus double crown system with titanium/co-cr combination on the Oral Health-Related Quality of Life in patients with completely edentulous mandible,

Materials and Method

Study Groups: Patients were randomly divided into two equal groups: the intervention group (group A) in which the secondary crowns of the telescopic overdenture were made of PEEK thermoplastic material, and the study group (group B) in which the secondary crowns of the telescopic overdenture were madeof Co-Cr material. Simple randomization procedure was used. Allocation of the patients in either intervention groupor control groupwas performed with computerized random allocation program. Computer-generated list of random numbers was obtained for both groups.

Study Population: Eighteen Completely edentulous patients were selected from the outpatient clinic of prosthodontic department, faculty of Dentistry Cairo University, in an age range of 45 - 65 years. Patients were given a detailed description of the planned procedures and provided written informed consent prior to participation. The study protocol was approved by the local ethics committee. All patients had to fulfill the following inclusion criteria: Patients are completely edentulous from 3 months at least, inter-arch distance is 15mm or more, anterior lower ridge with buccolingual width of 6mm or more, as measured from CBCT, patients have Angle's class I relation and without TMJ disorders, patients are free from any systemic disease that may interfere with proper osseointegration of implants. Heavy smokers and uncontrolled diabetic patients whose glycosylated hemoglobin (HbA1c) is more than 8% were excluded from the study.

All patientswere provided with conventional maxillary and mandibular complete denture followed by the insertion of two (NeoBiotech,Neo CMI implant IS-II active), 10mm length and 3.5mm diameter, implants in the interforaminal region. Following implant placement and a healing period of 3 months, the implants were uncovered and healing abutments were inserted and impression were made followed by milling of the prefabricated titanium shapeable abutments in 2-degree taper angle. The milled abutments were scanned using scanning machineand scanning software to design a coping with 0.6mm thickness. The design was exported

as STL file to a milling machine in order to mill the coping in wax. For group A, the secondary coping was fabricated in PEEK material (*BioHPPGranulat for 2 press system,Bredent, Germany*) which is processed in the for-2-press vacuum press device. For the second group, the secondary coping was casted in Cobalt Chrome material using the conventional lost wax technique. After secondary copings fabrication, metal framework was constructed for both groups *(fig.1)*, followed by mandibular overdenture construction. The final mandibular overdenture was inserted intraorally, while the abutments were screwed in their position and secondary copings were well seated upon them followed by intraoral pick up of the secondary copings into the metal framework using DTK-adhesive material*(fig.2, fig.3)*.

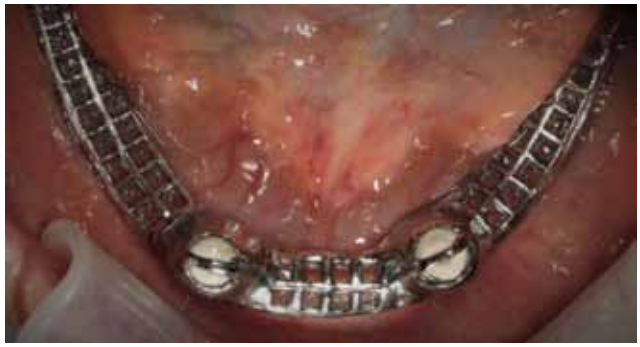

Fig. (1) Metal framework and PEEK copings

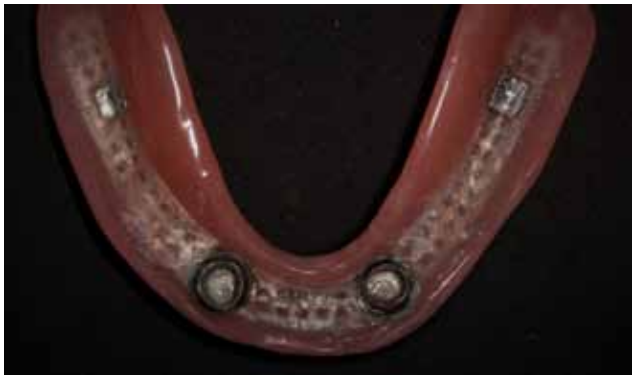

Fig. (2) The secondary copings picked up

Fig. (3)The final prosthesis

Outcome Measures: Two weeks after denture insertion, the patients were recalled for assessment, and after 3m, 6m, 9m and 12m. Patients were monitored in terms of Oral Health-Related Quality of Life via the use of OHIP-EDENT questionnaire. Patients were asked 19-questions in Arabic language by one examiner only. Patients answered the questions expressing their satisfaction concerning the prosthesis in five choices; never, hardly ever, occasionally, fairly often, very often. Each choice was given score. lower scores indicated better oral health-related quality of life.

Data were statistically described in terms of mean ± standard deviation (± SD), median and range when appropriate. Comparison between the study groups was done using Mann Whitney *U*test for independent samples. Within group comparison was done using Wilcoxon signed rank test for paired (matched) samples in comparing 2 groups and Freidman's test in comparing more than 2 groups. *p* values less than 0.05 was considered statistically significant. All statistical calculations were done using computer program IBM SPSS (Statistical Package for the Social Science; IBM Corp, Armonk, NY, USA) release 22 for Microsoft Windows.

Results

Eighteen patients were included in this study;Male to female ratio was 3.5(4 females and 14 males) in an age range of 45 - 65 yearswith average age group of 55.

Throughout the entire time intervals of the study, PEEK group showed lower scores than the Co-Cr group in term of the seven domains of the OHIP-EDENT questionnaire. At baseline only, Co-Cr group showed lower scores than that of the PEEK group in terms of two domains; psychological discomfort (p value= 0.049) and psychological disability (p value= 0.591). However, in general and as total scores, there is statistically insignificant difference between the two groups.

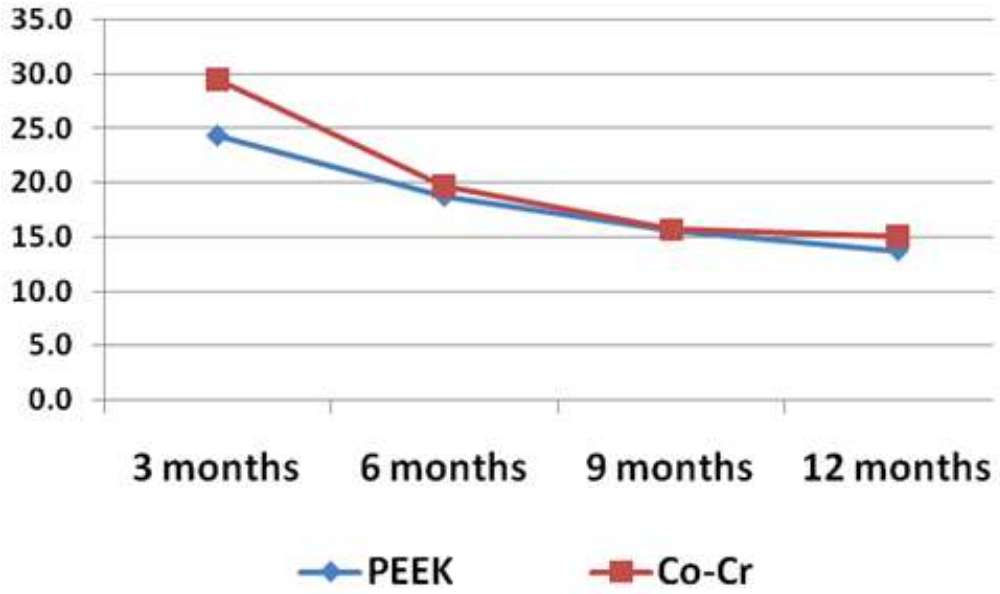

Fig .(4): Mean total score between the study groups

Based on Wilcoxon signed rank test, for the PEEK group, there is statistically significant difference in the OHIP-EDENT Scores between the baseline and after 12 months follow up as illustrated in table (1). While for the Co-Cr group, there is statistically significant difference in the OHIP-EDENT Scores between the baseline and after 12 months follow up as illustrated in table (1).

Table 1: The difference in the OHIP-EDENT Scores for group A (PEEK) andgroup B (Co-Cr) between the baseline and 12m:

Test Statistics(b,c)								
	Functional limitation-12m - Functional limitation-Baseline	**Physical pain-12m - Physical pain-Baseline**	**Psychological discomfort-12m - Psychological discomfort-Baseline**	**Physical disability-12m - Physical disability-Baseline**	**Psychological disability-12m - Psychological disability-Baseline**	**Social disability-12m - Social disability-Baseline**	**Handicap-12m - Handicap-Baseline**	**Total-12m - Total-Baseline**
Z	-2.401(a)	-2.456(a)	-2.271(a)	-2.264(a)	-2.232(a)	-2.264(a)	-2.410(a)	-2.375(a)
p value	0.016	0.014	0.023	0.024	0.026	0.024	0.016	0.018
a. Based on positive ranks.								
b. Wilcoxon Signed Ranks Test								
c. Group = PEEK Significance level at p≤0.05.								

Test Statistics(b,c)								
	Functional limitation-12m - Functional limitation-Baseline	**Physical pain-12m - Physical pain-Baseline**	**Psychological discomfort-12m - Psychological discomfort-Baseline**	**Physical disability-12m - Physical disability-Baseline**	**Psychological disability-12m - Psychological disability-Baseline**	**Social disability-12m - Social disability-Baseline**	**Handicap-12m - Handicap-Baseline**	**Total-12m - Total-Baseline**
Z	-2.588(a)	-2.565(a)	-2.588(a)	-2.539(a)	-2.032(a)	-2.539(a)	-1.826(a)	-2.524(a)
pvalue	0.010	0.010	0.010	0.011	0.042	0.011	0.068	0.012
a. Based on positive ranks.								
b. Wilcoxon Signed Ranks Test								
c. Group = Co-Cr Significance level at p≤0.05.								

Discussion

In the presented study, mandibular implant retained overdenture using double crown systems, with either titanium /PEEK combination or titanium /Co-Cr combination was evaluated regarding Oral Health-Related Quality of Life and it was showed that both have the same impact on oral and general health related quality of life when used for treating patients with completely edentulous mandibles. There are few clinical studies which evaluated the impact of various material combinations of double crown system on the oral and health related quality of life (OHRQoL). The available studies showed general improvement in (OHRQoL) by the use of double crown system as an attachment for mandibular implant overdenture as compared to conventional dentures.[12,13]

The results of the presented study showed a general improvement in the seven domains of(OHIP-DENT) questionnaire in both groups throughout the study period. Although statistically insignificant difference was found between both groups regarding the (OHRQoL), PEEK as a secondary crown material, had a positive impact on the oral and health related quality of life.

In Co-Cr group, overdentures insertion and removal were much more easier than that of the PEEK ones. That might explain the lower scores of the Co-Cr group at the baseline in terms ofpsychological discomfort and psychological disability. Although it is agreed that retention of overdentures is mostly mechanical when using double crown systems, it is also augmented by the physical factors of retention and the neuromuscular adaptation of the patient.[14]

At denture insertionappointment and for short period later, patients with PEEK secondary copings reported difficulty in insertion and removal of their overdentures due to the high retention of the PEEK copings. By time, patients of the PEEK group became morefamiliar with their over dentures and patients of Co-Cr group got more adaptated to their overdentures, and in return more satisfaction took place in both groups.

It has been suggested by several studies that the time effect plays an important role in terms of quality of life and patients satisfaction. The initial assessment of a new removable prosthesis is not a significant predictor of patients' perception later on.[15]This can by due to the changes that occure in the oral cavity due to the neuromuscular adaptation of the patient with the prosthesis.[16]This is supported by another two studies which suggested that patient satisfaction with mandibular complete dentures is determined more by the denture-wearing experience itself[17], and the age of the mandibular prosthesis as well.[18]

Conclusion

Funding: The study was self-funded

Competing Interests: No conflict of interest

Ethical Approval: Taken from the Ethics and research committee, Faculty of Dentistry, Cairo University and patients' consent was obtained.

References

1. Mericske-Stern, R., Taylor, T. D., & Belser, U. Management of the edentulous patient. Clinical Oral Implants Research. 2000; 11, 108–125.
2. Chandan, K., Agrawat, P., Mistry, G., & Singh, R. Implant Supported Overdenture Attachments- A Review. 2017;16(11), 87–91.
3. Kwon, H., Ph, D., Roh, Y., & Lee, S. The Comparison of Initial Retentive Force in Different Double crown systems. Journal of Korean Academy of Prosthodontics. 2006; 44(6), 677–682.
4. Alsabeeha, N. H. M., Payne, A. G. T., & Swain, M. V. Attachment systems for mandibular two-implant overdentures: a review of in vitro investigations on retention and wear features. The International Journal of Prosthodontics, 2009; 22(5), 429–440.
5. Ohkawa, S., Okane, H., Nagasawa, T., & Tsuru, H. Changes in retention of various telescope crown assemblies over long-term use. The Journal of Prosthetic Dentistry. 1990;64(2), 153–158.
6. Güngör, M. A., Artunç, C., & Sonugelen, M. Parameters affecting retentive force of conus crowns. Journal of Oral Rehabilitation. 2004;31(3), 271–277.
7. Arnold, C., Hey, J., Setz, J. M., Boeckler, A. F., & Schweyen, R. Retention force of removable partial dentures with different double crowns. Clinical Oral Investigations,2018; 22(4), 1641–1649.
8. Ohida, M., Yoda, K., Nomura, N., Hanawa, T., & Igarashi, Y. Evaluation of the static frictional coefficients of Co-Cr and gold alloys for cone crown telescope denture retainer applications. Dental Materials Journal. 2010; 29(6), 706–712.

9. Skirbutis, G., Dzingutė, A., Masiliūnaitė, V., Šulcaitė, G., & Žilinskas, J. A review of PEEK polymer's properties and its use in prosthodontics. Stomatologija Baltic Dental and Maxillofacial Journal. 2017; 19(19), 19–23.
10. Locker, D. Patient-based assessment of the outcomes of implant therapy: a review of the literature. The International Journal of Prosthodontics. 1998; 11(5), 453–461.
11. Finbarr Allen, BDS, PhD, MSc, Fdsrcps., & David Locker, BDS, P. A Modified Short Version of the Oral Health Impact Profile for Assessing Health-Related Quality of Life in Edentulous Adults. The International Journal of prosthodontics. 2002; 15(5), 446–451.
12. Yunus, N., Saub, R., Taiyeb Ali, T., Salleh, N., & Baig, M. Patient-Based and Clinical Outcomes of Implant Telescopic Attachment–Retained Mandibular Overdentures: A 1-Year Longitudinal Prospective Study. The International Journal of Oral & Maxillofacial Implants. 2014; 29(5), 1149–1156.
13. Brandt, S., Brandt, J., Lauer, H.-C., & Winter, A. Evaluation of Patient Satisfaction with Dentures Retained By Ceramic Primary and Electroplated Secondary Conical Double Crowns upto 16 Years. Journal of Dental Oral Health. 2018;5, 1-6
14. Heckmann SM, Heusinger S, Linke JJ, Graef F,Pro¨schel P. Improvement and long-term stability of neuromuscular adaptation in implant-supporte overdentures. Clinical Oral Implant Research.2009; 20, 1200–1205.
15. Fenlon, M. R., & Sherriff, M. Investigation of new complete denture quality and patients' satisfaction with and use of dentures after two years. Journal of Dentistry. 2004; 32(4), 327–333.
16. Michaud, P. L., De Grandmont, P., Feine, J. S., & Emami, E. Measuring patient-based outcomes: Is treatment satisfaction associated with oral health-related quality of life. Journal of Dentistry. 2012; 40(8), 624–631.
17. Celebić, A., Knezović-Zlatarić, D., Papić, M., Carek, V., Baucić, I., & Stipetić, J. Factors related to patient satisfaction with complete denture therapy. The Journals of Gerontology. Series A, Biological Sciences and Medical Sciences. 2003; 58(10), M948-53.
18. Cerutti-Kopplin, D., Emami, E., Hilgert, J. B., Hugo, F. N., Rivaldo, E., & Padilha, D. M. P. Predictors of Satisfaction with Dentures in a Cohort of Individuals Wearing Old Dentures: Functional Quality or Patient-Reported Measures. Journal of Prosthodontics.2017; 26(3), 196–200.

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The Correlation Between Nesfatin-1 Level and Insulin Resistance in Gestational Diabetes Verses Control

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Abstract

Objective: The examination of nesfatin-1 level in females with gestational diabetes versus controls and its relation with the markers of insulin resistance.

Method: The study was accomplished for eighty eight pregnant females at 24th -28th week of gestation which were involved 44 females diagnosed with gestational diabetes and 44 females without. Age and bone mass index were matched in two groups. Nesfatin-1 and insulin concentrations were measured by using enzyme linked immunosorbent assay. Insulin level and (homeostasis model assessment index- insulin resistance) were measured in two groups. The manufacture instructions were performed accurately. The comparison between previous parameters was performed.

Results: The level of nesfatin-1 wasn´t differed significantly between two groups. While insulin, homeostasis model assessment index-insulin resistance and fasting blood glucose were significantly increased in gestational diabetes than control groups.

Conclusion: The mean of nesfatin-1 levels showed no significant difference between two groups. While fasting blood glucose, insulin, and homeostasis model assessment index-insulin resistance were significantly higher in GDM. Advance age, higher bone mass index were associated of gestational diabetes.

Keywords: *Gestational diabetes; nesfatin-1, insulin resistance.*

Introduction

Gestational diabetes "is defined as diabetes first diagnosed in the second or third trimester of pregnancy that is not clearly either preexisting type 1 or type 2 diabetes(1). Placental production of anti-insulin hormones like: cortisol, progesterone,a human placenta lactogen,oestrogen that are lead to evolve insulin resistance after mid pregnancy(2).

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The risk characteristics for development of gestational diabetes: reduced sensitivity of insulin and raised resistance of insulin in women before pregnancy, production of insulin is inadequate after conception, and cell functional weakness(3).

Nesfatin-1 is polypeptide which is consist of 82 amino acid (aa) that is obtained from DNA binding protein (NUCB2 (and calcium. NUCB2 (nonesterified fatty acid/ nucleobinding 2) is present in the plasma membrane and neuroplasmaand peripheral organ(4). The PC3/1 and PC2 that are changing the NUCB2 to nesfatin-1, 2 and 3 (5). The one of the marked roles of nesfatin-1 is regulation of hunger, control of food ingestion and appetite which is leading to satiety feelings(6).

Nesfatin-1 role is supporting insulin release via Ca+2 influx through L-Type Ca+2 canals without depending on protein kinase A (PKA) and phospholipase A2, impairment in the regulation of nesfatin-1 might be involved in metabolic upset like type (II) D.M.[7,8].

Insulin action in skeletal muscle, adipose tissue and liver are very essential in the homeostasis of total body fuel.. Insulin exerts anabolic effects by stimulation uptake and storage of carbohydrate, amino acids and fat and prevented catabolism of those fuel stores[9].

The facilitative glucose transporter (GLUT2) is taking up blood glucose that is present on the β-cells surface. Inside the cell, generating adenosine triphosphate (ATP) by glycolysis of glucose results in the raising ATP/ADP ratio. This alteration in the ratio lead up to close ATP-sensitive K+-channels (KATP-channels).In non-energizing status, the canals remain opening to keep the resting potential via transfer potassium ions (K+) down their concentration gradient out of the cell. Upon closing, the following drop in "the magnitude of the outwardly directed K+-current elicits the depolarization of the membrane, followed by the opening of voltage-dependent Ca+-channels (VDCCs) "[10].

The aim of this study that is examination of nesfatin-1 level in females with gestational diabetes versus controls and find the relationship between nesfatin-1 and markers of insulin resistance.

Subjects and Method

This case control study was involved 88 pregnant females at 24^{th}-28^{th} weeks of gestation that was categorized in to two groups forty four females diagnosed without gestational diabetes and 44 females without (control). Their age and BMI are matched. Previous acceptance was obtained from all females. This study is accomplished in Baghdad and AL Yarmouk Teaching Hospital and National center for Diabetes research and Treatment / Mustansiriya University from November 2018 to May 2019 . Females with pre-existing DM, liver, renal and inflammatory disease,fetal and placental abnormality, hypertension,anti-inflammatory drugs, glucocorticoid of any dose in the last 3 months before sampling were excluded.

The diagnosis of GDM depend on the International Association of the Diabetes and Pregnancy and study groups (IADPSG)[1], Fasting blood sugar ≥ 126mg/dlor random blood sugar (200mg/dl) that minimum value for diabetes diagnosis otherwise GDM in females with moderate or high-risk factors were diagnosed by performing OGTT one or more of the venous plasma concentration must be met or exceeded for a positive diagnosis FBS ≥ 92 after 1hours 180 mg/dl at 2 hours 153mg/dl. Females were categorized as controls under this threshold[1].

Method

Five milliliter of blood was drawn from pregnant females when they were fasted not less than 8 hour then centrifuged and stored at −80ºC until use. Nesfatin-1 and insulin levels were analyzed by enzyme linked immunosorbent assay kits which were manufactured in ((CUSABIO\ China) (HUMAN / Germany) company. Serum glucose was analyzed by an enzymatic colorimetric method which performed by Human kits . The relationship between nesfatin-1 and insulin concentration were estimated in two groups .The homeostasis model assessment insulin resistance index (HOMA-IR) was performed for all participants[11]. All statistical analysis, SPSS software 22.0 was used. The Anderson darling test was used for normal distributions. Mean and standard deviation were used when followed normal distribution. Median and interquartile range were used when not follow normal distribution .The differences in means between two groups were analyzed by t test when two sample follow normal distribution with no significant outlier). The differences in median of two groups were analyzed by Mann Whitney U test when they do not follow normal distribution).Linear regression analysis used to assess the association between different variables. Binary logistic regression analysis performed to calculate the odd ratio (OR) and their 95% confidence intervals, when the outcome can be categorized into 2 binary levels, and Wald used to assess which parameters had more strong effect (Wald basically is t^2 which is Chi-Square distributed with df=1). P value considered when appropriate to be significant if less than 0.05.

Results

The mean of nesfatin-1 levels were similar in both groups .While FBS, fasting insulin, and HOMA-IR were significantly higher in GDM compared to control, also insulin resistance percentage (determined as with HOMA-IR ≥ 2.5) was higher in women with GDM, as illustrated in table 1.

Table 1: Assessment of Various Biomarkers for GDM

Variables	Control	GDM	p-value
Number	44	44	-
Nesfatin-1(pg/mL), mean ± SD	38.1±7.4	38.8±7.9	0.676[1]
FBS (mg/dL), mean ± SD	79.1±8.2	107.7±20.6	<0.001 [S][1]
Insulin(μIU/mL), median (IQR)	4.6 (3.6-5.5)	11.7 (5.2-25.3)	<0.001 [S][2]
HOMA-IR (%), median (IQR)	0.9 (0.7-1.1)	2.7 (1.3-6.6)	<0.001 [S][2]
Insulin resistance, n (%)	4 (9.1%)	22 (50.0%)	<0.001 [S][3]
SD: standard deviation, IQR: interquartile range, S: significant [1]Independent t-test [2]Mann – Whitney U test [3]Chi square test			

HOMA-IR: homeostasis model assessment index, FBS: fasting blood sugar.

Table 2: Nesfatin-1 relation to women with GDM

	Nesfatin-1	
	GDM	
	R	p-value
Age	-0.076	0.624
GA	-0.144	0.352
BMI	-0.153	0.321
FBS	-0.107	0.490
Insulin	0.152	0.324
HOMA	0.074	0.631
r: correlation coefficient		

HOMA-IR offeredgood ability, insulin offeredfair abilityand Nesfatin-1 had ability to diagnose GDM, as illustrated in table 3

Table 3: ROC analysis of various markers for GDM

	AUC	95%CI AUC	p-value	-LH	+LH
HOMA-IR	0.830	0.735 – 0.902	<0.001	0.15	3.55
Insulin	0.759	0.656 – 0.844	<0.001	0.34	2.75
Nesfatin-1	0.514	0.405 – 0.622	0.822	0.82	1.55
ROC: receiver operator characteristics, AUC: area under the curve, CI: confidence interval, LH: likelihood ratio					

In terms of specificity nesfatin-1 offered comparable value to that of HOMA-IR and insulin for diagnosis GDM with cut off value less or equal to 36.2 diagnosis GDM, however it sensitivity was very lowthan that of HOMA-IR and insulin. As illustrated in table 4

Table 4: validity analysis of various markers for GDM

	Cut-off	SN	SP	AC	PPV	NPV
HOMA-IR	>1.1	88.6	75.0	81.8	78.0	86.8
Insulin	>5.2	75	72.7	73.9	73.3	74.4
Nesfatin-1	≤36.2	38.6	75	56.8	60.7	55
SN: sensitivity, SP: specificity, AC: accuracy, PPV: positive predictive value, NPV: negative predictive value						

Advance age, higher BMI, elevated fasting insulin, and elevated value of HOMA-IR, were predictors of GDM. Nesfatin-1was not, as illustrated in table 5

Table 5: logistic regression analysis of the predictors of GDM

	Wald	OR (95%CI)	p-value
Age	5.891	1.098(1.018-1.183)	0.015 [S]
BMI	10.251	1.174(1.064-1.296)	0.001 [S]
Nesfatin-1	0.179	1.012 (0.958-1.070)	0.673
Insulin	10.146	1.106(1.039-1.176)	0.001 [S]
HOMA-IR	10.878	1.752 (1.255-2.445)	0.001 [S]
OR: odd ratio, CI: confidence interval, Hx: history			

Discussion

This study shows that there were no significant differences in mean nesfatin-1 concentration between females with GDM versus control. Our study is inagreement with Aslan et al. who noticed that nesfatin-1 concentrations in cord blood were similar in both groupsand the correlation between maternal nesfatin levels and their special cord blood were positive [(12)] .This study is in agreement with Zhai et al.2017, which include 7 a meta-analysis studies,But subgroups in this studies, newly diagnosis women with type 2 diabetes had been significantly higher nesfatin-1 concentration and those who taking antidiabetic drugs had been significantly lower nesfatin-1 concentration so this supports a relation between nesfatin-1 levels and type 2 diabetes [(13)].

Nesfatin-1 levels are decreased in patients with type 2 diabetes who are taking ant diabeticdrugs, these drugs :decreasing of blood glucose, raising sensitivity of insulin and diminished food ingestion. This result clarified also by J. Dong, H. et al.2013 observed thatnesfatin-1 can catalyzed the metabolism of lipid and showed anti-inflammatory effects. [(14)]

The different observation have been shown by groups of Zhang et al.2017as they explained that nesfatin-1 concentrations in maternal serum and cord blood in females with GDM were higher compared to controlsasnesfatin-1 is neatly linked to insulin resistance and obesity in pregnancy[(15)].

But disagreement with (RadzisławMierzynski et al, 2019, Ademoglu et al 2017, Kucukler et al 2016)observed that, nesfatin-1 serum concentrations was significantly lower in females with GDM than controls[(16,17,18)].

The study of Algul et al. 2016. showed that fasting nesfatin-1 concentration decreased in patients with type 2 DM and metabolic syndrome, compared to controls and patients with T1DM.This outcomes are clarified by:GDM and T2DM, and (IGT) share many common pathophysiological mechanisms such as insulin resistance and hyper in sulinemia, and all of these conditions are more often observed in overweight and obese individuals that study suggested a possible role of nesfatin-1 in GDM, and nesfatin-1 level may be predictor for GDM development and act as antidiabetic therapy[(19)].

The contradiction between the outcomes showed by many studies might be clarified by the difference in study protocols,method of patient selection, the gestational age when samples were collected(2th,3rd trimester),gestational age in the GDM diagnosis (in the 1st trimester (might be IGT before pregnancy) or 2nd trimester ("model" gestational diabetes.) and the type of treatment for GDM: with diet or with metformin or insulin, that might be suggestive the degree of metabolic disorders,

(Hana M. Gashlan 2017, Kucukler et al.2016, Saisho et al2013) all observed that fasting blood glucose and C-peptide concentration are significantly higher in females with GDM than controls due to imbalance between insulin resistance and insulin secretion .The elevated insulin resistance was obvious in females with GDMthat proved by increasing biomarker of insulin resistance. They suggested that increased insulin resistance associated to beta cell dysfunction is related with the degree of glucose intolerance and dosage of insulin that need for females withGDM [(20,18,21)]

This study observed that there was no correlation between nesfatin-1 levels and maternal age, BMI and

gestational age, in both groupsin agreement with Aslan and cols.et al[12] . While study done by (Radzisławet al. 2019, Ying Zhang 2017, Anwar *et al.* 2014, Ramanjaneya et al. 2010) all noticed that nesfatin-1 level was positively correlated withgestational ageand (BMI) in both groups[16,15,22,23] .But negative correlation was observed byKucukler et al (2016) [18].

This study failed to find correlation between nesfatin-1 levels and, fasting insulin, and HOMA-IR and fasting glucose in both groups in agreement with (Aslan et al2012., Algul et al 2015 [12,19] and disagree with (Zhang 2017,Ramanjaneya et al2010) who detected a positive significant correlation [15,.23],while a negative correlation was observed byKucukler et al 2016 [18] .

This study concludesthe mean of nesfatin-1 levels showed no significant difference between women with gestational diabetes and control .While fasting blood glucose, insulin, and homeostasis model assessment index-insulin resistance) were significantly higher in GDM compared to control

Conclusions

Ethical Clearance: Approval to conduct the study was obtained from the dean of college of medicine, Mustansiriyah University

Source of Funding: Self

Conflict of Interest Statement: We declare that we have no conflict of interest.

Reference

1. American Diabetes Association. Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes—2018. Diabetes Care 2018, 41, S13–S27. [CrossRef] [PubMed]
2. Gabbe obstetrics 7th edition 2016.
3. Luo, L.; Liu, M. Adipose tissue in control of metabolism. J. Endocrinol. 2016, 231, R77–R99. [CrossRef][PubMed].
4. Goebel-Stengel M, Wang L. Central and peripheral expression and distribution of NUCB2/nesfatin-1. Curr Pharm Des. 2013;19: 6935-6940.
5. Palasz A, Krzystanek M, Worthington J, Czajkowska B, Kostro K, Wiaderkiewicz R, et al. Nesfatin-1, a unique regulatory neuropeptide of the brain. Neuropeptides. 2012; 46: 105-112.
6. Foo KS, Brauner H, Ostenson CG, Broberger C. Nucleobindin-2/ nesfatin in the endocrine pancreas: distribution and relationship to glycaemic state. J Endocrinol. 2010; 204:255-63.
7. Nakata M, Manaka K, Yamamoto S, Mori M, Yada T. Nesfatin-1 enhances glucose-induced insulin secretion by promoting Ca2+ influx through L-Type channels in Mouse islet-cells. Endocrine J. 2011;58:305-13.
8. Nakata M, Manaka K, Yamamoto S, Mori M, Yada T. Nesfatin-1 enhances glucose-induced insulin secretion by promoting Ca2+ influx through L-Type channels in Mouse islet β-cells. Endocrine J. 2011;58:305-13. [Links].
9. Textbook of Diabetes4th edition(2010)
10Uusi-Rasi K, Kärkkäinen MU, Lamberg-Allardt CJ. Calcium intake in health maintenance-a systemic review. Food Nutr Res. 2013; 57:21082.).(23.1) 2013
11. Bray GA. Medical consequences of obesity. J Clin Endocrinol Metab. 2004;89:2583–9.
12. Aslan, M.; Celik, O.; Celik, N.; Turkcuoglu, I.; Yilmaz, E.; Karaer, A.; Simsek, Y.; Celik, E.; Aydin, S. Cord blood nesfatin-1 and apelin-36 levels in gestational diabetes mellitus. Endocrine 2012, 41, 424–429. [CrossRef] [PubMed]
13. Zhai, T.; Li, S.-Z.; Fan, X.-T.; Tian, Z.; Lu, X.-Q.; Dong, J. Circulating Nesfatin-1 Levels and Type 2 Diabetes: A Systematic Review and Meta-Analysis. J. Diabetes Res. 2017, 2017, 7687098. [CrossRef].
14. J. Dong, H. Xu, H. Xu et al., "Nesfatin-1 stimulates fatty-acid oxidation by activating AMP-activated protein kinase in STZ-induced type 2 diabetic mice," PLoS One, vol. 8, no. 12, article e83397, 2013.
15. Zhang, Y.; Lu, J.; Zheng, S.; Yan, J.; Chen, L.; Liu, X.;Wu,W.;Wang, F. Serum levels of nesfatin-1 are increased in gestational diabetes mellitus. Gynecol. Endocrinol. 2017, 33, 621–624. [CrossRef] [PubMed].
16. Radzisław et al. Nesfatin-1 and Vaspin as Potential Novel Biomarkers for the Prediction and Early Diagnosis of Gestational Diabetes Mellitus: Int. J. Mol. Sci. 2019, 20, 159; doi:10.3390/ijms20010159.
17. Ademoglu, E.N.; Gorar, S.; Keskin, M.; Carlioglu, A.; Ucler, R.; Erdamar, H.; Culha, C.; Aral, Y. Serum nesfatin-1 levels are decreased in pregnant women newly diagnosed with gestational diabetes. Arch. Endocrinol. Metab. 2017, 61, 455–459.

[CrossRef]-

18. Kucukler, F.K.; Gorkem, U.; Simsek, Y.; Kocabas, R.; Gulen, S.; Guler, S. Low level of Nesfatin-1 is associated with gestational diabetes mellitus. Gynecol. Endocrinol. 2016, 32, 759–761. [CrossRef] [PubMed].
19. Algul, S.; Ozkan, Y.; Ozcelik, O. Serum nesfatin-1 levels in patients with different glucose tolerance levels. Physiol. Res. 2016, 65, 979–985.
20. Hana M. Gashlan Vitamin D and Insulin resistance in gestational diabetes mellitus,J Diabetes andEndocrinology, 2017 DOI: 10.5897/ JDE2017.0111-
21. Saisho Y, Miyakoshi K, Ikenoue S, Kasuga Y, Matsumoto T, Minegishi K, et al. Marked decline in beta cell function during pregnancy leads to the development of glucose intolerance in Japanese women. Endocr J. 2013;60(4):533- 539. 65.
22. Anwar gm, yamamah g, ibrahim a, el-lebedy d, farid tm, mahmoud r: nesfatin-1 in childhood and adolescent obesity and its association with food intake, body composition and insulin resistance. Regulpept188: 21-24, 2014.
23. Ramanjaneya M, Chen J, Brown JE, et al. Identification of nesfatin-1 in human and murine adipose tissue: a novel depot-specific adipokine with increased levels in obesity. Endocrinology 2010; 151:3169–80.

Construct Validity Indonesian Version of Barthel Index for Post Stroke

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Abstract

Background & Aims: Stroke is a significant health problem with high prevalence and mortality worldwide. In Indonesia, it is the first leading cause of death after ischemic heart disease in 2017. As Barthel Index has been regarded as the best outcome measure used in rehabilitation of people with stroke, this study sought to determine the construct validity of the Indonesian version of the tool. Specifically, the study looked into the inter-rater reliability of the tool, the problems encountered by participants with the English version and the corresponding modifications to be incorporated in the Indonesian version.

Method: Utilizing an exploratory sequential mixed method design and involving five different groups of participants with a total of 391, the study began with the forward and backward translation of the English Barthel Index followed by the validation, reliability and validity testing of the Indonesian version.

Result: Results showed that inter-rater reliability is satisfactory. Some terms in the English version were modified to suit the linguistic and cultural context of Indonesia. In terms of content validity, the Indonesian version of Barthel Index is acceptable. The construct validity test revealed two major factors, namely, functional performance and physiological function.

Conclusion: it thereby provides a baseline data to advance knowledge on the use standardized tool like BI, to further improve nursing practice in the stroke room, and to enhance the nursing education curriculum.

Keywords: *Construct Validity, Barthel index, Post Stroke*

Introduction

Indonesia has strategic potential in the development and economic growth. However, it does not always have a positive impact; development and economic growth also have a negative impact on people's living behavior. Common changes are high consumption of junk food and fast food, high calorie food consumption, consumption of fatty foods, consumption of cigarettes and alcohol, and low consumption of fiber, fruit and vegetables, and physical activity. The behavior is visible on Riskesdas 2007 data that the prevalence of obesity is 28.1%.[1] The high prevalence of obesity is one of the risk factors of heart disease and stroke.

Measuring outcomes using standardized assessments provides information related to client progression while establishing the value and effectiveness of treatment.[2] Measuring outcomes enables nurse and other health care to identify a patient's current functional status and using this information subsequently direct therapy.[3] Selecting an appropriate standardized assessment can be time consuming as no standardized assessment will measure all the domains for every client group or environmental

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setting and the advantages and disadvantages of each assessment must be considered.[4, 5] Therefore, it is vital that nurses and health worker select an appropriate standardized assessment to assess function that has demonstrated validity and reliability with older adults and stroke patients.[4-6]

The use of Barthel Index measurement tools must be tested in terms of its adaptation, validity and reliability test to be able to provide accurate data about the status of stroke patient condition, specifically if the measuring instrument has not gone through adaptation test, validity and reliability in other language.[7]

In Indonesia, the assessment of functional status of daily activity has used the Barthel index instrument in elderly patients, patients with limited mobility, rheumatoid arthritis and patients after stroke. The Barthel Index has been tested in terms of its reliability and validity to assess the activity of daily living status of elderly and has been recommended that Barthel Index can be used on elderly. However, in this study, the researcher assessed the construct validity of the Indonesian version of the Barthel index for stroke patient as utilized by Indonesian nurses and health professionals. It has been commonly observed that after stroke, the patients suffer hemiplegia and limitations of daily living activity.

Method

The study utilized an exploratory sequential mixed method research design. As an exploratory design, qualitative data was first collected and analyzed, and themes were used to drive the development of a quantitative instrument to further explore the research problem. As a result of this design, two stages of analyses were conducted.

In this study the researcher have taken 308 nurses participants have experience minimal 2 year to care post stroke from the seven hospitals in Sulawesi Island and considering 47 people with stroke were selected at random from the stroke ward. For nurses have observed one patient, thus in this study 47 patients were involved in the conduct of this study. The method used for randomization was to draw list when the patients entered the pre-discharge planning stage throughout the data collection period. 25 (53%) were male and 22 (47%) were female. All of them were diagnosed with first stroke as confirmed by a CT scan. Their mean age was 68 years (SD=7.6)

The study has utilized the original Barthel Index (BI) of Activities of Daily Living (ADL), first developed in 1965 by Mahoney. Firstly, the researcher asked permission for translation, adaptation and validation from The Maryland State medical Society who holds the copyright of the original Barthel Index. Given permission.[8]

Data collection commenced after duty hours of the participants. The BI was provided only after the informed consent had been signed. Each participant read the informed consent in the presence of the researcher and was encouraged to ask questions about their participation in the study. As soon as the participants agreed to get involved in the study, they were asked to respond to each of the items of the Barthel Index. The items were filled up on a 5-point scale with options ranging from none to all the time.

Data Analysis: Particularly content analysis has been done for the synthesis from the expert committee review and the pre-testing for the semantic equivalence, idiomatic equivalence, experiential equivalence and conceptual equivalence of the questionnaires. The expert panel were then asked to evaluate each item of the instrument for content equivalence. The guideline offered was that the ACP should be .90- not .80 as the standard criterion for acceptability for the S-CVI. 3 Kappa coefficient agreement has used to evaluate the rater's agreement. This was used to determine the inter-rater reliability of the developed Indonesian version Barthel Index. 4. Exploratory factor analysis was utilized for the construct validity of the Indonesian version Barthel Index.

Results

Inter -rater Reliability: The average agreement which was calculated using weighted kappa in Groups I to VI. (Table 1) The results demonstrated that the group fourth and sixth had a moderate level of agreement. This is possibly due to the overestimated patient's functional ability and they were not familiar with the use of Indonesian version of the Barthel index. And the nurses were working in the small city (Toraja and Kendari) so that the possibility that they have not attended any training, seminar and workshop about the assessment of the ADLs of stroke patients. Training improves consistency in application of stroke assessment scales.[9, 10]

While, mean Kappa coefficient is 0.670, which

is interpreted as "substantial" and is significant at 0.05. This implies there is an overall substantial level of agreement among the raters in the pilot test, which assessed the use of the developed Indonesian version of the Barthel Index (BI).

The level of inter-rater agreement was determined by the magnitude of the overall weighted kappa statistic. When quantifying actual levels of agreement, kappa's calculation uses a term called the proportion of chance (or expected) agreement. Cohen suggested the kappa result be interpreted as following value less than 0.01 as indicating poor agreement and 0.01-0.20 as slight, 0.21-0.40 as fair, 0.41-0.60 as moderate, 061-0.80 as substantial and 0.81-1.00 almost perfect.[11] This further means that the instructions allowed a clear definition of each item and performance level in the BI, hence standardizing the interpretation during the administration of the BI. Accordingly, the confidence interval (CI) around an estimate of the kappa is a function of the absolute percentage agreement, the prevalence or variance of the condition, as well as the number of pairs being compared. Standard errors and CI can be calculated to see how precise our estimates are provided the difference follows a distribution that is approximately normal. The 95% limit of agreement approach is judged against the "gold standard" method of measurement.[12]

Table 1: Cohen's Kappa on the measure of Agreement on the Pilot test Assessment of the Indonesian version of the Barthel Index.

Group	K-value	Level agreement	Approx. Sig
I	0.782	Substantial	More than 0.01
II	0.782	Substantial	More than 0.01
III	0.791	Substantial	More than 0.01
IV	0.461	Moderate	Less than 0.01
V	0.627	Substantial	More than 0.01
VI	0.577	Moderate	Less than 0.01
Mean	0.670	Substantial	Significant

Table 2: Content Validity Index

No	Item Statements	Expert						Agreement	CVI
		1	2	3	4	5	6		
1.	Feeding (if food needs to be cut up = help	4	3	4	2	4	4	5	0.83
2.	Moving from wheelchair to bed and return (includes sitting up in bed)	3	4	2	3	4	4	5	0.83
3.	Personal toilet (wash face, comb hair, shave, clean teeth)	4	3	3	4	4	4	6	1.00
4.	Getting on and off toilet (handling clothes, wipe, flush)	3	4	4	3	4	3	6	1.00
5.	Getting on and off toilet (handling clothes, wipe, flush)	3	3	2	4	4	4	5	0.83
6.	Bathing self	4	4	4	4	4	3	6	1.00
7.	Walking on level surface (or if unable to walk, propel wheelchair	4	3	3	3	3	4	6	1.00
8.	Ascending and descending stairs	3	4	3	4	4	4	6	1.00
9.	Dressing (includes tying shoes, fastening fasteners)	4	4	3	3	3	4	6	1.00
10	Controlling Bowel	4	3	3	3	3	4	6	1.00
	Scale Validity Index (CVI)								0.99

Table 3: Principal Component Analysis (PCA) Total variance explained: Indonesian version Barthel Index

Total	% Of variance	Cum.%	Total	% Of variance	Cum%
5.023	50.232	50.232	5.023	50.232	50.232
1.090	10.895	61.128	1.090	10.895	61.128
1.000	10.005	71.132	1.000	10.005	71.132
.758	7.582	78.715			
.645	6.449	85.164			
.466	4.661	89.825			
.404	4.037	93.862			
.372	3.717	97.578			
.148	1.478	99.056			
.094	.944	100.000			

Table 4: PCA; Rotated component Matrix of Indonesian Version Barthel Index.

No		Comp 1	Comp 2
1	Feeding (if food needs to be cut up = help)	.606	-
2	Moving from wheelchair to bed and return (includes sitting up in bed)	.659	-
3	Personal toilet (wash face, comb hair, shave, clean teeth)	.774	-
4	Getting on and off toilet (handling clothes, wipe, flush)	.748	-
5	Bathing self	.751	-
6	Walking on level surface	.856	-
7	Ascend and descend stairs	.770	-
8	Dressing (includes tying shoes, fastening fasteners)	.778	-
9	Controlling bowels	-	.742
10	Controlling bladder	.616	-

Discussion

Development of the Translated Indonesia Barthel Index: The necessary item modifications that were introduced in the proposed translated Indonesian Barthel Index. It can be noted that items 2, 6, and 8 required no change, as they were clearly understood by the participants. For item 1, to be more appropriate in the Indonesian context 'feeding (if food needs to be cut up = help' is changed to 'Feeding (bring food and liquid with a spoon to mouth'. (Table 2) It has been noted that manipulating a spoon was more culturally familiar than using knife and fork for picking up food to the mouth. The physical demands to obtain independence rating on the feeding item would require higher hand dexterity and upper limb coordination from Indonesian subject compared to western counterpart (holding a fork). This could explain why the rank order of items was previously found to differ across different cultural groups.[6, 13] Items 5, 7, 9, and 10 were considered to be more of a technical term. The expert review of this study observed some content ambiguity; hence, they suggested the use of a more culturally appropriate language. This is evident in item 3 (from personal toilet to doing personal hygiene), item 4 (from toilet to water closet), and item 7 (from ascending and descending to going up and down).

Component analysis factoring of Indonesian version BI this shows the result of Explanatory Factor Analysis. The eigenvalue represents the total variance explained by each factor. (Table 3) The result showed that there were three extraction factors from Initial factor Eigenvalue with value > 1.0 [14] sum of squared loading also showed that there are three factors as revealed for the Principal Component Factoring. The implement that tree factors can be extracted from the Indonesian Barthel Index. That the Eigenvalue support the Indonesian Barthel Index's variable belongs to two components.

PCA of the Indonesian version of the BartheL Index. The result of the Explanatory Factor Analysis (EFA) the Eigenvalue represents the total variance explained by each factor. The result showed that there were three extraction factors (5.023, 1.090, and 1.000) from Initial factor Eigenvalue with value > 1.0 [14], the sum of Squared loading also showed that there are three factors as revealed for the Principal Component Factoring. This implies that three factors can be extracted from the Indonesian version Barthel Index. The Eigenvalue supports that the Indonesian Barthel Index's variable belongs to three components. But after component Matrix of Indonesian BI there are nine items that belong to one component, items 1,2,3,4,5,6,7,8 and 10 because all of these items have component values above .60. While the in groups component two has only item 9, namely bowel controls. (Table 4) However, the researcher decided that item 10 be into integrated component 2 because, based on the table 5 item 9 have Eigenvalue of 99.0 and item 10 have Eigenvalue 100.0. This shows that both of the item has a very close the Eigen values, then the bladder control and bowel control are both physiological functions of the body and while component 1 functional performances [15] [16] These findings were found to be consistent with two others studies. Tenant et al. discussed that among the items the authors identified the 'bladder control' item[17],

which had a deviated value score; Kucukdeveci et al. and Leung et al. who discussed items found to misfit the single dimension model revealed similar results for Modified BI particularly for item 9 and 10 the 'bladder control' and 'bowel control.[10, 13]

Conclusion

The Indonesian version of the BI has good validity and reliability that it can be used with the stroke population. The findings indicate that there are culture-specific contents requiring to be incorporated into the original items when adapting the MBI for use in assessing the patients.

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Conflict of Interest: The authors declare that they have no competing interests

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References

1. Balitbangkes DR. Report on results of national basic health research (RISKESDAS) 2007. Jakarta: Depkes RI, 2008.
2. Unsworth J. Practice development: a concept analysis. Journal of nursing management 2000;86:317-26.
3. Duncan EA, Murray J. The barriers and facilitators to routine outcome measurement by allied health professionals in practice: a systematic review. BMC health services research 2012;12:96.
4. Lund A, Michelet M, Kjeken I, Wyller TB, Sveen U. Development of a person-centred lifestyle intervention for older adults following a stroke or transient ischaemic attack. Scandinavian journal of occupational therapy 2012;192:140-9.
5. Castiglia SF, Galeoto G, Lauta A, Palumbo A, Tirinelli F, Viselli F, et al. The culturally adapted Italian version of the Barthel Index (IcaBI): assessment of structural validity, inter-rater reliability and responsiveness to clinically relevant improvements in patients admitted to inpatient rehabilitation centers. Functional neurology 2017; 224:221-8.
6. Breytenbach F. Content validity of the modified barthel index for stroke patients in South Africa [Doctoral dissertation]. South Africa: University of South Africa; 2016.
7. Sousa VD, Rojjanasrirat W. Translation, adaptation and validation of instruments or scales for use in cross-cultural health care research: a clear and user-friendly guideline. Journal of evaluation in clinical practice 2011;172:268-74.
8. MAPI RI. Linguistic validation of the MBI into nine languages. MAPI Research Institute, 2017.
9. Duffy L, Gajree S, Langhorne P, Stott DJ, Quinn TJ. Reliability (inter-rater agreement) of the Barthel Index for assessment of stroke survivors: systematic review and meta-analysis. Stroke 2013;442:462-8.
10. Kucukdeveci AA, Yavuzer G, Tennant A, Suldur N, Sonel B, Arasil T. Adaptation of the modified Barthel Index for use in physical medicine and rehabilitation in Turkey. Scandinavian journal of rehabilitation medicine 2000;322:87-92.
11. McHugh ML. Interrater reliability: the kappa statistic. Biochemia medica 2012; 223:276-82.
12. Shah S, Vanclay F, Cooper B. Improving the sensitivity of the Barthel Index for stroke rehabilitation. Journal of clinical epidemiology 1989;428:703-9.
13. Leung SO, Chan CC, Shah S. Development of a Chinese version of the Modified Barthel Index--validity and reliability. Clinical rehabilitation 2007; 2110:912-22.
14. Kaiser HF. Coefficient alpha for a principal component and the Kaiser-Guttman rule. Psychological reports 1991;683:855-8.
15. De Morton NA, Jones CT, Keating JL, Berlowitz DJ, MacGregor L, Lim WK, et al. The effect of exercise on outcomes for hospitalised older acute medical patients: an individual patient data meta-analysis. Age and ageing 2007;362:219-22.
16. de Morton NA, Keating JL, Jeffs K. The effect of exercise on outcomes for older acute medical inpatients compared with control or alternative treatments: a systematic review of randomized controlled trials. Clinical rehabilitation 2007; 211:3-16.
17. Tennant A, Penta M, Tesio L, Grimby G, Thonnard JL, Slade A, et al. Assessing and adjusting for cross-cultural validity of impairment and activity limitation scales through differential item functioning within the framework of the Rasch model: the PRO-ESOR project. Medical care 2004;421 Suppl:I37-48.

Input Evaluation (HR, Funds, Method, Facilities and Infrastructure, and Targets) on the Implementation of Biscuits as Complementary Foods for Pregnant Women in Parepare City

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Abstract

Context: This study aimed to assess the Inputs (HR, Funds, Method, Facilities and Infrastructure, and Targets) on the implementation of biscuits as complementary foods for Pregnant Women in Parepare City. This study used a descriptive qualitative method to assess the management of the implementation of the Complementary foods distribution for the Pregnant Women Program in the Parepare City based on Input aspects. Input consists of Human Resources, Funds, Method, Infrastructure and Targets. The results of the study showed officers who carry out complemetary foods distribution for pregnant women were TPG (Nutrition officer) and MCH officers (Midwives). If the Nutrition officer is on duty in the field, the MCH officer will replace the role of the TPG in the distribution of Biscuits for complementary foods. Funds are adjusted to the distribution and target, funds are distributed from the Central Government, the Provincial Government, the City Health Office, the community health center (TPG/Midwife), to the Village (Cadre). The distribution of biscuits for pregnant women was not in accordance with the initial plan and existing regulations.Biscuit distribution method for pregnant women based on technical instructions is 150 pieces/ month and carried out for 3 months, with a dose of 5 pieces/day. There were no available facilities and infrastructure that meet 9 warehouse standards according to technical instructions

Keyword: *Input, Biscuit as complementary foods, Pregnant Women, Nutrition Officer and Midwife*

Introduction

Complementary foods distribution Program for pregnant women who suffer chronic energy deficiency has been implemented in all Regencies/Cities in Indonesia every year by the Health Office. Complementary foods products provided in the form of Biscuits that contain Macro and Multi Micro Nutrients. However, there are still a number of obstacles in the program, including procurement of goods that only occur in certain periods, the report format from the Ministry of Health is limited to the implementation of complementary food distribution, targets cannot be monitored regularly, and report formats are not uniform among each community health center[1].

The effectiveness of a program implementation is also influenced by good management. The implementation of biscuits as complementary foods begins with the

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stages of Input, Process, Output and Outcome. So that management really needs to be considered so that it can be applied in various fields including health to solve public health problems[2]. Management is urgently needed to support a coordinated and integrated system in the fields of health, sustainable human resources, infrastructure development, and effective data management systems to overcome current challenges[3].

Input is a collection of parts or elements contained in the system and is needed for the system to function[1]. Administrative tools include personnel, funds, facilities and method, also known as sources, procedures and capabilities. Input elements can be categorized in 6M, namely man, money, materials, method, markets and machinery[4].

This study aimed to assess the Input (man, money, materials, method, markets and machinery) on the implementation of biscuits as complementary foods for Pregnant Women in the Parepare City.

Method

This study used descriptive qualitative method to assess the management of the implementation of the Complementary foods distribution Program for Pregnant Women in Pare pare City based on Input aspects. Input consists of man, money, materials, method, markets and machinery. Data collection through in-depth interviews with informants and direct observation to the location.

In qualitative research the number of informants is usually small, so in order to maintain the validity of the data, several method are needed. The validity test used in qualitative research was called triagulation. To establish the validity in this study so: 1) Key Informants (Head of nutrition section of the City Health Office); 2) Triangulation of Resources (Community Health Center Nutrition Workers, Village Midwives, Cadres); 3) Triangulation of Method (Interview, Observation, Document)

Results

Human Resources: Based on the data it can be known that officers who carry out complementary foods distribution programs for pregnant women are carried out by Nutrition Workers (TPG) and MCH officers (Midwives). If the Nutrition Officer works in the field, the MCH officer will replace the TPG role in providing Biscuits as complementary foods for pregnant women.

The number of Nutrition Workers (TPG) involved in the Pare pare City Health Office was 2 people, and the number of nutrition workers involved in all community health centers was 14 people.

"The number of human resources in Parepare consisted of 2 nutrition workers at the city health office, 2 at the Lakassa community health center, 4 at Madising community health center, 4 at Lapadde community health center, 2 at Cempae community health center, 3 at Lumpue community health center. people to carry out complementary foods distribution programs, (EN, 38 years old)

"The village midwife who came only once ... there were also those who were given nutrition consultations ...". (AJ, 22 years old)

The number of MCH officers (Midwives) involved in all community health centers was 63 people. If the nutrition officer is absent, then it is replaced by another officer, namely the midwife.

"In the Lakessi Community Health Center, there were around 6 people who usually carry out complementary foods distribution programs" (AY, 27 years old)

Funds/Money: Funds are distributed from the central government, the provincial government, the City Health Office, the community health center (TPG/ Midwife), to the village (cadre).

Budget on Biscuit: Based on the results of research in the field, the distribution of biscuits for pregnant women is only at the central government level until it ends at the community health center, and not through cadres. The main reason is because there is no special fund for cadres.

Cost: Transportation and warehouse storage costs should be allocated. Funds are considered insufficient to cover the costs of building warehouses, transportation and accommodation as well as staff salaries from the central level to cadres. These funds also need to be clearly regulated in the technical guidelines and recording still needs to be improved in terms of neatness and accuracy, and further checks need to be made to find out the exact nominal of the budget.

Distribution Method: In general, the distribution

time is only when pregnant women do ANC to community health centers so that it is not suitable for the needs of pregnant women, especially those who do not routinely do ANC.Some pregnant women with chronic energy deficiency are not visited after the biscuits run out because they are from other Community Health Center areas but always visit other Community Health Centers as well. Time, energy, and cost limitations to carry out complementary foodsdistribution for pregnant women with chronic energy deficiency to the home

Dosage: In general, the specified dose is not met properly because the distribution time is only when pregnant women do ANC to the public health center. So that many are not in accordance with the needs of pregnant women, especially those who do not routinely do ANC. Pregnant women do not routinely take biscuits because they do not understand well the dose to be consumed and do not understand well the benefits of biscuits for pregnant women with chronic energy deficiency. Time, energy, and cost limitations to complete complementary foods distribution in pregnant women with chronic energy deficiency. This is the main reason the biscuits are not distributed directly through the cadres but rather waiting for pregnant women to come to the community health center.

Facilities/Materials: There are still many community health centers that do not carry out standard storage. Although there are already quite qualified because 7 of the 9 required standards have been provided such as the Lapadde community health center. Storage in many households is not according to standard. The results of interviews conducted with several informants found the fact that the storage of biscuits as complementary foods does not comply with the standards listed in the technical instructions, some are just put on the cupboard or in the refrigerator.

Pregnant women do not know the standard of biscuit storage at home because it is not specifically socialized. Storage is not prepared a special place. Pregnant women only pick up the packaging shortly after the biscuits are eaten. There are also those who store it in jars and invite any guest who wants to consume because of cultural factors.

Discussion

Human Resources: Based on the results of an interview with one of the Coordinating Midwives (Bikor), it is known that officers who carry out complementary food distribution in pregnant women are carried out by TPG (Nutrition Officer) and MCH officers (Midwife). If the Nutrition officer works in the field, the MCH officer will replace the TPG role in providing Biscuits as complementary foods for pregnant women. A collaborative approach between midwives and nutrition workers in the service of pregnant women can be an effective method in overcoming the nutritional problems of pregnant women[5].

The success of the public health center in carrying out the program is determined by a balanced human resource between medical staff on the one hand and promotive and preventive staff on the other. The main problem in the management of health workers is the unequal distribution of human resources [6]. In addition there are Over-staffing for non-professional staff (non-technical) and under-staffing for professional staff (technical staff) [7]A similar study took place in the Taburia distribution program with an input element in the form of managing the nutritional status of stunting toddlers in the work area of the Sirampog community health center which was considered ineffective, because the health worker coordinator who was midwife not the Nutrition officer. It was considered incompatible with competence [8]. Midwives should have a management approach, especially Nutrition management, so that they can organize all elements involved in their services properly in order to reduce maternal and child mortality [9]

Funds: The funds are adjusted to the distribution and target, the funds are distributed accordingly starting from the Central Government, the Provincial Government, the City Health Office, the community health center (TPG/ Midwife), to the Village (Cadre). The cost depends on the number of target recipients of the program[10].

The results of the research in the field showed that the distribution of biscuits for pregnant women was not in accordance with the initial plan and existing regulations. The distribution flow in Parepare city started from the central government to the community health center, which should still distribute through the TPG, Midwives, and Villages/Cadres. From interviews with officers, the main reason was no special funds intended for cadres. While the technical instructions are not regulated in detail about the use of the complementary foods distribution budget. So that the application of the program in the field is uneven.

Complementary Foods Distribution Method: Complementary Foods Distribution Method for pregnant women through annual planningand according to the prescribed dosage. The demand for biscuits is adjusted to the amount of chronic energy deficiency proposed from the public health center and the City Health Office in the previous year, so the number of biscuits available may not be able to cover pregnant women with chronic energy deficiency this year because it is not necessarily the same amount as the previous year. In general, the specified dose is not met properly because the time of distribution is only when pregnant women do ANC to the public health center. So, it is not in accordance with the needs of pregnant women, especially those who do not routinely do ANC.

Pregnant women do not routinely take biscuits because they do not understand well the dose to be consumed and do not understand well the benefits of biscuits for pregnant women with chronic energy deficiency. The limited time, energy, and cost to complete complementary foods distribution in pregnant women with chronic energy deficiency is the main reason that biscuits are not distributed directly through cadres but rather waiting for pregnant women to come to community health center[11].

Facilities/Materials: Facilities and infrastructure are important factors that support the implementation of complementary foods distribution in pregnant women, including the availability of adequate health services such as community health centers and the existence of complementary food storage for pregnant women. Storage of biscuits as complementary foods should not be mixed with dangerous goods and are not suitable for consumption, storage in warehouses according to standards (pay attention to the taxonomy of inputs for transportation and storage). Each community health center has its own warehouse to facilitate distribution of pregnant women. There are still many community health centers that do not carry out standard storage. Inappropriate food storage can cause damage and affect the nutritional value of the food[12].

Target: The target of biscuit distribution is Pregnant women with chronic energy deficiency. There were 49 pregnant women getting biscuits as complementary foods (all pregnant women with chronic energy deficiency got biscuits as complementary foods). Some pregnant women who were stated to have chronic energy deficiency did not understand well the schedule for giving biscuits for complementary foods. Pregnant women were not enthusiastic about visiting health services, they stated that they got biscuits while doing ANC, they were also got biscuits even though they were late or sometimes asked for availability.

In addition to chronic energy deficiency, Gakin (Poor Family) is also a concern for the improvement of Nutrition in Parepare, data on pregnant women obtained from village midwives or cadres about pregnant women who are below the poverty line are also given biscuits, although the foods they consume often fall into the category of less nutritious and unbalanced is certainly a big hope that the child can still live healthy with the help of nutrition from these complementary foods.

Chronic energy deficiency as well as Gakin are the main priority of the biscuits distribution as complementary foods. This is the first and foremost goal that must be realized immediately so that it can be distributed quickly and accurately. Pregnant women with chronic energy deficiency with a low economy will find it difficult to meet their nutritional needs through other foods, because of their economic difficulties[13]. Chronic energy deficiency conditions that are not handled properly will cause fatal for pregnant women[14].

Conclusion

The human resources that carry out the complementary food distribution program for pregnant women are TPG (Nutrition officer) and MCH officers (Midwives). Funds are distributed from the Central, Provincial, City Governments. However, funds were deemed insufficient to cover warehouse rentals, transportation to public health centers, and procurement of technical manuals. Biscuit distribution method for pregnant women based on technical instructions is 150 pieces/month and carried out for 3 months, with a dose of 5 pieces/day. There were no available facilities and infrastructure that meet 9 warehouse standards according to technical instructions.

Ethical Clearance: Taken from Faculty of Public Health, UniversitasHasanuddin Committee.

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Conflict of Interest: None

References

1. Azwar A. Introduction to Health Administration. Edisi Keti. Jakarta: Binarupa Aksara; 2010.
2. Satrianegara., Fais. Organization and management of health services. Jakarta: Salemba Medika; 2014.
3. Ibegbunam I., McGill D. Health commodities management system: priorities and challenges. J Humanit Logist Supply Chain Manag. 2012, doi: 10.1108/20426741211260741.
4. Azwar A. Introduction to Administration. Tangerang: Binapura Aksara Publisher; 2010.
5. Arrish J., Yeatman H., Williamson M. Midwives' Role in Providing Nutrition Advice during Pregnancy: Meeting the Challenges? A Qualitative Study. Nurs Res Pract. 2017; 2017, doi: 10.1155/2017/7698510.
6. Lestari TRP. Analysis Of Availability Health Personnel In The Health Center Of Mamuju In West Sulawesi, Year 2014. Kajian. 2017; 21(1):75-88, doi: 10.22212/kajian.v21i1.768.
7. Pudjirahardjo WJ. Development of Health Human Resources in the Era of Decentralization and Market Changes. Bul Penelit Sist Kesehat. 2012;15(1 Jan), doi: 10.22435/bpsk.v15i1 Jan.2979.
8. Sulistiyanto., Dwi A. The role of the nutrition officer in providing nutrition care services to inpatients. Unnes J Public Health. 2017;6:75-83.
9. The Partnership for Maternal, Newborn and Child Health. WHO | Opportunities for Africa's newborns: Practical data, policy and programmatic support for newborn care in Africa. Swiss: WHO on behalf of The Partnership for Maternal Newborn and Child Health; 2006.
10. Handayani L. Evaluation Of Supplement Feeding's Programme to Children Under Five Years Old. J Manaj Pelayanan Kesehat. 2008;11(01):21-6.
11. Mangalik G., Koritelu RT., Amah MW., Junezar R., Kbarek OPI., Widi R. Supplementary Feeding Program: Case Study of Pregnant Women with Chronic Energy Deficiency in Cebongan Salatiga Health Center. J Ilmu Keperawatan Dan Kebidanan. 2019;10(1):111-5, doi: 10.26751/jikk.v10i1.537.
12. Uçar A., Yilmaz MV., Çakıroğlu FP. Food Safety – Problems and Solutions. Significance Prev Control Food Relat Dis. 2016, doi: 10.5772/63176.
13. Kavle JA., Landry M. Addressing barriers to maternal nutrition in low and middle income countries: A review of the evidence and programme implications. Matern Child Nutr. 2018;14(1), doi: 10.1111/mcn.12508.
14. Shaheen R., Lindholm L. Quality of life among pregnant women with chronic energy deficiency in rural Bangladesh. Health Policy Amst Neth. 2006;78(2-3):128-34, doi: 10.1016/j. healthpol.2005.11.008.

The Relationship Between Lifestyle and Breast Cancer among 25-64 Year Old Women on Urban Areas of Indonesia in 2016

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Abstract

Background: Breast cancer was the cancer with the second highest prevalence in Indonesia in 2013 after cervical cancer, at 5 cases per 10,000 population. Modifying one's lifestyle can prevent the disease. Lifestyle factors that can be modified relate to obesity, smoking, alcohol consumption, following a diet of vegetables and fruits, physical activity, hormone therapy after menopause, diabetes mellitus and stress.

Method: The study uses a cross-sectional study design, using data from the 2016 Non-Communicable Disease Research of the Health Research and Development Agency, Ministry of Health of the Republic of Indonesia. A research sample of 38,749 women aged 25-64 who had undergone a clinical examination was collected from 34 provinces, consisting of 76 districts and cities in Indonesia. The breast cancer group comprised all respondents who were diagnosed with breast cancer at a clinical breast examination (SADANIS), following a biopsy and confirmed by breast mammography/ultrasound examination and anatomic pathology (PA) examination. Odds ratios (ORs) and 95% confidence intervals (CIs) in a multivariate logistic regression analysis were used to observe the relationship between lifestyle and breast cancer.

Results: The results show that the prevalence of breast cancer in women aged 25-64 in urban areas of Indonesia was 0.2%. Multivariate logistic regression analysis showed a significant relationship between women who consumed alcohol and incidence of the disease, the rate being 3.87 (95% CI: 1.76-8.49) higher than for those who did not consume alcohol, after controlling for age, education and occupational covariate variables.

Conclusions: Lifestyle has a relationship with breast cancer among 25-64 year old women in urban areas of Indonesia. It is very important to prevent the disease because it greatly affects the mortality and morbidity of women. Improving education can significantly change the lifestyle of women, thereby reducing the risk of breast cancer.

Keyword: *Relationship, Breast Cancer, Lifestyle, Indonesia.*

Introduction

Cancer is the second leading cause of death in the world. In 2018, the number of cancer deaths was around 9.6 million, consisting of lung cancer (18.4%), colorectal cancer (9.2%), stomach cancer (8.2%), liver cancer (8.2%), breast cancer (6.6%), esophageal cancer (5.3%), pancreatic cancer (4.5%), prostate cancer (3.8%) and other cancers (35.8%)[1].

According to the Indonesian Ministry of Health, state expenditure on cancer is the second highest type after hemodialysis. In 2012 this amounted to 144.7 billion rupiahs and increased to 905 billion rupiahs in 2014[2]. Based on basic health research data from

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2013, the prevalence of cancer in all ages in Indonesia was 14 cases per 10,000 population (around 347,792 people), with the highest rate in the Special Region of Yogyakarta province, at 41 per 10,000 (around 14,596 people). Breast cancer was the cancer with the second highest prevalence in Indonesia in 2013 after cervical cancer, at 5 cases per 10,000 population. The highest prevalence of breast cancer in Indonesia was also in the Special Region of Yogyakarta, at 24 per 10,000 [3].

Every gene has a function in the body, one of the main ones being to divide cells. If a gene mutation occurs, the cells will divide without control. They will not function normally, so turn into cancer cells. Gene mutations can be caused by aging, the influence of radiation on the environment on radiation, chemicals, hormones and other factors such as smoking and alcohol. Cells can usually divide and turn into cancer over a long period of time, which explains why older people have a higher risk of breast cancer[4].

Various risk factors of breast cancer have been identified, such as age, genetic factors (carrying of mutated genes *BRCA1 and BRCA)*), hormonal factors, lifestyle factors, personal history of breast cancer and environmental factors. Lifestyle factors include high fat diets, lack of exercise, deficiency of certain vitamins or fibre, adult weight gain, alcohol intake and smoking, together with the lack of moderate physical activity or vegetable intake [5].

Based on epidemiological studies, it is known that lifestyle factors play a very important role in the development of breast cancer. Modifying one's lifestyle can prevent the disease. Lifestyle factors that can be modified relate to obesity, smoking, alcohol consumption, diet of vegetables and fruits, physical activity, hormone therapy after menopause, diabetes mellitus and stress[6].

The results of scientific research have found that consumption of fibre in fruit and vegetables, especially green vegetables, can reduce the risk of breast cancer, while alcohol consumption can increase the risk. Women who consume alcohol can increase their hormone estradiol, which is a risk factor in breast cancer. Several studies have shown that girls who exercise regularly will experience menarche delays and reduce the risk of breast cancer, as will women aged below 40 who do high physical activity, especially those who have not reached menopause and have a BMI of < 25 kg/m^2. Women's breast tissue is very sensitive to carcinogens, so they should avoid smoking[7].

Breast cancer screening is an examination to find abnormal breast conditions that can become breast cancer. It can be in the form of breast self-examination (BSE), clinical breast examination or mammography screening. Diagnosis can be made by consideration of medical history and physical examination, laboratory examination, imaging examination, breast ultrasound, MRI (magnetic resonance imaging) and CT-SCAN[8].

Research conducted at the Makasar City Hospital in 2016 showed that smoking had a significant relationship with the incidence of breast cancer (OR = 2.00; 95% CI: 1.02-3.93)[9]. A prospective cohort study of the relationship between alcohol consumption and breast cancer in 105,986 women concluded that 5.0-9.9 grams alcohol intake per day or 3-6 times per week increased the incidence of breast cancer (RR = 1.15; 95% CI: 1.06-1.24)[10]. A systematic review and meta-analysis reported that increased physical activity can reduce the risk of breast cancer (OR = 0.73; 95% CI: 0.63-0.85)[11]. The results of a study by Yulianti L, Setyawan H, and Sutiningsih D showed that there was a relationship between physical activity and the incidence of breast cancer (OR = 1.22; 95% CI: 0.51-2.94). Women with low physical activity had a greater risk of developing breast cancer compared to those with frequent exercise habits or high physical activity[12].

Breast cancer is the most common cancer and the second cause of female deaths from the disease. The ability of existing screening tests and knowledge of the risk factors that cause breast cancer is an interesting disease to study that is useful in prevention breast cancer. Breast cancer can be prevented by changing one's lifestyle. Several lifestyle factors that can be changed are known to be very effective in preventing the disease[13]. This study assesses women's lifestyles (smoking, alcohol consumption, physical activity, protein consumption and fiber consumption) in relation to the incidence of breast cancer in those aged 25-64 in urban areas of Indonesia (NCD Research in 2016).

Method

The study employed a cross-sectional design using NCD (non-communicable disease) research data from the Indonesian Ministry of Health's Health Research and Development Agency. It was conducted in August-September 2016 in 34 provinces in Indonesia, consisting

of 76 regencies and cities, and centred on urban areas.

The 2016 NCD research sample was designed for presentation at the national level. The number of samples determined was 70,000 respondents spread across 1,400 census blocks and 76 selected districts in 34 provinces throughout Indonesia. A total of 43,948 respondents were successfully visited and interviewed. A total of 39,188 respondents were willing to undergo clinical examinations, although 439 of these had incomplete data. The total number of respondents who completed the study was therefore 38,749.

Breast cancer was discovered from the results of diagnosis of breast cancer in clinical breast examinations and biopsy, and confirmed by breast mammography/ ultrasound examination and anatomic pathology (PA) examination conducted by the Health Research and Development Agency of the Ministry of Health of the Republic of Indonesia. Lifestyle factors measured were smoking, alcohol consumption, physical activity, protein intake and fibre intake. Smoking status was divided into smokers and non-smokers, including those who smoked every day and those who had sometimes in the past month (when the research was conducted). Alcohol consumption was the habit of drinking alcohol in the past month (when the research was conducted). Physical activity was divided into high and low physical activity; high activity referred to at least 3 days a week (1500 MET-minutes / week). Protein intake was the weekly habit of consuming animal and vegetable protein, divided into high (daily) and low (<5 days a week). Fibre intake was the weekly habit of consuming fruit and vegetables, also divided into high (daily) and low (<5 days a week).

Bivariate analysis was used to observe the relationship between lifestyle factors (smoking, alcohol consumption, physical activity, protein and fibre intake) and the incidence of breast cancer. Odds ratios (ORs) and 95% confidence intervals in multivariate analysis with logistic regression were used to examine the relationship between lifestyle and breast cancer after controlling for covariate variables (age, education and occupation).

Results

Table 1: Prevalence of Breast Cancer in Women Aged 25-64 in Urban Areas of Indonesia in 2016

Variable	Frequency	Percentage (%)
Breast Cancer		
Yes	68	0.2
No	38,681	99.8

The univariate analysis results in Table 1 show that the proportion of women aged 25-64 suffering from breast cancer was 0.2%, while for those who were not suffering from the disease it was 99.8%.

Table 2: Characteristics of the Study Sample

Variable	Breast Cancer		No Breast Cancer		P-value
	n= 68	%	n=38,681	%	
Age					
≥ 40 Years	46	0.2	23,637	99.8	0.327
< 40 Years	22	0.1	15,044	99.9	
Education					
Low	58	0.2	36,261	99.8	0.010
High	10	0.4	2,420	99.6	
Work status					
Unemployed	43	0.2	24,566	99.8	0.963
Working	25	0.2	14,115	99.8	
Smoking					
Smoker	6	0.3	2,381	99.7	0.313
Non- Smoker	62	0.2	36,300	99.8	
Alcohol Consumption					
Yes	7	0.6	1,098	99.4	0.003
No	61	0.2	37,583	99.8	

Variable	Breast Cancer		No Breast Cancer		P-value
	n= 68	%	n=38,681	%	
Physical Activity					
Low	65	0.2	36,114	99.8	0.627
High	3	0.1	2,567	99.9	
Protein Intake					
Low	48	0.2	25.963	99,8	0.632
High	20	0.2	12.718	99,8	
Fibre Intake					
Low	48	0.2	27.019	99,8	0.894
High	20	0.2	11.662	99,8	

Based on the bivariate analysis in Table 2, it can be seen that the proportion of breast cancer in those aged ≥ 40 years was 0.2%; for those with low education 0.2%; the unemployed 0.2%; smokers 0.3%; for those who consumed alcohol 0.6%; those with low physical activity 0.2%; those with low protein intake 0.2%, and low fibre intake 0.2%. There is a significant relationship between education (P: 0.010) and alcohol consumption (P: 0.003) with the incidence of breast cancer.

Table 3: Relationship between Lifestyle and the Incidence of Breast Cancer in Women Aged 25-64 in Urban Areas of Indonesia

Variable	Crude Analysis		Adjusted Analysis*	
	OR	95% CI	OR	95% CI
Smoking	1.47	0.64-3.41	1.49	0.64-3.45
Alcohol Consumption	3.93	1.79-8.61	3.87	1.76-8.49
Physical Activity	1.54	0.48-4.90	1.43	0.45-4.56
Protein Intake	1.18	0.70-1.98	1.20	0.71-2.02
Fibre Intake	1.04	0.61-1.75	1.10	0.65-1.85

*Controlled by covariate variables (age, education and work status)

Table 3 shows the relationship between lifestyle and the incidence of breast cancer in women aged 25-64 years in urban areas of Indonesia. From the results of the bivariate analysis of this relationship it can be seen that women aged 25-64 who smoked (OR: 1.47; 95% CI: 0.64-3.41); who consumed alcohol (OR: 3.93; 95% CI: 1.79-8.61); who had low physical activity (OR: 1.54; 95% CI: 0.48-4.90); and who had low protein consumption (OR: 1, 18; 95% CI: 0.70-1.98) and low fibre consumption (OR: 1.04; 95% CI: 0.61-1.75) increased their risk of developing breast cancer. Women aged 25-64 who smoked had a greater risk of developing breast cancer than those who did not smoke, after being controlled for covariate variables of age, education and work status (OR: 1.49; 95% CI: 0.64-3.45). The results of the multivariate logistic regression analysis show that there was a significant relationship between alcohol consumption and the incidence of breast cancer, 3.87 (95% CI: 1.76-8.49) times higher than for those who did not consume alcohol, after controlling for age, education and work status. Women who had low physical activity had a greater risk of developing breast cancer than those with high physical activity, again after being controlled by the covariate variables of age, education and work status (OR: 1.43; 95% CI: 0.45-4.56). Those who had low protein consumption (OR: 1.20; 95% CI: 0.71-2.02) and low fibre consumption (OR: 1.10; 95% CI: 0.65-1.85) also had a greater risk of developing breast cancer after the controls described above.

Discussion

The results of the analysis show that there is a relationship between lifestyle and the incidence of breast cancer in women aged 25-64 in the urban areas of Indonesia. A poor lifestyle will increase the risk, but changing it can prevent the disease. However, providing

information on breast cancer risk factors and ways of prevention is not enough. Increasing the education provided can significantly change the lifestyle of women, so reducing risk.

This study found that the prevalence of breast cancer in the women studied is 0.2% and that there is a relationship between the level of education and the incidence of breast cancer in (p: 0.010). The proportion of breast cancer in women with a low education is 0.2%. The study employed a cross-sectional design; it can be seen in Table 2 that there are small amount of cells in several research variables, such as smoking, alcohol consumption and physical activity. The multivariate logistic regression analysis shows that the prevalence of breast cancer in women who consume alcohol is 3.87 (95% CI: 1.76-8.49) times higher than for those who do not Consuming alcohol, lack of physical activity and smoking are risk factors in breast cancer. Many other studies have shown association relationships between women who consume alcohol and breast cancer, including a cohort study[3].

Many risk factors affect the occurrence of breast cancer, including lifestyle. Changing one's lifestyle is important in the effort to reduce breast cancer; moreover, screening testing can also make early diagnosis and allow for early prevention efforts. Some studies have reported that the risk of breast cancer can be reduced by increasing physical activity and exercising regularly. In addition, exercise can also reduce other risks of breast cancer such as obesity. Physical activity has also been proven to increase patients' chances of survival after being diagnosed with the disease. However, the majority of women do not do this[13].

Smoking is a carcinogenic lifestyle contributing to breast cancer and other cancers. The carcinogenic effect is caused by the aromatic hydrocarbon contained in tobacco. This substance, with the genetic polymorphism in N-AcetylTransFerase-2, can affect the development of breast cancer; tobacco consumption causes 21% of cancer deaths world wide[8].

Modifying one's lifestyle can reduce the risk of breast cancer. Therefore, education programmes discussing lifestyle changes are very important. These should be offered from childhood and contain information about the importance of a healthy lifestyle by avoiding obesity in adulthood, smoking, alcohol consumption and the benefits of increased physical activity[8].

Conclusion

Lifestyle has been shown to have a relationship with breast cancer. A poor lifestyle is a risk factor in breast cancer in women aged 25-64 in the urban areas of Indonesia. It is important to prevent the disease, because it has an important effect on the mortality and morbidity of women. Increasing education can significantly change the lifestyle of women, thus reducing the risk of breast cancer.

Ethical Considerations: Ethical testing was conducted by the Health Research Ethics Commission of the Indonesian Ministry of Health's Research and Development Agency No: LB 02.01 / 5.2 / KE / 154/2016.

Competing Interests: The authors declare that no competing interests exist.

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Reference

1. WHO. Global Burden Cancer (GLOBOCAN). 2018.
2. Ministry of Health of the Republic of Indonesia. Month of Breast Cancer Care. Central Data and Information of Ministry of Health of the Republic of Indonesia. 2016. Available from. http://www. pusdatin. kemkes.go.id/article/view/17020100002/ bulan-peduli-kanker-payudara. html
3. Health Department of the Republic of Indonesia. Situation of Cancer Disease. Central Data and Information of Ministry of Health of the Republic of Indonesia. 2015. Available from. http://www. depkes.go.id/resources/download/pusdatin/ infodatin/infodatin-kanker.pdf
4. Harmer V. Breast Cancer Nursing Care and Management. 2nd ed. Chichesster United Kingdom: Black well Publishing Ltd; 2011.
5. Keitel, MA, Kopala M. Counseling Women with

Breast Cancer: A Guide for Professionals. London: Sage Publications, Inc. 2000.

6. Ministry of Health of the Republic of Indonesia. National Guidelines for Medical Services Governance of Breast Cancer. 2018. Available from. http://kanker.kemkes.go.id/guidelines/PNPKPayudara.pdf
7. Breast Cancer Medical Education, Team.Cleverly Facing Breast Cancer. Jakarta: Gema Insani. 2017; 36-48
8. Dieterich M, Stubert J, Reimer T, Erickson N, Berling A. Influence of Lifestyle Factors on Breast Cancer Risk. PMC Article. 2014; 407-414. (PubMed). Available from. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4317679/ . Accessed on 06 August 2019
9. Maria I L, Sainal AA, Nyorong M. Lifestyle Risks to The Incidence of Breast Cancer in Women. Journal MKMI. 2017; 13(2): 157-166
10. Chen WY, Rosner B, Hankinson SE, Colditz GA, Willett WC. Moderate alcohol consumption during adult life, drinking patterns, and breast cancer risk. JAMA : The Journal of the American Medical Association. 2011; 306(17): 1884-90. (PubMed). Available from https://www.ncbi.nlm.nih.gov/pubmed/22045766 Diakses 06 Agustus 2019
11. Gao Y, Huang YB, Liu XO, Chen C, Dai HJ, Song FJ, Wang J, Chen KX, Wang YG. Tea consumption, alcohol drinking and physical activity associations with breast cancer risk among Chinese females: a systematic review and meta-analysis. Asian Pacific Journal of Cancer Prevention. 2013; 14(12): 7543–50 (PubMed). Available from https://www.ncbi.nlm.nih.gov/pubmed/24460331 Diakses 06 Agustus 2019
12. Yulianti L, Setyawan H, Sutiningsih D. Risk Factors for Breast Cancer. (Case Study in Ken Saras Hospital in Semarang). University of Diponegoro: Society Health Journal FKM. 2016;4(4): 401-409
13. Hashemi SHB, Karimi S, Mahboobi H. Lifestyle changes for prevention of breast cancer: Electronic Physician. 2014;6(3): 894-905. Available from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4324293/

Coronary Artery Disease in the Military Setting: Lower Gensini Score in High-Rank Personnel Compared to Low-Rank and Civilian

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Abstract

Background: Studies had reported an increasing trend of coronary artery disease (CAD) cases in the military population. However, the severity of the CAD among different military rank is yet to be studied. The Gensini scoring system as a popular and developed objective method to quantify the CAD severity through the coronary an giographic findings.

Material and Method: In this retrospective cross-sectional study, researchers consecutively enrol a consecutive total of 171 patients referred to the Indonesian Navy Hospital of Dr Ramelan, who underwent elective coronary angiography from January to June 2019. Researchers divided the study population into three groups of low-rank military personnel, high-rank military personnel, and the civilian. Anthropometric, laboratory finding, and Gensini score were obtained from medical records.

Results: This research found that Post-hoc LSD test analysis showed the average score of Gensini Score of high-rank military personnel (18.39 ± 32.71) is significantly lower than both low-rank (32.76 ± 41.84; p=0.031) and civilian (36.08 ± 43.41; p=0.005).

Conclusions: High-rank military personnel was found to have lower Gensini score compared to low-rank and civilian.

Keywords: *Gensini Score, Military Rank*

Introduction

Coronary artery disease (CAD) is the principal causes of death and disability in the world, causing nearly half of the 36 million deaths as a noncommunicable disease. CAD had become a very problematic condition both in developed and developing countries and its incidence has reached 422 million cases and 17 million deaths globally in 2015.[1] In Europe, CAD causes almost 2 million deaths in the European Union (EU) and nearly 4 million deaths.[2] The rate of CAD incidence in developing countries is twice more than in developed countries. In India, around more than 30% of all deaths were due to CAD.[3–6] Indonesia as the most populated nation in South-East Asia, and home to 260 million people with over 10% of the population is living in abject poverty, CAD is accountable for 37% of all deaths.[7,8]Similar to

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the civilian population, the increased cardiovascular risk factors prevalence also affect the military population. Recent studies reported an increasing trend CAD prevalence in the military population.[9] Investigations revealed that most of the time, both low and high-rank military personnel are under high-pressure duty-related stress condition followed by physical and psychological issues, which may contribute as a risk factor for CAD development.[9–11] Hypertension, as other CAD risk factors, is also highly prevalent in the military personnel. In Indonesian Navy Hospital of Dr Ramelan, secondary hypertension incidence ranked at third and primary hypertension in the seventh of the top 10 out-patient clinic visitation, with 13,130 and 6,061 patients respectively.[12] The military system has a very rigid ranking hierarchy; thus, unpredictable changes in the rank structure are almost impossible[13], suggesting that each military rank may have distinct disease characteristics. However, the comparison of CAD severity between different military rank is yet to be investigated.

The Gensini scoring system is a popular and developed objective method to quantify the CAD severity through the coronary angiographic findings.[14] Many studies have confirmed its efficacy to identify CAD severity of the patient who underwent PCI.[15] Hence, in this research, we evaluate the severity of the CAD between different military rank and civilian by comparing their average Genisini score.

Material and Method

Study Population and Grouping: In this retrospective cross-sectional study, we randomly enrol a consecutive total of 171 elective coronary angiography patients from the Indonesian Navy Hospital of Dr Ramelan from January to June 2019. Included patients aged between 25 to 80 years old with complete medical record history. Patients with congenital heart disease, cardiomyopathy, heart valve disease, renal failure, active chronic inflammation, carcinoma, system dysfunction of immunology and haematology, or been medicated with immunosuppressive agents are excluded. Clinical and demographic characteristics of the patients (age, gender, military status, military rank, body mass index, coagulation test, diabetes mellitus, complete blood count, blood pressure, hypertension, hyperlipidemia, peripheral arterial disease, chronic kidney disease, left ventricle ejection fraction, treadmill stress test) were analysed by retrospective chart review.

Data Collection and Ethical Clearance: All data were collected from patients medical history. Researchers determined hypertension as ≥140/90 mmHg blood pressure or antihypertensive medication usage[16], hyperlipidemia as >130 mg/dL fasting low-density lipoprotein concentration or antihyperlipidemic medication usage[17], diabetes mellitus as ≥126 mg/dL fasting plasma glucose concentration or antidiabetic medication usage[18]. We divided patients into three groups, high-rank military personnel, low-rank military personnel, and civilian. High-rank military personnel consist of Ensign, Lieutenant Junior Grade, Lieutenant, Lieutenant Commander, Commander and Captain; while low-rank military personnel consist of Second Seaman, First Seaman, Able Seaman, Second Corporal, First Corporal, Chief Corporal, Petty Officer Second Class, Petty Officer First Class, Senior Chief Petty Officer and Master Chief Petty Officer.

Assessment of Coronary Angiography by Using Gensini score: Coronary angiography was evaluated by qualified nonpartisan cardiologists who were blinded to the patient's clinical features. Significant CAD was determined as ≥50% stenosis of lumen diameter in any of the major epicardial coronary arteries including the left main coronary artery, left circumflex artery, left anterior descending artery, right coronary artery, or one of their major branches. Researchers classified the distribution of the CAD as a one-vessel disease (1-VD) whose disease in one vessel only, two-vessel disease (2-VD) whose disease in two vessels or only in left main trunk without being accompanied by right coronary artery stenosis, and three-vessel disease (3-VD) whose disease in three vessels or in left main trunk accompanied by right coronary artery stenosis. We determine a significant left main disease as ≥50% stenosis of the left main trunk, with or without accompanying lesions in other arteries.[19]

We calculated The Gensini score by giving a severity score to every coronary artery narrowing for as much as 1 point for ≤25% stenosis, 2 points for 26-50% stenosis, 4 points for 51-75% stenosis, 8 points for 76-90% stenosis, 16 points for 91-99% stenosis, and 32 points for 100% stenosis. Afterwards, we multiply every severity score of the coronary artery stenosis by the accountable importance value of the coronary circulation lesion's position. The lesion position's importance values are gradual as follows: 1.0 for right coronary artery, posterolateral artery, distal segment of left anterior descending coronary artery, and obtuse marginal artery; 1.5 for mid-segment of left anterior

descending coronary artery; 2.5 for proximal segment of circumflex artery; 2.5 for proximal segment of left anterior descending coronary artery; 5 for left main coronary artery; and least of all, 0.5 for other segments. Eventually, we assessed the Gensini score by summing up every coronary artery stenosis severity scores.[20]

Statistical Analysis: Categorical variables were presented as frequencies and percentages while the continuous variables presented as mean ± standard deviation. One way ANOVA and LSD Post-Hoc test was used to compare the difference between groups. All statistical analyses were done using SPSS statistical software ver. 25.0.

Findings:

Study Population Characteristics: The average age of patients was 53.04±10.56 years. The number of patients classified as 1-VD, 2-VD, and 3-VD was 33 (19.3%), 28 (16.4%), and 47 (27.5%), respectively. We found that not only Gensini score to be significantly different between study population groups (p=0.015), but also the age (p=0.000), height (p=0.003), weight (p=0.017), random blood glucose (p=0.005) and blood urea nitrogen (p=0.016). Meanwhile, the rest of the study variable did not show a significant difference in between study population groups, as illustrated in Table 1, alongside with the summarized clinical characteristics of the whole study population.

Table 1. Characteristic of patients who underwent coronary angiography

Variable	Total	Civilian	Low-Rank	High-Rank	P
Gensini Score	32.30 ± 40.29	36.08 ± 43.41[c]	32.76 ± 41.84[c]	18.39 ± 32.71[a, b]	0.015*
Age (years)	53.03 ± 10.56	57.62 ± 9.74[b, c]	48.07 ± 8.84[a]	49.42 ± 10.10[a]	0.000*
Height (cm)	165.49 ± 6.66	163.82 ± 7.53[c]	165.71 ± 5.90	168.15 ± 4.57[a]	0.003*
Weight (kg)	70.25 ± 10.51	68.06 ± 10.77[b]	72.66 ± 10.18[a]	71.94 ± 9.78	0.017*
BMI (kg/m^2)	25.62 ± 3.28	37.71 ± 1.09[b]	33.14 ± 9.15[a, c]	34.22 ± 9.31[b]	0.050
SBP (mmHg)	127.50 ± 23.94	127.15 ± 25.02	130.95 ± 23.75	125.14 ± 22.31	0.787
DBP (mmHg)	75.67 ± 11.49	75.98 ± 13.02	75.71 ± 11.38	75.10 ± 8.63	0.812
RBG (mg/dL)	118.96 ± 45.27	129.47 ± 50.00[c]	117.20 ± 52.74	102.65 ± 24.22[a]	0.005*
BUN (mg/dL)	14.81 ± 7.47	16.60 ± 9.17[b, c]	12.63 ± 3.58[a]	13.63 ± 5.90[a]	0.016*
Cr (mg/dL)	1.13 ± 0.28	1.12 ± 0.33	1.15 ± 0.19	1.15 ± 0.27	0.081
WBC (x10^3/uL)	7.25 ± 1.90	7.17 ± 1.84	7.18 ± 1.92	7.62 ± 2.04	0.468
Hgb (g/dL)	14.13 ± 2.19	13.46 ± 1.60	14.78 ± 3.96	14.66 ± 1.19	0.519
Hct (%)	42.17 ± 4.04	40.53 ± 4.95	43.17 ± 3.98	43.83 ± 3.30	0.536
Plt (x10^3/uL)	264.38 ± 55.36	262.44 ± 61.91	269.59 ± 73.95	26.29 ± 49.64	0.500
LMD	7 (4.1)	4 (2.34)	2 (1.17)	1 (0.58)	
1-vessel CAD	18 (10.53)	8 (4.68)	6 (3.51)	4 (2.34)	
2-vessel CAD	12 (7.02)	9 (5.26)	1 (0.58)	2 (1.17)	
3-vessel CAD	14 (8.19)	6 (3.51)	3 (1.75)	5 (2.92)	

Values are presented as mean ± standard deviation or n (%)

a: significant difference compared to the civilian (p<0.05)

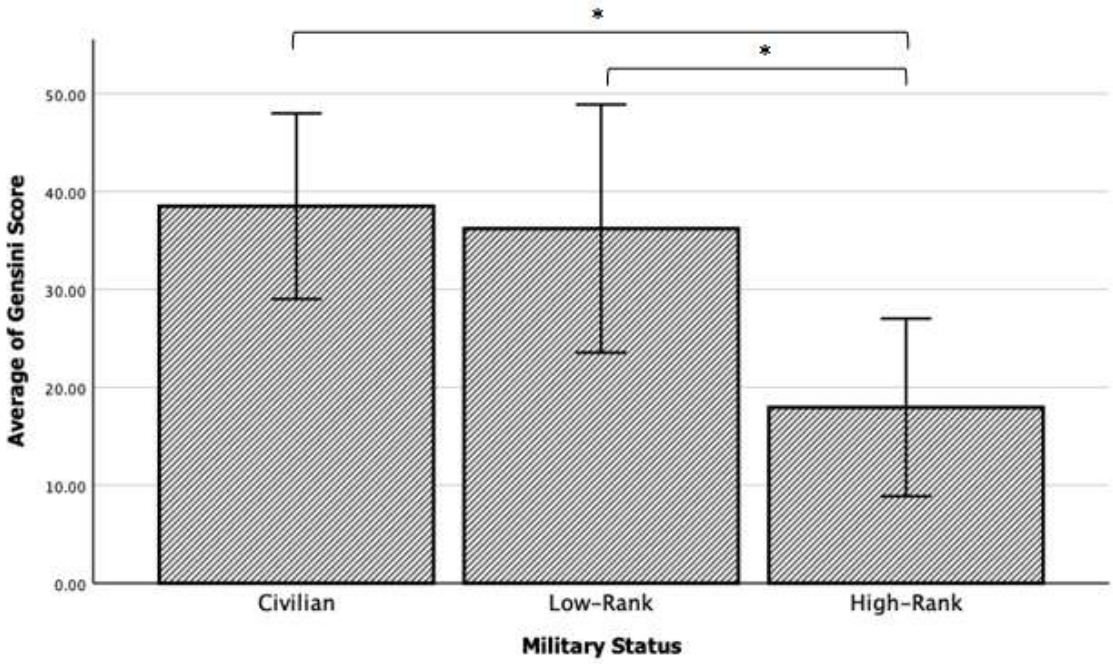
b: significant difference compared to the low-rank military personnel

c: significant difference compared to the high-rank military personnel

*: ANOVA test showed a significant difference at <0.05.

BMI: Body Mass Index. SBP: Systolic Blood Pressure. DBP: Diastolic Blood Pressure. RBG: Random Blood Glucose. BUN: Blood Urea Nitrogen. Cr: Creatinine. WBC: White Blood Cell. Hgb: Hemoglobin. Hct: Hematocrit. Plt: Platelet. LMD: Left Main Disease. CAD: Coronary Artery Disease.

Association between Gensini Score and Military Status: Post-hoc LSD test showed the average score of Gensini Score of high-rank military personnel (18.39 ± 32.71) is significantly lower than both low-rank (32.76 ± 41.84; p=0.031) and civilian (36.08 ± 43.41; p=0.005), as shown in Graph 1. However, no significant difference was found on the average Gensini Score of low-rank military personnel compared to civilian (p=0.761).



Error Bars: 95% CI

*: ANOVA Test showed significant difference at <0.05

Figure 1: Comparison of the average of Gensini score grouped by military status level

Discussion

Coronary artery disease (CAD) event happens differently among the patient population in the military setting.[11] In this study; researchers found that high-rank military personnel was proven to have lower Gensini Score compared to the civilian (p=0.005). This finding might be explained on the National Defence Medical Centre of Canadian Armed Forces research which showed that military personnel has a lower risk of CAD compared to civilian due to higher physical activity, lower-level state of anxiety and better psychosocial adjustment to illness.[11,21] Hence, lower CAD severity in the high-rank military personnel may be due to CAD risk reduction through higher physical activities, fewer anxieties, and better adaptation capability.

However, not all military personnel have reduced CAD severity. This research found that low-rank military personnel has more severe CAD marked by higher Gensini score compared to high-rank personnel (p=0.031). No significant difference was found between low-rank military personnel and civilian (p=0.761). This finding suggested that lower CAD severity may only occur on the high-rank military personnel. This phenomenon might be explained from the previous report, which showed that the low-rank military personnel tends to have difficulties in overcoming the harmful effects of a traumatic combat life. Meanwhile, those from more privileged backgrounds and acting as a leader in the high-rank military personnel, possess a distinct soft skill of psychological and a sense of control to buffer against combat life stress, while also less negatively or even positively affected by combat.[22,23] Previously, it also has been reviewed that distress might increase the risk of CAD development through the activation of sympathetic nervous function.[13] Autopsy result showed that significant CAD was found on 70% of young military personnel who were dead in Korea and Vietnam war.[24] These findings suggest that the distress in the low-rank military personnel might increase the risk of atherosclerosis development, causing more severe CAD. High-rank military personnel has also been reported to have less physical exhaustion compared to low-rank since low-rank military personnel tends to work as a standing guard or other physically exhausting jobs daily.[21] Hence, it is concluded that only high-rank military personnel have lower CAD severity.

This research data was limited from only a single centre. Hence, our findings are yet to be directly generalized for the Indonesian National Defence Forces population. Additionally, very little prior research on the

health status of the military personnel based on their rank. Hence, we found difficulties in comparing our findings with previous results. In the future, multicenter research should be conducted to obtain a more generalized result. Comparison of the distress level and other CAD risk factors between different military rank should be further investigated to determine their involvement in CAD severity.

Conclusion

High-rank military personnel have lower Gensini score compared to low-rank and civilian in the military setting who underwent elective coronary angiography.

Conflict of Interest: The authors declare no conflict of interest

Source of Funding: This research received no external funding

Ethical Clearance: The Ethics Committee has approved this research of the Indonesian Navy Hospital (No 06/EC/KERS/2019). This study and research were carried out under the principles of the Declaration of Helsinki, and all participating patients have provided written informed consent.

Reference

1. Tyrovolas S, Lotufo PA, John D, Hailu T, Lopez A, Qorbani M, et al. Global, Regional, and National Burden of Cardiovascular Diseases for 10 Causes, 1990 to 2015. J Am Coll Cardiol. 2017;70(1):1–25.
2. Wilkins E, Wilson I, Wickramasinghe K, Bhatnagar P, Leal J, Luengo-Fernandez R, et al. European Cardiovascular Disease Statistics 2017 edition. Eur Hear Network, Brussels [Internet]. 2017;192. Available from: http://www.ehnheart.org/images/CVD-statistics-report-August-2017.pdf
3. WHO. World Health Organization. Reducing risks, promoting healthy life. WHO Geneva. 2002;
4. Gaziano TA. Cardiovascular Disease in the Developing World and Its Cost-Effective Management. Circulation. 2005;112(23):3547–53.
5. Reddy KS, Yusuf S. Emerging Epidemic of Cardiovascular Disease in Developing Countries. Circulation [Internet]. 1998 Feb 17;97(6):596–601. Available from: https://www.ahajournals.org/doi/10.1161/01.CIR.97.6.596
6. Joshi R, Cardona M, Iyengar S, Sukumar A, Raju CR, Raju KR, et al. Chronic diseases now a leading cause of death in rural India—mortality data from the Andhra Pradesh Rural Health Initiative. Int J Epidemiol [Internet]. 2006 Dec 1;35(6):1522–9. Available from: http://academic.oup.com/ije/article/35/6/1522/660009/Chronic-diseases-now-a-leading-cause-of-death-in
7. Chow C et all. Reducing the burden of Cardiovascular Disease in Indonesia The George Institute for Global Health [Internet]. 2017. Available from: https://www.georgeinstitute.org/sites/default/files/reducing-the-burden-of-cvd-in-indonesia-evidence-review.pdf
8. Priasto A, Ginting E. Summary of Indonesia's Poverty Analysis. ADB Pap Indones. 2016;02(October 2015).
9. Lynch P, Oelman BJ. Mortality from coronary heart disease in the British army compared with the civil population. Br Med J (Clin Res Ed). 1981; 283(6288):405–7.
10. Parsons I, White S, Gill R, Gray HH, Rees P. Coronary artery disease in the military patient. J R Army Med Corps. 2015;161(3):211–22.
11. Swenson JR, Grenier J, Nolan R, FitzGibbon GM, Leach AJ, Raman S. Adaptation to Coronary Artery Disease: First Pilot Study in the Military. Mil Med. 2018;162(12):792–7.
12. Oktavia F, Martini S. Besar Risiko Kejadian Hipertensi Berdasarkan Faktor Perilaku pada Tentara Nasional Indonesia (TNI) (Risk of Hypertension Based on Behavior Factor in Indonesian Army). Media Kesehat Masy Indones [Internet]. 2016;12(3):127–36. Available from: http://journal.unhas.ac.id/index.php/mkmi/article/view/1067
13. Grenier JL, Swenson JR. Psychosocial Aspects of Coronary Artery Disease Related to Military Patients. 1997;42(March):176–84.
14. Gensini GG. A more meaningful scoring system for determining the severity of coronary heart disease. Am J Cardiol [Internet]. 1983 Feb;51(3):606. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0002914983801052
15. Huang G, Zhao J, Du H, Lan X, Yin Y. Coronary Score Adds Prognostic Information for Patients With Acute Coronary Syndrome. Circ J. 2010;74(3):490–5.
16. 2013 ESH/ESC Guidelines for the management

of arterial hypertension. Eur Heart J [Internet]. 2013 Jul 21;34(28):2159–219. Available from: https://academic.oup.com/eurheartj/article-lookup/doi/10.1093/eurheartj/eht151

17. Schaiff RAB, Moe RM, Krichbaum DW. An overview of cholesterol management. Am Heal drug benefits [Internet]. 2008 Nov;1(9):39–48. Available from: http://www.ncbi.nlm.nih.gov/pubmed/25126264
18. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabetes Care [Internet]. 2010 Jan;33 Suppl 1: S62-9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/20042775
19. Avci A, Fidan S, Tabakçı MM, Toprak C, Alizade E, Acar E, et al. Association between the Gensini Score and Carotid Artery Stenosis. Korean Circ J [Internet]. 2016;46(5):639. Available from: https://synapse.koreamed.org/DOIx.php?id=10.4070/kcj.2016.46.5.639
20. Chen Z-W, Chen Y-H, Qian J-Y, Ma J-Y, Ge J-B. Validation of a Novel Clinical Prediction Score for Severe Coronary Artery Diseases before Elective Coronary Angiography. Schnabel RB, editor. PLoS One [Internet]. 2014 Apr 8;9(4):e94493. Available from: https://dx.plos.org/10.1371/journal.pone.0094493
21. Siart B, Pflüger LS, Wallner B. Pulling Rank: Military Rank Affects Hormone Levels and Fairness in an Allocation Experiment. Front Psychol. 2016;7:1750.
22. Krantz G, Ostergren PO. Double exposure. The combined impact of domestic responsibilities and job strain on common symptoms in employed Swedish women. Eur J Public Health [Internet]. 2001 Dec;11(4):413–9. Available from: http://www.ncbi.nlm.nih.gov/pubmed/11766483
23. Sherman GD, Lee JJ, Cuddy AJC, Renshon J, Oveis C, Gross JJ, et al. Leadership is associated with lower levels of stress. Proc Natl Acad Sci [Internet]. 2012 Oct 30;109(44):17903–7. Available from: http://www.pnas.org/cgi/doi/10.1073/pnas.1207042109
24. McNamara JJ, Molot MA, Stremple JF, Cutting RT. Coronary Artery Disease in Combat Casualties in Vietnam. JAMA J Am Med Assoc. 1971 May; 216(7):1185.

Social Support on Parents of Children with Intellectual Disability

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Abstract

Context: Intellectual disability is one of the disabilities that occurs in children with Intellegence Quotient (IQ) characteristics <70. The limitations possessed by intellectually disabled children can be stressors and burdens that can cause psychological problems for parent, therefore, social support is needed for parents. The purpose of this study was to identify social support obtained by parents who have intellectually disabled children. This quantitative descriptive study was conducted at schools for special needs children in Bandung, with a sample of 81 parents of intellectual disabled children who met the research criteria. Social support was measured by the Social Support Questionnaire that was modified and developed using The Sarafino theory. Data were analyzed by univariate. The results showed that 70.4% of parents have received social support in the higher category, while 29.6% had low social support. The results of the study showed that the highest social support received by parents was instrumental support, while the lowest domain was recognition suppsort. Nurses need to collaborate with parents, teachers and other health providers to strengthen the supportive program for parents with intellectually disabled children.

Keywords: *Children, intellectual disability, parents, social support.*

Introduction

Disability in children is a condition that includes physical, mental, intellectual, or sensory limitations over a long period of time, which will cause delays in children's participation in society[1]. At present, the prevalence of disability in children is increasing. Indonesia is the 8th largest country that has children with disabilities[2]. Intellectual disability in children is ranked second from overall disability that occurs in children in Indonesia for about 30,460 number of cases[3]. West Java Province is in the highest position with intellectual disabilities children, which has 13,173 children and Bandung is the town that has 1,077 children with intellectual disability[4], almost reaches 10% of the total population of intellectual disabilities children in West Java.

Children with intellectual disabilitieshad impaired cognitive and adaptive skills (limited communication, self-help, speaking, self-directed) that occurs before entering the age of 18[5,67].In addition, the way of thinking of children with intellectual disabilities that is too simple, the ability to catch and memory are weak, and the understanding of language and numeracy is weak too. This will make it difficult for children to attend regular schools[8].

Another problem, which can be found in children with intellectual disability is a problem related to independence[9]. Children with an intellectual disability tend to be difficult to communicate and adapt so that this results in the dependence of children'sintellectual disabilities on their parents or the surrounding environment to be very high.

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Poor independence and a high sense of dependence from intellectual disabilities children are the cause of the child's future still in uncertainty. The future uncertainty can cause a negative impact on parents, namely to become stressors and psychological problems. Psychological problems that arise for parents include worryingabout stress, and anxiety in parents[10].

Parents who have intellectual disabilities children have more significant risks to the physical and psychological well-being of parents. Some challenges that could be faced by parents are increased financial burden to care for intellectual disabilities children; regulate life with the behavior of children who have problems or have limitations, and stigmatize the community towards children withintellectual disability themselves[11]. This will make stressors for parents of intellectual disabilities children.

Sarafino said that the individual's reaction to stressors is different, and the role of social support is needed to deal with these stressors[12]. When viewed from the theory of stress adaptation models belonging to Stuart, one of the factors that can be related to parent's psychological problems (anxiety or stress) is social support[6]. Social support is one source of coping that is owned by individuals when getting a stressor and can help individuals to integrate these stressors[12].

Social support can come from several sources, including partners, family, friends, health workers, or organizations and communities. Individuals who have social support believe that they are loved, valued, and part of their environment, which can help individuals when they need it. It can be said that social support is an action carried out by others to individuals or support received by individuals from other people. Social support also refers to the individual's perception that comfort, caring, and help are available when individuals need it, it can be said to be perceived support[12].

Lack of support for parents with intellectual disabilities children can be a negative experience for parents and children with intellectual disabilities. Parents with limited support tend to have negative effects, such as emotional and behavioral problems as an anxious response in providing care for children with intellectual disability[13]. Mothers who received low social support were more likely to experience high stress[14].It is important for nurses to explore how social support is obtained by parents. Sarason revealed that social support has been linked to many benefits for health, both physically and mentally[15].

Material and Method

This study used a descriptive approach with a cross-sectional approach. This study aimed to identify and explore social support in parents with intellectual disabilities children in Bandung.The samples studied were 81 parentsas a primary caregiver and lived with intellectual disabilities children, taken by purposive sampling. Social support was measured using a Social Support Questionnaire that had been modified and developed using Sarafino theory with alpha Cronbach values of 0.728. The questionnaire includes the domain of emotional support, instrumental support, informational support, and award/assessment support. Each statement item was measured on a 1-4 scale. The method of categorizing uses the cut-off point, with a low support category if the total score was ≤50, and high category if the total score between 51-80.Datacollection was carried out for 2 months (May-July 2019). The collected data was then analyzed using univariate analysis.

Results

Characteristics of Respondents: Based on the characteristics of respondents, it was found that the age of parents who have children with intellectual disabilities was dominated by 36-45 years old (44.4%), 95.1% were married, mostly wasa mother (75.3%) and were not working (housewife) (76.5%). Most family income was below the minimum wage (70.4%), and the last education taken was high school (67.9%).

The age of children mostly was in the teenage years (13-16 years) (38.3%) the child status were biological children (97.5%), more than half of children were male (53.1%), and the intellectual disability categories were mild (55.6%).

Table 1: The Characteristics of Respondents

Characteristics	Frequency (f)	Percentage (%)
Age of Parents		
26-35	8	9.9
36-45	36	44.4
46-55	29	35.8
56-65	8	9.9
Gender of Parents		
Men	20	24.7
Women	61	75.3

Characteristics	Frequency (f)	Percentage (%)
Job Status		
Working	19	23.5
Not Working	62	76.5
Family Income		
Below the minimum wage	57	70.4
Above or equal to the minimum wage	24	29.6
Marital Status		
Married	77	95.1
Not Married or divorced	4	4.9
Parent's Last Education		
Junior High School	12	14.8
Senior High School	55	67.9
College	14	17.3
Age of Children		
5-12	29	35.8
13-16	31	38.3
17-25	21	25.9
Children Status		
Biological	79	97.5
Not Biological	2	2.5
Gender of Children		
Male	43	53.1
Female	38	46.9
Level of Intellectual disability of Children		
Mild	45	55.6
Moderate	32	39.5
Severe	2	2.5
Profound	2	2.5

Table 2: Parent's Social Support Sources

Source of Social Support	Frequency (f)	Percentage (%)
Spouse		
Yes	76	93.8
No	5	6.2
Parents (Grandfather/ mother)		
Yes	58	71.6
No	23	28.4
Friends (fellow parents of intellectual disabilities children/peer group)		
Yes	55	67.9
No	26	32.1
Others: -Professional Staff	9	11.1
-Siblings (Family)	14	17.3
-Neighbour	2	2.5
-Community	4	4.9

Almost all respondents received support from a spouse (husband/ wife); 71.6% of respondents received support from parents (grandparents of intellectual disabilities children). Then 67.9% of parents get support from friends (fellow parents of children with intellectual disability). Parents also mentioned several other sources of support such as professionals, relatives, neighbors, social media and the community.

Social Support:

Table 3: Social Supports Received by Parents

Social Support	Frequency (f)	Percentage (%)
Low	24	29.6
High	57	70.4

Based on table 3, parents mostly have social support in high categories (70.4%), whereas parents who have low social support were 29.6%.Based on the social support domain, it was found that instrumental support was the highest domain (84%) and award/assessment support became the lowest domain (60.5%) that received by parents (table 4).

Table 4: Social Support Domains Received by Parents of Children with Intellectual Disabilities

Social Support Domain	Categories			
	Low		High	
	f	%	f	%
Emotional Support	25	30.9	56	69.1
Instrumental Support	13	16.0	68	84.0
Informational Support	31	38.3	50	61.7
Award/Assessment Support	32	39.5	49	60.5

Discussion

Social support is a condition that refers to the comfort, care, respect, or assistance available to someone from another individual or group. However, not all individuals get the social support they need. This relates to several factors, including the unavailability of the resources they need or the individual not assertive enough to ask for help from others[12].

Social support is one thing that is needed for parents who have children with intellectual disabilities. There is support from the social and family environment, able to provide a positive influence on parents to avoid various psychological disorders or stresses[17]. In addition, social support for parents of intellectually disabled children is one form of effort made by individuals or other groups

in encouraging parents to accept the conditions of intellectually disabled children[22]. Duran states that when parents find out their child is intellectually disabled, parents tend to close down and stop communicating with those around them. This is done by parents because they feel they will get a negative reaction from the people around and will refer to a decrease in their mental health. Therefore, it is necessary to increase the support that comes from families and people around them[19]. One factor that can improve social support in parents is the willingness of partners to assist when caring for intellectual disabilities children. Based on the results of the study, 93.8% received support from their husbands or wives. Support from couples is expected to be able to overcome psychological problems for parents because the couple is the closest and most important person for parents.

The role of support for grandparents from children with an intellectual disability is also important. This is related to solving problems that are likely to be encountered by parents of intellectual disabilities children. Family members who are the closest to parents are expected to provide more support to parents. Their support tends to make parents accept the reality of their children[17].Other than that, friends also become important people outside the family. Parents mentioned that they get support from friends. Parents having new friends when they take their children to school. Sothey can exchange stories and experiences with fellow parents. This is in line with research conducted by Cuzzrocrea which states that support from friends is able to reduce stress levels for parents who have children with disabilities, one of which is intellectual disability[18]. Good motivation for parents from friends can also balance the support conditions felt by parents of intellectual disabilities children[19].

However, the results of the study stated that only nine parents received support from professionals such as nurses and teachers in schools. In fact, the role of nurses and teachers is also important for the psychological well-being of parents of intellectual disabilities children. In addition, only two parents said that they had the support of their neighbors, even toughneighbors or surrounding communities have a big role in providing support for parents.

The results of this study indicate that parents get social support in the high category. This is likely due to the role of the closest person to the parent. Parents in this study were members of the peer group. Parents who have children with special needs will usually form peer groups and will support one another with other parents[18]. This will increase the social support that is obtained by parents. Parents who have high social support, especially in material and spiritual support, tend to have better attitudes toward intellectually disabled children[19]. In addition, parents with high social support will have a better quality of life than parents who do not have support[20].

Based on the domain of social support, the highest support in this study is instrumental support, while the other three domains have almost the same percentage value. However, award support/assessment based on the results of this study is the domain with the lowest percentage value.

High instrumental support for parents of intellectual disabilities children may be related to the presence of direct assistance for parents. Buran states that the presence of other people (spouse, family, or friends) who can help parents in providing care or caring for intellectual disabilities children is proven to increase the score of social support for parents[21]. The function of the couple themselves in this domain is as the person closest to the parent, where parents can do the division of care for children with intellectual disability[19].

Emotional support is the second of the highest support domains received by parents. In this study parents stated that their partners were willing to listen to stories, share joys and sorrows, exchange ideas, and listen to their hearts.The couple has a role as someone who can listen to or accompany parents at any time, so as to reduce the burden of thought and burden of care for mentally retarded children. In addition to partners, friends can also be some oneto share stories, provide motivation, and solutions so that parents can avoid being ostracized. Parents who have low emotional support may be due to lack of willingness of partners and friends to listen to stories, share joys and sorrows, and do not accept the child's condition[19].Informational support also needed by parents. In this study, parents get information, advice or direction regarding the development and parenting of children from peergroups and social media. The availability of easy and diverse information access becomes very beneficial for parents to get information, advice, and direction to solve problems.

Award or assessment support is the lowest domain obtained by parents. Parents state they rarely get praise

from people around them. Parents feel that the people closest to them rarely appreciate their parents, and sometimes do not consider what parents do important, even though praise and appreciation are very important because it can provide comfort and a sense of being loved by other individuals. Praise and appreciation may also be able to increase self-efficacy for parents in dealing with the stress of caregiving[12]. The sympathetic feelings of professionals (teachers, doctors, nurses) are able to make parents feel understood and valued[21]. Therefore, it is important for those closest people including health workers to always give praise and appreciate the things that have been done by parents. Praise given to parents may be able to increase the sense of comfort and confidence.

Conclusion

Social support is very much needed by parents with intellectually disabled children. Spouses, family, friends, peer groups and other health workers are important sources for parents. Parents need support for access to health information, praise or appreciation from those around them and professionals. Appreciation support is very important to increase parental self-efficacy in parenting intellectually disabled children.

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Reference

1. Ministry of Justice and Human Rights of The Republic of Indonesia. Act Number 19 (2011).
2. Organization WH. World report on disability 2011. World Health Organisation and The World Bank [Internet]. Vol. 91. 2011. Available from: http://www.ncbi.nlm.nih.gov/pubmed/22726850
3. Primadi O. Highlight of Disability, 2(1):1–5. 2014.
4. Ministry of Education and Culture The Republic of Indonesia. Statistic of Special Needs School in Indonesia. 2017
5. Betz C, Sowden L. Pediatric Nurse Handbook. In: 5. Jakarta: EGC; 2009
6. Stuart G. Principle and Practice of Psychiatric Nursing. Singapore: Elsevier; 2016.
7. Wong D, Earon MH, Wilson D, Winkelstein M, Schwartz P. Pediatric Nursing. In: 1. 6th ed. Jakarta: EGC; 2013.
8. Soetjiningsih. Child Development. In: 2. Jakarta: EGC; 2013.
9. Norhidayah, Wasilah S, Husein AN. Stressor in Mother with Mentally Retarded Children. Berk Kedokt. 2016;9(1):43–50.
10. Kayandi, Fraline; Suryadi DM. Penyesuaian Diri Ibu Yang Memiliki Anak Disabilitas Intelektual Moderat. Arkhe. 2009; 2(14):97–105.
11. Bodla, Saima, Ammara. Social Support and Psychological Wellbeing among Parents of Intellectually Chalanged Children. Int J Rehabil Sci. 2012;01(02):29–35.
12. Sarafino EP, Smith TW. Health Psychology In: Biopsychosocial Interactions. Seventh Ed. United States of America: John Wiley & Sons, Inc; 2011.
13. Barreto C, Byrne C, Delaney M, Harrington A, Kazokova K. Support for parents of Children with An Intellectual Disability: The Social Care Worker's View. Journal of Social Care. 2017; 1(1): 1-9.
15. Sarason IG, Sarason BR. Social support: Mapping the construct. J Soc Pers Relat. 2009; 26(1):113–20.
18. Cuzzocrea F, Murdaca AM, Costa S, Filippello P, Larcan R, Cuzzocrea F, et al. Parental stress, coping strategies and social support in families of children with a disability. Child Care Pract [Internet]. 2016; 22(1):3–19. Available from: http://dx.doi.org/10.1080/13575279.2015.1064357
19. Duran S, Ergün S. The stigma perceived by parents of intellectual disability children : an interpretative phenomenological analysis study. Anatol J Psychiatry. 2018;19(4):390–6.
20. Misura AK, Memisevic H. Quality of Life of Parents of Children with Intellectual Disabilities in Croatia. J Educ Soc Res. 2017;7(2):43–8.
21. Buran G. Social Support and Anxiety Levels of Parents with Disabled Children. Rehabil Nurs. 2014;1–7.

Health Promotion Action by Primary Health Care for Smoking Prevention

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Abstract

Context: Tobacco use has been proven to be detrimental to health. Health promotion offered by Primary Health Care (PHC) for smoking prevention has not shown any satisfactory results. The issues of tobacco use were always identified every year. This study aimed to explore the health promotion (HP) actions for smoking prevention in PHC as a material to inform smoking prevention efforts in PHC.

Qualitative research was conducted on 35 participants from two PHCs in Surabaya. In-depth interviews were conducted on 25 PHC workers followed by observation and document tracking. Triangulation of sources obtained from stakeholders and patients.

Although, in practice, health promotion in a certain sense adopted the WHO strategy, PHC workers viewed the concept of health and health promotion traditionally. There were a number of efforts of smoking prevention which still required some improvements including the promotion and supervision of local regulations, raising awareness and the ability of people to live healthy, and creating a conducive environment.

PHC health promotion action for smoking prevention adapted the strategy of WHO even though it tended to develop personal skills. More effective and efficient smoking prevention efforts required professionals who understand health promotion and a combination of strategies. The government as a policy maker occupied a key and central position in supporting the efforts.

Keywords: *smoking prevention, The Ottawa Charter, health promotion*

Introduction

Tobacco is the only legal product that kills many users. The current use of tobacco has an impact on premature deaths of around 8 million people worldwide each year. The total includes about 600,000 people who presumably died from the effects of being passive smokers(1). The deaths related to tobacco use frequently occur in lower middle income countries which become the targets of intensive marketing of the tobacco industry. The total economic cost of smoking is estimated at around 1.4 trillion USD per year, equal to 1.8% of the world's domestic products(2).

Indonesia is the country with the highest number of smokers among other ASEAN countries, which is 65.19 million. This number is equal to 34% of the total population of Indonesia(3). The number of smokers does not immediately decrease due to the efforts to stop smoking that has not been effective while a number of novice smokers like teenagers are constantly increasing. The proportion of the population aged ≥15 years who

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smoke and chew tobacco tends to increase[4]. The prevalence of smoking in the population aged 10-18 years also experienced an upward trend. The 2013 RKD was 7.2%, the 2016 National Health Indicator Survey was 8.8%, and the 2018 RKD was 9.1%[5].

Surabaya is the second largest metropolitan city in Indonesia.Surabaya has become a strategic, potential, and prospective target for the cigarette industries to market their products. Disease trends attributed to smoking behavior which include chronic diseases such as hypertension, heart disease, stroke, asthma, COPD and lung cancer show an upward trend in the last three years[6]. Considering the increasing trend of the chronic diseases, the efforts to control the effects of tobacco require more serious concern. Meanwhile, the indicators of smoking in the house are still becoming the issues every year[7].

HP has a fundamental role in realizing the overall Sustainability Development Goals agenda[8]. HP is an effort closely related to the principle and development of PHCas a first-rate health service. Accessibility, follow-up and continuity of basic services and their presence in the community are the ideal contexts offered in an integrated and focused manner to concern on and implement HP activities[9].The efforts of HP in PHC should be implemented so that people are able to promote clean and healthy life behavior (PHBS) as a form of solving the health problems they experience[10].

The complexity of the problem of smoking requires a systematic and comprehensive strategy. The strategy or action of coaching of PHBS in PHC refers to The Ottawa Charter from the results of the First International HP Conference initiated by WHO[11],[12]. The strategies that can be used include advocate (advocacy), mediate (community development) and enable (empowerment) which are implemented through five actions.

Meanwhile, in practice, the integration of HP interventions in PHC presents a challenge or obstacle in the form of a heavy workload, time constraints, and professionals and patient belief in HP[13],[14]. The implementation of HP in Indonesia still faces some obstacles[15]. The purpose of this study is to explore the actions of HP for the smoking prevention in PHC. The researchers consider this indispensable knowledge to inform the prevention of smoking by PHC.

Method

Research Design: This research is a qualitative research with a phenomenological approach. The phenomenological approach in this research is to understand and explore the reality experienced by professionals and the underlying aspects[16].

Informants / Research Subjects: The determination of informant number is until theinformation variations are no longer found. The key informants in this study include 23 PHC workers which cover the Head of PHC, and PHC workers who have a role in carrying out the HP action to prevent smoking. There are additional informants outside the PHC as a PHC triangulation consisting of 6 patients and 5 stakeholders. One other informant is the Head of the Disease Prevention and Control Division to obtain information about the Surabaya City Government's policy regarding smoking prevention. All informants have stated their willingness to be interviewed by first signing an informed consent.

Data Collection: Data collection is done by conducting in-depth interviews, observation and analysis of documents.The instruments in this study are the main researcher as a master program student and two lecturers inPublic Health Faculty of Airlangga University. Supporting equipment in gathering information includes in-depth interview guides, observation sheets, document study sheets, smartphones and stationery.A semi-structure topic guide contains questions about HP's action for smoking prevention.

Research Location and Time: The researchers choose two PHCs in Surabaya as the location of the research based on the value of the no-smoking indicator inside the house in 2016-2018.The two PHCs chosen are Tembok Dukuh PHC with a positive trend indicator valueand Simomulyo PHC with a negative trend.The data collection is carried out in September to October 2019.

Data Analysis and Validity: Data as a result of field notes is transcribed, coded and analyzed using domain analysis. The analysis is carried out as soon as possible after each data collection in the field is completed. The researchers begin with an overall picture of the phenomena that have been collected. The entire data is read and marked with margin notes in the data that are considered important, then the data is coded.Findings in the form of statements experienced by informants are grouped. Irrelevant and repeated statements are

reduced.The findings of each statement are collected in units of meaning. The researchers develop an overall description of these findings to find the essence of the phenomenon[17].

Data validation is done through source triangulation and method triangulation. Source triangulation is done by confirming data from the key informants to other informants, while method triangulation is done by confirming data from in-depth interviews with observations and document searches.

Results

The informants who have participated in this study consisted of 23 PHC workers, 1 Head of Disease Control and Prevention, 5 stakeholders, and 6 patients. The majority of informants from PHC were women (n = 22/23). The average service life was 6.54 years. PHC workers consisted of 5 general practitioners, 2 dentists, 4 public health, 7 midwives, 3 nurses, and 2 psychologists. Other informants consisted of 5 stakeholders with undergraduate education, and 6 patients with high school and undergraduate education.

The findings from the analysis were divided into 4 main categories: HP workers' perceptions, HP's actions and the results for smoking prevention.

PHC Workers' Perception: The theme related to the perception of PHC workers in the HP of prevention smoking identified covered the healthy concept and HP.The healthy concept was identified from PHC workers' answers that healthy was interpreted as a physical and mental condition that was not sick so that individuals were able to do their activity.

"..it is considered healthy if someone does not hurt, both the body and ... the soul "(AM/31/Physician).

There are few of them who defined healthy holistically; including behavioral and environmental (physical, economic and social) aspects.

The PHC workers interpreted HP as a medium to inform, the efforts to inform healthy ways of life, prevention efforts, socialization, and counseling. HP has not been widely understood. The focus of the intervention is on the individual.

"inform the importance of health. We promote a message to the community to be able to maintain their health."(HS/56/Head of Community Health Center).

"…media used to provide information to the wider community "(IS/33/Health Promotor).

Action and Results of HP for Smoking Prevention: The HP actions to prevent smoking identified from the informants included building healthy policies, creating supportive environments, strengthening community actions, developing personal skills, and reorienting health services.

Building Healthy Policy: The Surabaya City Government has issued a regional regulation on non-smoking and smoking-restricted areas in Surabaya since 2008 and was revised in 2019 to be a non-smoking area (KTR). This regulation became the basis in regulating the rights of smokers and non-smokers in reducing health risks. PHC has socialized the new regulation to several institutions, especially health service facilities, schools, children's activity arenas, places of worship, public transportation, workplaces, etc. PHC advocated institutions in (KTR) to issue regulations or decrees on the formation of a development and supervision team.

"We already have ... regulations on KTR. That's number one, so we use it as a reference for any spots."(FS/35/Health Promotor).

Creating Supportive Environments: The activities to create an environment that strengthened smoking prevention efforts included installing banners, posters, stickers and establishing smoke free villages as a model. The efforts to modify the environment to support HPstill needed to be increased.

"..I have already socialized about the Regional Regulation on KTR. I have distributed leaflets, banners, posters in terms of which areas are not allowed to smoke.."(FS/35/PJP).

Strengthening Community Action: PHC had an Integrated Service Post (posyandu) for youth, a youth-sourced activity. Teenagers could develop skills in providing education to their peers. This strategic activity has not been developed more optimally.

"*There are around 30 cadres of adolescent or teenagers posyandu. We hold a roadshow. The posyandu cadres have provided counseling to youth groups (Karang Taruna) in the halls. Their skills also improve." (FN/32/Midwife).*

Developing Personal Skills: PHC activities to increase knowledge, awareness, and ability to live

healthy lives away from smoking include socialization of regulations in schools, RT / RW meetings, counseling at Integrated Service Post (posyandu) and Integrated Development Post (posbindu).

"..the material of smoking prohibition has been given to elementary school."(HS/56/Physician).

Reorienting Health Services: were PHC activities to develop health services from the health-illness continuum to be healthy through a preventive promotive approach. PHChas integrated service posts (Posyandu) as a form of service sourced from the community. Posyandu was a health service that can accommodate community participation which makes it a channel to bring community health centers (PHC/ Puskesmas) closer to the community. Indealing with the patients who were indicated smoking, individual health services such as doctors and midwives would give aninformation to control the smoking habits. PHC providedsmoking cessation counseling services for novice smokers.

"If a baby has a cough and flu, I would ask, does anyone smoke at home?"(FN/32/PKPR).

Discussion

PHC workers' understanding of the concept of health affected the orientation of the services they provided[18]. HP was a process of enabling people to improve their health control and determinants in order to improve their health[11].In practice, health services in PHC prioritized curative, disease-centered and focus on problem solving[10].Health professionals had the role of HP, so they were expected to have a holistic view towards the health. Health determinant was also a part of health that required intervention as a promotive and preventive effort. PHC workers needed to understand the concepts and principles of health promotion to be able to support the development of HP practices[19].HP was more than just preventing disease and changing individual behavior. The attitude of PHC workers to HP depended on the concept of health interpreted which could affect the goals of the health services. The framework of the HP effort also depended on the determinants of health targeted[20].The Ottawa Charter emphasized the need for a new understanding of HP. Its definition indicated an important change from the focus of modifying individual behavior factors to the determinants that maintained people's health[21].

HP Interventions using a combination of HP strategies and actions offered by WHO had proven to be effective and cost-effective in preventing and managing chronic diseases and related risk factors[22]. The implementation of health promotion for smoking prevention by PHC covered almost all WHO strategies and actions. The actions were carried out at the structural, social and personal level.However, every action still requires continuous optimization.

The efforts to control the impact of tobacco were strengthened by regulations. Policy wasthe key strategy. Policies and regulations required guidance, supervision and law enforcement. Cross-sectoral collaboration other than health actors was carried out to support the implementation of regulations. Government officials were expected to be able to bethe role modes for healthy living behavior. The pilot area, installation of banners and posters were the efforts of the Puskesmas to create a supportive environment. Creating a supportive environment was an essential strategy to ensure the effectiveness of other strategies. Socialization and education related to tobacco control efforts were carried out. Developing personal skills actions also needed to be combined with other actions, for instance, the government policy in controlling tobacco use could be done by limiting teenagers' access to tobacco products by restricting cigarette shops and raising cigarette taxes. Reorienting health service was a very important strategy to deal with the growing problem of chronic diseases.

Conclusions

PHC health promotion action for smoking prevention has adapted the strategy of WHO even though it tends to develop personal skills. More effective and efficient smoking prevention efforts require professionals who understand health promotion and a combination of strategies. PHC workers need capacity building to achieve the main goals of PHC as a primary health care facility that promotes promotion and prevention. The government as the policy maker occupies a strategic position in supporting the efforts to prevent smoking.

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References

1. World Health Organization. WHO global report on trends in tobacco smoking 2000-2025 - First edition [Internet]. [cited 2019 Oct 29]. Available from: https://www.who.int/tobacco/publications/surveillance/reportontrendstobaccosmoking/en
2. World Health Organization. Tobacco [Internet]. 2019 [cited 2019 Oct 29]. Available from: https://www.who.int/health-topics/tobacco
3. Widowati H. Indonesia, Negara dengan Jumlah Perokok Terbanyak di ASEAN [Internet]. [cited 2019 Oct 29]. Available from: https://databoks.katadata.co.id/datapublish/2019/05/31/indonesia-negara-dengan-jumlah-perokok-terbanyak-di-asean
4. Indonesia Ministry of Health. National report on basic health research. Jakarta; 2014.
5. Indonesia Ministry of Health. National report on basic health research - RISKESDAS 2018. Jakarta; 2017.
6. Dinas Kesehatan Kota Surabaya. Tren Penyakit Kronis 2019. Surabaya; 2019.
7. Dinas Kesehatan Kota Surabaya. Penilaian Kinerja Puskesmas 2016-2018. Surabaya; 2018.
8. Fortune K, Becerra-Posada F, Buss P, Galvao LAC, Contreras A, Murphy M, Rogger C, Keahon GE de FA. Health Promotion and The Agenda for Sustainable Development, WHO Region of the Americas [Internet]. Bulletin of the World Health Organization. 2018. p. 621–6. Available from: https://www.who.int/bulletin/volumes/96/9/17-204404/en/
9. Star field B, Shi L MJ. Contribution of Primary Care to Health Systems and Health. Milbank Q; 2005.
10. Indonesia Ministry of Health. Pedoman Pelaksanaan Promosi Kesehatan di Puskesmas. Indonesia; 2007.
11. World Health Organization. The Ottawa Charter for Health Promotion. Ottawa; 1986.
12. Indonesia Ministry of Health. Pedoman Pembinaan Perilaku Hidup Bersih dan Sehat (PHBS). 2269/MENKES/PER/XI/2011 2011.
13. Rubio-Valera M, Pons-Vigués M, Martínez-Andrés M, Moreno-Peral P, Berenguera A, Fernández A. Barriers and Facilitators for the Implementation of Primary Prevention and Health Promotion Activities in Primary Care: A Synthesis through Meta-Ethnography. Harper DM, editor. PLoS One [Internet]. 2014 Feb 28 [cited 2019 Nov 25];9(2):e89554. Available from: https://dx.plos.org/10.1371/journal.pone.0089554
14. Moreno-Peral P, Conejo-Cerón S, Fernández A, Berenguera A, Martínez-Andrés M, Pons-Vigués M, et al. Primary care patients' perspectives of barriers and enablers of primary prevention and health promotion - A meta-ethnographic synthesis. PLoS One. 2015;10(5):1–21.
15. PPPPKMI. Peluang dan Tantangan Tenaga Promotor Kesehatan di Era JKN [Internet]. Bandung; 2018. Available from: http://dosen.stikesdhb.ac.id/gugum/wp-content/uploads/sites/34/2018/05/2018_TANTANGAN-TENAGA-PROMKES.pptx
16. Kusumawardani N, Soerachman R, Laksono AD, Indrawati L, H. PS, Paramita A. Penelitian Kualitatif di Bidang Kesehatan. Erdian, editor. Yogyakarta: PT. Kanisius Yogyakarta; 2015. 12–52 p.
17. Becker. Living and Relating: An Introduction to Phenomenology. California: SAGE Publication; 1992.
18. Julliard K, Klimenko E, Jacob MS. Special Feature Definitions of Health Among Healthcare Providers. Nurs Sci Q. 2006;19(3):265–71.
19. Johansson H, Weinehall L, Emmelin M. "It depends on what you mean": a qualitative study of Swedish health professionals' views on health and health promotion. BMC Health Serv Res. 2009;
20. Naidoo J & Wills J. Public health and health promotion: developing practice Canada. Elsevier Limited; 2005.
21. Kickbusch I. The Contribution of the World Health Organization to a New Public Health and Health Promotion. Am J Public Health. 2003;93(3):383–8.
22. Jackson SF, Perkins F, Khandor E, Cordwell L, Hamann S, Buasai S. Integrated health promotion strategies: a contribution to tackling current and future health challenges. 2007;

The Influence of Posyandu Cadres' Training to ward the Predisposing Factors of Provider Initiated Testing and Counseling (PITC) of HIV Services for the Pregnant Women and Its Utilization on Samarinda Municipality, Indonesia

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Abstract

Introduction: The infection of HIV from mother to child can be prevented through the prevention of transmission from mother to child's efforts based on the WHO recommendation in 2010. The cadres are considered to be capable of monitoring pregnant women in their area, so they are considered to be capable of moving pregnant woman's willingness to carry out an HIV test at the nearest Community Health Center or *Puskesmas*. The purpose of this study was to prove the influence of training given to cadres toward predisposing factors of PITC of HIV Services on Pregnant Women and influence of the training and PITC of HIV Service utilization by the pregnant women after 1-3 months follow up period.

Method: This quasi experimental research conducted from March to May 2019. The population was *posyandu* cadres. Sampling was 42 cadres, divided into treatment and control group. Data assessed using a questionnaire on the pre-test and post-test.

The Results: A significant difference in knowledge showed after the training between treatment and control group p=0.000. On the contrary, no significant difference in self-efficacy shown before and after the training in the treatment and control group p = 0.178 and 0.216, consecutively. There was also no significant influence showed on the attitude of cadres before and after the training for the treatment and control group p=0.488 and p=0.731, consecutively. There was a significant influence of training toward the PITC of HIV service utilization by the pregnant women p=0.004.

Conclusion: There was a significant influence between training toward knowledge of the *posyandu* cadres' knowledge on the PITC of HIV and the PITC of HIV service utilization by the pregnant women.

Keywords: Cadre, training, provider initiated testing and counseling, HIV, pregnant women

Introduction

HIV infection is one of the main health problems in Indonesia. This infectious disease can affect maternal and child mortality. Indonesia is one of the countries with the estimated increase in *the incidence rate of* infection with more than 25%[(1)]. Prevalence and HIV transmission from mother to child is likely to be low, however the number of pregnant women infected with HIV are likely to be arise. The infection of HIV from mother to child can be prevented through the prevention of transmission from mother to child's efforts based on the WHO recommendation in 2010. It is essential that

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all of the pregnant women are offered to perform a test for HIV. Offering HIV testing to pregnant women can be done when mothers come for antenatal care (ANC) visits[2].

Indonesia is still remains to be the lowest coverage of pregnant women perform HIV test i.e. less than 1% compared with Thailand as the highest i.e. 94%, China 64%, Vietnam 52% and Cambodia 41% [3].

In 2012 the incidence of HIV transmission from mother to child has been reached 2.6 % of the entire cases of HIV/AIDS in Indonesia (Ministry of Health Republic of Indonesia, 2012).While the coverage of HIV tested pregnant women in East Kalimantan only 2.58 % of the 17,552 targeted pregnant women in 2012[4] In the East Kalimantan province, the Samarinda municipality has the highest number of HIV/AIDS cases compare with other districts/municipality in the province. The cumulative of HIV/AIDS cases till the month of May 2013 in the Samarinda municipality was 3,146 cases.

According to data from the Health Office of Samarinda municipality, on 2016 out of 5,556 pregnant women in Samarinda City only 34% or 1,867 people or who want to come to a health facility and want to do an HIV test and want to receive the results of the test[5].

As an extension in delivering primary health service to the community in Indonesia, the*posyandu* is established in every village. The *posyandu* runs by several health volunteers or cadres, accompanied by health professionals. One of the cadres' tasks is delivering PITC of HIV services to pregnant women in their community.

To increase the coverage of the pregnant women's willingness to get an HIV test, the cadres' empowerment is needed. The cadres are considered to be capable of monitoring pregnant women in their area, so they are considered to be capable of moving pregnant women's willingness to carry out an HIV test at the nearest Community Health Center or *Puskesmas*.

Based on the previous cross-sectional study conducted in the Samarinda municipality from September to November 2019, known that the predisposing factors influenced the cadres' empowerment in delivering PITC of HIV services were knowledge, attitude and self-efficacy. These predisposing factors can be increased by training.

Hence, the purpose of this study was to prove the influence of training given to cadres toward predisposing factors of PITC of HIV Service on Pregnant Women and influence of the training and PITC of HIV Service utilization by the pregnant women after 1-3 months follow up period.

Materials and Method

This *Quasi Experimental* research was conducted from March to May 2019. The population of this research was *posyandu* cadres in Samarinda Municipality. The sample determined using simple random sampling method. The number of sampling was 42 cadres, which divided into treatment group and control group. The assessment of the research was carried out by giving questionnaires at the pre-test and post-test of the treated group. Besides being given training, cadres are given modules as materials to be studied. For the control group, only modules are given, as a guide for implementing the program. After the training, the observation continued with the follow up regarding the utilization of PITC of HIV services by the pregnant women.

The training was conducted in 2 days. Participants were given materials and practices to increase the role of cadres in conducting education, motivation, and assistance to pregnant women. The material provided were basic knowledge about HIV, self-efficacy, and attitude as a cadre. Training used a role play, brainstorming and exercises.This training then followed by observations between 1 – 3 months afterwards.

Results

1. **Respondents Characteristics:** The characteristics of research respondents as can be seen in table 1.

Table 1: Characteristics of Respondents

Characteristics	n (%)
Age	
20-35	7 (15.9)
36-50	19 (43.2)
51-65	15 (34.1)
> 65	3 (6.8)h
Mean	47.0
Education Level	
Elementary school	3 (6.8)
Junior High School	10 (22.7)
Senior High School	24 (54.5)
College	7 (15.9)

Occupation	
House Wife	35 (79.5)
Civil Servants/Teachers	2 (4.5)
Entrepreneurs/Traders	7 (15.9)

2. **Statistical Analysis Results:** ***Mann Whitney*** Test utilized to analyze the difference and significance of pre-test and post-test for both groups. The results as can be seen bellow.

Table 2: Statistical Analysis Results (Mann Whitney Test)

Observation result	Group	Mean	Standard Deviation	Asymp. Sig. (2-tailed)
Knowledge Pre	Treatment	37.3571	3.07485	0.130
	Control			
Post	Treatment	41.0476	4.79305	0.000
	Control			
Self-Efficacy Pre	Treatment	23.8095	3,43041	0.178
	Control			
Post	Treatment	24.9048	3.48383	0.216
	Control			
Attitude Pre	Treatment	44.3810	2.95764	0.488
	Control	44.9048	1.72930	0.489
Post	Treatment	45.2857	5.56006	0.731
	Control	44.8095	2.96005	0.731

3. **Utilization of the PITC of HIV by the pregnant women (Follow Up):** 1 – 3 months after the training, observation as the follow up of the training given was done. The result can be seen as bellow.

Table 3: The Utilization of the PITC of HIV Services Analysis

No.	Group	HIV Test				Total		p value
		Yes		No				
		n	%	n	%	n	%	
1.	Treatment	11	100	0	0	11	100	0.004
2.	Control	4	40	6	60	10	100	
	Total	15	71.4	6	28.6	21	100	

Discussion

1. **Respondents Characteristics:** Most of the respondents were at 36 – 50 (43.2%) and 36 – 50 (34.1%) year old range. The oldest respondent was 68 years old and the youngest was 23 years old. The respondents mainly (54.5%) were senior high school graduates and 79.5% were housewives.

2. **Influence Of Training toward Predisposing Factors:**

a. **Knowledge:** Result from MannWhitney test shown that there was no difference in knowledge before training between the treatment and control group (p = 0.130). While a significant difference was found after the training (p = 0,000) between the treatment and the control group. This result is in line with the result of a research on interventions conducted in the Men Like Men (MSM) group, to promote health and stress management to groups in HIV-infected MSM conducted by Brown et al (2019)[6].

Knowledge will underlie a person in doing behavior change so that the behavior shaped will be more lasting compare with the behavior that not constituted by knowledge[7]. Knowledge can be interpreted as know or understand after seeing (witnessed, experienced or taught). Cadres who have good knowledge are expected to be able to provide a good and qualified service at*posyandu*.

With increasing knowledge of the cadres as the results of the intervention cadres are expected to

provide a better service to the community.

Cadres' knowledge of HIV transmission is very important as a foundation to provide education and counseling to pregnant women so that can rise their willingness to have an HIV test. A woman who has a good knowledge about the transmission of HIV transmission from mother to child will try to protect themselves and want to treat themselves[8].

b. Self-efficacy: Self-efficacy defines as one's feelings of adequacy, efficiency, and one's ability to cope with life[9].

In this research, there was no significant difference found on self-efficacy before and after intervention in the treatment group and the control group with $p = 0.178$ and $p = 0.216$, consecutively. Meaning that statistically the training was not influenced the cadres' self-efficacy. This condition happened because the cadres' self-efficacy before the training mostly was already in good self-efficacy category, only 4 respondents or 9.5% had poor self-efficacy category. However, in many research found that a training can increase a self-efficacy as proved by Oakley et al (2017) in a research of training of teenage at age 11 – 14 year old. It also said in this research that peer education proved to be comparable to adult education[10].

Higher self-efficacy of the*posyandu* cadres will increase the cadres performance in delivering the PITC of HIV to the pregnant women. This research was in line with research bySulaeman and Indarto (2018) that showed that pregnant women with high self-efficacy would be more likely to come to *posyandu* compare with pregnant women with low self-efficacy. This condition similar with the health cadres. Cadres that have high self-efficacy were expected to be more capable in motivate pregnant women to be willing to take an HIV test at the nearest community health center[11].

According to Bandura (1997), women have a high self-efficacy in managing a role. Women who have a career as addition to her role as house wives will have higher self-efficacy when compared with men[12]. Self-efficacy and coping strategies also significantly has correlation[13].

c. Attitude: The attitude referred to in this research is the attitude of *posyandu* cadres in supporting pregnant women to carry out HIV testing at the *puskesmas*. The result of the attitude variable analysis with the *Independent Test T,* showed no significant difference in the attitude of the respondent before and after training with p = 0.488 and p = 0.731, consecutively. It means that statistically the training was not influenced the cadres' attitude. This condition happened because the cadres' attitude before the training mostly was already in good attitude category, only 3 respondents or 7.1% had poor attitude category.

Factors that influence the formation of attitudes are personal experiences, culture, significant others, mass media, institutions or educational institutions and religious institutions as well as individual emotional factors[14]. Level education has been reported as another factor that influence the attitude byWidagdo and Husodo (2009).. The higher level of education the easier to receive a new information and the contrary[15].

In line with this research, a study conducted by Andira et al (2008) showed that cadres who have a positive attitude has better performance compared with cadres who have a negative attitude[16]. Hermanus et al. 2010 stated that there were differences in people's attitudes in a positive direction after an intervention was carried out, the attitude of the community was more open and more direct in a personal way[17].

3. Influence Training toward the PITC of HIV Services Utilization by the Pregnant Women: The result of *posyandu*cadres assistance in the follow up of the training after 1-3 months shown that the number of pregnant women who tested for HIV in the treatment group was 11 pregnant women (100%) and in the control group was 4 pregnant women (40%). The result of chi-square test analysis was *p=0.004* meaning that the training that had been conducted had influenced the PITC of HIV services utilized by the pregnant women in Samarinda municipality.

This result showed that the training conducted, indeed, had influenced toward the PITC of HIV service utilized by the pregnant women. PITC has been proven effective in identifying HIV cases in mothers and children[18].

Conclusion

The statistical analysis found that there was a

significant influence of training given to cadres toward cadres' knowledge of PITC of HIV Services for pregnant women. There was no significant influence of training toward cadres' self-efficacy and attitude showed. This condition happened because the self-efficacy and attitude of cadres before training mostly already good.

The training proved to be significantly influenced the PITC of HIV Service utilization by the pregnant women after 1-3 months follow up period.

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References

1. UNAIDS. UNAIDS World AIDS Day Report 2012 [Internet]. Geneva (Switzerland); 2012. Available from: http://www.unaids.org.
2. Ministry of Health Republic of Indonesia. Estimation and Projection of HIV / AIDS in Indonesia in 2011-2016. Jakarta; 2012.
3. WHO. HRP biennial technical report 2009-2010: UNDP/UNFPA/WHO/World Bank Special Programme of Research, Development and Research Training in Human Reproduction. Geneva: World Health Organization; 2011;
4. Health Office EKP. Health Profile of East Kalimantan Province. Samarinda; 2013.
5. Health Office of Samarinda Municipality. Monthly Report on Voluntary Counseling and HIV Testing (VCT). Samarinda; 2017.
6. Brown JL, Vanable PA, Bostwick RA, Carey MP. A Pilot Intervention Trial to Promote Sexual Health and Stress Management Among HIV-Infected Men Who Have Sex with Men. AIDS Behav. Springer; 2019; 23(1):48–59.
7. Poerwadarminta W. General Indonesian Dictionary 1976. Jakarta: Balai Pustaka, Jakarta; 2007.
8. Boateng D, Kwapong GD, Agyei-Baffour P. Knowledge, perception about antiretroviral therapy (ART) and prevention of mother-to-child-transmission (PMTCT) and adherence to ART among HIV positive women in the Ashanti Region, Ghana: a cross-sectional study. BMC Womens Health [Internet]. 2013 Jan [cited 2016 Apr 14];13:2. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3563602 & tool=pmcentrez & rendertype=abstract
9. Schultz DP, Schultz SE. Theories of Personality 8th Edition, Wadsworth: Thomson. ISBN 0-534-62403-2. 2005;
10. Oakley AR, Nelson SA, Nickols-Richardson SM. Peer-led culinary skills intervention for adolescents: Pilot study of the impact on knowledge, attitude, and self-efficacy. J Nutr Educ Behav. Elsevier; 2017;49(10):852–7.
11. Sulaeman ES, Indarto D. Associations of self-efficacy, family support, peer support, and posyandu facility, with mother's visit to posyandu in Karanganyar, Central Java. J Matern Child Heal. Universitas Sebelas Maret; 2018;3(3):233–41.
12. Champion VL, Skinner CS. The Health Belief Model. In: Health Behavior and Health Education: Theory, Research and Practice. 2008. p. 45–65.
13. Kaveh MH, Rokhbin M, Mani A, Maghsoudi A. The Role of Health Volunteers in Training Women Regarding Coping Strategies Using Self-Efficacy Theory: Barriers and Challenges Faced by Health Volunteers in Empowerment of Women. Asian Pacific J cancer Prev APJCP. Shahid Beheshti University of Medical Sciences; 2017;18(9):2419.
14. Azwar S. Human Attitude Theory and Measurement, 2nd Edition. Yogyakarta: Pustaka Pelajar Offset. 2012.
15. Widagdo L, Husodo BT. Utilization of MCH books by Posyandu cadres: Study of Posyandu cadres in the working area of the Kedungadem Health Center in Bojonegoro District. Makara J Heal Res. 2009;13(1):39–47.
16. Andira RA, Abdullah Z, Sidik D. Factors Related to Cadre Performance in Posyandu Activities in Bontobahari Sub-district of Bulukumba District, 2012. 2012;
17. Herman us A, Zeth M, Asdie AH, Mukti AG, Masoned J. Behavior and Risk of HIV-AIDS in Papuan Communities: Study of the Development of Local Models of HIV-AIDS Policy. J Heal Serv Manag. 2010;13(4):206–19.
18. Kidia K, Kranzer K, Dauya E, Mungofa S, Hatzold

K, Busza J, et al. Provider-initiated HIV testing & counseling (PITC) in children: Tacking the P of PITC. Int J Infect Dis [Internet]. 2014 Apr [cited 2016 Apr 21]; 21:134. Available from: http://www.sciencedirect.com/science/article/pii/S1201971214007644

Nutritional Evaluation of Chayote Flour-Based Biscuits(Sechium Edule)

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Abstract

Background: 1 Product development using chayote and evaluation of nutrients is a way to extend the benefits of chayote.

Objectives: The objectives of of this study was to evaluate the nutritional content in chayote flour-based biscuits so that it can be used as a healthy food product.

Method: Proximate evaluation for water content using the thermogravimetric method, the ash content of the dry ashing method and the fat content of the Soxhletation method. Analysis of proteins and vitamins using the UV-VIS spectrophotometry method, while minerals use the atomic absorption spectrophotometry method.

Results: The results showed that the proximate analysis obtained the highest to lowest levels of carbohydrate, fat, protein, water and ash, was calculated with the average value of each analysis ie carbohydrates (57.66 g / 100g), fat (19.39 g / 100g), protein (16.99 g / 100g), water (6.68 g / 100g) and ash (5.28 g / 100g). The highest vitamin C is 13.97%, then vitamin E (0.11%) and vitamin A (0.041%) and the mineral composition, namely potassium is the highest mineral in biscuits based on chayote flour(3,902 g / 100g), then sodium and calcium (861.0 g / 100g and 665.6 g / 100g).

Conclusion: Biscuits based on chayote flourcontain high carbohydrate, vitamin C and potassium minerals. It is hoped that product based on chayote flourbecome healthy food for the prevention of diabetes mellitus and hypertension

Keywords: *Biscuits, chayote, flour, minerals, vitamins*

Introduction

Biscuits are popular snacks among the people because they can be consumed at any time and have a relatively long shelf life. Various types of biscuits have been developed to produce biscuits that are not only tasty but also healthy. Biscuits are popular with many people because they are easily consumed in the form of baked foods with small pieces that have a dry and crispy texture. The antioxidant activity of biscuits makes it a very useful food in preventing degenerative diseases due to the deterrence effect of free radicals and oxidative stress [1-4].

Food products in the form of biscuits are in great demand by children to adults, ranging from the lower to upper economic communities. This tendency is related to people's lifestyles and dietary patterns which have completely changed as a form of modernity in life, so that it requires various innovations and ease in getting food. In addition to staple foods and flour is still the main ingredient in making biscuits[5, 6].

The raw material for biscuits is flour, but in the development of food technology, it can be processed from basic ingredients of flour other than flour, including

flour from chayote to the characteristics of the biscuits produced[7]. Chayote is processed into flour to maintain the shelf life and is widely used by the community in making bread, cakes, noodles, etc. The processing of chayote into flour has several advantages over its fresh fruit, namely as a raw material for advanced processing industry, long shelf life due to low water content and can be used as a functional [8-10].

Chayote is a vegetable that is widely consumed by the public and the price is quite cheap so that it has always been the people's choice in fulfilling their food. The solution in extending the shelf life is the manufacture of chayote based products including the development of chayote yogurt to enrich the variety of yogurt with a broad market prospect [11], Drying will increase the level of crude fiber of fresh squash (0.27 g/100 g) to 0.35 g/100 g and reduce the water content reduced from 93.27% to 63.58%[10], processed into high-value nutritious pastries [12], Jam[13] and chayote juice.[14].

Chayote is used mainly in processed form because of its nutritional content, which includes vitamins, minerals, fiber, water and amino acids (lysine, histidine, arginine, aspartic acid, glutamic acid, cysteine, valine, isoleucine, serine, alanine and tyrosine[14]. Chayote which shows diuretic, anti-inflammatory and hypertensive activities have business opportunities in producing nutritionally valuable food products and maintaining health [15].Chayote flour significantly reduces blood glucose levels[16]

Conjoined flour-based biscuits have been produced into fast food, but information about its nutritional value has not been reported. Evaluation of nutrient content in chayote-based biscuits is very important to provide guarantees for processed products, so it can be made as a food product that has acceptability and in its development can be one of the food choices to overcome public health problems.

Materials and Method

The Research Setting: The research was carried out in the chemical education laboratory for the manufacture of conjoined chayote biscuits, the Mathematics and Science Education Faculty research laboratory of Tadulako University for proximate and vitamin analysis, health laboratory of Central Sulawesi province for mineral analysis.

Time and Location Research: This research was conducted in the period of 3 months, September 2019 - November 2019. It was conducted in Palu City.

Product Preparation: Chayote used in this research was taken from smallholder plantations in Palolo District, Sigi Regency, Central Sulawesi Province, which is close to Palu City. The process of making chayote flour is: chayote is washed using running water, crushed into small sizes. It is dried using an oven, the drying is carried out for 2 x 24 hours (until dry), the dried chayote is then ground and sieved using an electromagnetic sieve shaker with a filter size of 80 mesh, obtained flour and is used for biscuit preparation.

Making Biscuits Basedchayote Flour: Chayote flour is mixed with baking soda and vanilla powder evenly mixed with sugar and eggs until fluffy, allowed to stand for 15-20 minutes, formed round or in accordance with the tastes of each place in the oven plate with a temperature of 160ºc - 175ºc for 30-35 minutes, lift and chill, chayote biscuits are ready for analysis.

Proximate Analysis: Proximate evaluation for water content using the thermogravimetric method, the ash content of the dry ashing method and the fat content of the Soxhletation method. Analysis of proteins using the UV-VIS spectrophotometry method. Measurement of total carbohydrate content in a sample is calculated based on calculations (in%): % carbohydrate = 100% -% (protein + fat + ash + water)

Vitamin A Analysis (Spectrophotometric Method): The sample was extracted with hexane solvent several times on a 250rpm agitation shake machine until all Vitamin A was extracted (the extract was no longer colored). The resulting Vitamin A extract is passed over anhydrous sodium sulfate to release bound water. Vitamin A extract is measured in volume. Vitamin A extract was analyzed by Vitamin A level using UV-VIS spectrophotometry at a wavelength of 450 nm.

Vitamin E Analysis (Spectrophotometric Method): The sample was extracted with hexane solvent several times on a 250-rpm agitation shake machine until all Vitamin E was extracted (the extract was no longer colored). The resulting Vitamin E extract is passed over to anhydrous sodium sulfate to release bound water. Vitamin E extract volume is measured. Then the Vitamin E content was analyzed using UV-VIS spectrophotometry at a wavelength of 470 nm.

Vitamin C Analysis (Spectrophotometric Method): 5 grams of biscuit sample is weighed and add 50 ml of water. Shake above the shake machine until the sample dissolves. Filter the sample, then measure the volume of filtrate obtained. Measure sample absorption at the maximum wavelength obtained, then determine the concentration of vitamin C contained in the sample using a regression equation obtained from a standard curve.

Analysis of K, Na and Ca Levels (Atomic Absorption Spectrophotometry): The sample solution that has been made is taken 1 mL and diluted with water in a 50 mL measuring flask to the mark limit. The levels of potassium, sodium and calcium in the sample solution are determined by measuring their absorption with an atomic absorption spectrophotometer. Potassium metal is measured at wavelength 766.5 nm, Sodium metal is measured at wavelength 285.2 nm and calcium metal is measured at wavelength 589 nm.

Results

Proximate Analysis: The results of the proximate analysis of chayote-based biscuits are shown in Table 1. The highest to lowest contents of carbohydrate, fat, protein, water and ash content have been calculated with an average value of each analysis i.e. carbohydrates (57.66 g/100g), fat (19.39 g/100g), protein (16.99 g/100g), water (6.68 g/100g) and ash (5.28 g/100g).

Table 1: Proximate composition of chayote flour-based biscuits

Parameters	Results (g/100 g)
Water	6,68 ± 0,24
Ash	5,28 ± 0,33
carbohydrates	51,66 ± 0,69
fat	19,39 ± 0,36
Protein	16,99 ± 0,24

Source: Primary data 2019, *Results are expressed as mean ± Std. Dev of 3 replicates

Mineral and Vitamin Composition: Biscuits processed from chayote flour showed the highest evaluation results containing vitamin C which was 13.97%, then vitamin E (0.11%) and vitamin A (0.041%) as listed in table 2. The data shown in Table 2 shows the mineral composition of potassium which is the highest mineral in chayote flour-based biscuits (3,902 g/100g), then sodium and calcium (861.0 g/100g and 665.6 g/100g).

Table 2: Vitamin and mineral composition of chayote flour-based biscuits

Parameters	Results (g/100 g)
Vitamin	
Vitamin A	0,041 ± 0,0003[a]
Vitamin C	13,97 ± 0,066
Vitmin E	0,11 ± 0,13
Mineral	
Sodium (Na)	861,0 ± 16,97
Calcium (Ca)	665,6 ± 87,68
Potassium (K)	3.902,0 ± 251,73

Source: Primary data 2019, *Results are expressed as mean ± Std. Dev of 3 replicates

Discussion

Nutritional Evaluation: he composition of chayote and its products is influenced by climate, region, growth conditions, plant age and processing method[17]. The heating process in biscuit processing greatly influences the nutritional content, this is in line with a research conducted by Patel (2019) concluded that the baking temperature has a significant influence significant ($p<0.05$) on the quality of bottle gourd biscuits (*Lagenaria siceraria*) and at temperatures up to 220°C showed the most damaging effects

Content of Water and Ash: Water content is an important criterion in determining the shelf life and quality of processed foods based on chayote, the higher the water content, the growth of microorganisms increases[18]. Ash content in chayote-based biscuits is 6.68%, this ash content shows the amount of minerals that are quite diverse[10, 19].Ash content in biscuits can indicate the index of mineral constituents because ash is an inorganic residue that remains after the water content and organic compounds are removed from the biscuits by heating[20, 21].A research conducted by Islam (2018) shows that the content of fresh chayote ash is 0.30% which is significantly higher than that of chayote-based biscuits or an increase of 6.38%.

Carbohydrate Level: Carbohydrates are the main component of chayote-based gourd biscuits51.66% showing the high starch content in chayote-flour flask as a basic ingredient for making biscuits. Half the carbohydrates in biscuits that cause biscuits can replace the staple food, this role is very good for prediabetes. [22]. Diabetes is a condition that begins diabetes mellitus and continues to increase in prevalence staple food excessively[23, 24].

Fat Level: The composition of fat in chayote-based biscuits can be seen in Table 1. In general, the biscuits that have been analyzed contain 19.39 g/100g (19.39%), the fat content meets the quality requirements of the biscuits, which is above 9.5 g/100g based on the quality requirements of biscuits according to SNI 01-2973-1992. Low fat content make biscuits developed into low-fat foods[25].

Protein Level: Protein is the least macronutrient in chayote flour-based biscuits namely 16.99 g/100g (16.99%), the protein content in biscuits is influenced by the raw material used and processing. Interactions between molecules affect the structure of proteins that can reduce protein content in biscuits, including the binding of phenolic compounds to proteins so that their availability can be significantly reduced[26, 27].

Mineral and Vitamin Level: High vitamin C level made the biscuits chayote flour are very good as a source of antioxidants. Water-soluble Vitamin C is a powerful antioxidant in helping the body resist infection agents and overcome harmful free radicals[21, 28].

Comparison of sodium and potassium is 0.22 (Na/K ratio <1) this shows that chayote flour-based biscuits is very suitable to be consumed to reduce blood pressure[29, 30]. Sodium and potassium play a role in maintaining the osmotic pressure of body fluids, while calcium is a good mineral for bone formation.

Conclusion

Carbohydrates (57.66 g/100g), vitamin C (13.97 g/100g) and potassium minerals (3,902 g/100g) are the most macro nutrients and micronutrients (vitamins and minerals) in 100 grams of chayote flour-based biscuits

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References

1. Poudel AR. Preparation And Quality Evaluation Of Buckwheat Flour Incorporated Biscuit. Food Technology Instruction Committee. Hattisar, Dharan: Institute of Science and Technology Tribhuvan University 2011.
2. Parsaei M, Goli M, Abbasi H. Oak flour as a replacement of wheat and corn flour to improve biscuit antioxidant activity. Food science & nutrition. 2018;6(2):253-258.
3. Liu RH. Dietary bioactive compounds and their health implications. Journal of food science. 2013;78(s1):A18-A25.
4. Gbenga Fabusiwa F, Oladele E, Oboh G, et al. Nutritional properties, sensory qualities and glycemic response of biscuits produced from pigeon pea wheat composite flour. Journal of food biochemistry. 2018;42(4):e1255. Grewal PK. Development and quality evaluation of antioxidant rich and high protein biscuits. School Of Science And Health. Australia: Western Sydney University 2018.
6. Yuliani S, Mardesci H. Pengaruh Penambahan Tepung Ampas Tahu terhadap Karakteristik Biskuit yang Dihasilkan. Jurnal Teknologi Pertanian. 2017;6(1):1-11.
7. Priyono E, Ninsix R, Apriyanto M. Studi Pencampuran Labu Kuning (Cucurbita Moschata) Dengan Tepung Beras Terhadap Karakteristik Biskuit Yang Dihasilkan. Jurnal Teknologi Pertanian. 2018;7(1):8-20.
8. Thomas PE, Abraham LM, Dharmapalan B. Physio-chemical and Sensory Properties of Biscuits Fortified with Carrot Powder. International Journal of Food and Fermentation Technology. 2018;8(2):217-221.
9. El Nakib D, Ibrahim M, Mahmoud N, et al. Incorporation of Spirulina (Athrospira platensis) in Traditional Egyptian Cookies as a Source of Natural Bioactive Molecules and Functional Ingredients: Preparation and Sensory Evaluation of Nutrition Snack for School Children. European Journal of Nutrition & Food Safety. 2019;9(4):372-397.
10. Islam S, Kumar A, Dash KK, et al. Physicochemical analysis and nutritional properties of fresh, osmo-dehydrated and dried chayote (Sechium edule L.). Journal of Postharvest Technology. 2018;6(2):49-56.
11. Shi B, Li Y, He Y, et al. Optimization of processing technology of chayote yoghurt. Journal of Food Safety and Quality. 2019;10(2):344-350.

12. da Luz LAP, Soares JM, do Amaral LA, et al. Addition of chayote pell flour in cookie: physico-chemical characterization and sensory analysis among children. Research, Society and Development. 2020;9(1).
13. Shiga TM, Peroni-Okita FHG, Carpita NC, et al. Polysaccharide composition of raw and cooked chayote (Sechium edule Sw.) fruits and tuberous roots. Carbohydrate polymers. 2015;130:155-165.
14. de la Luz Riviello-Flores M, Arévalo-Galarza L, Cadena-Iniguez J, et al. Nutraceutic Characteristics of the Extracts and Juice of Chayote (Sechium edule (Jacq.) Sw.) Fruits. Beverages. 2018;4(2):1-9.
15. Coronel O, León-García E, Vela-Gutiérrez G, et al. Chayote (Sechium edule (Jacq.) Swartz). Fruit and Vegetable Phytochemicals: Chemistry and Human Health. 2017:979-992.
16. Sakung JM, Sirajuddin S, Zulkifli A, et al. The Effect of Chayote (Sechium Edule) on Blood Glucose Level of High School Teachers of Pre-Diabetes. Indian Journal of Public Health Research & Development. 2018;9(5):245-250.
17. Vieira EF, Pinho O, Ferreira IM, et al. Chayote (Sechium edule): A review of nutritional composition, bioactivities and potential applications. Food chemistry. 2019; 275:557-568.
18. Rohani-Ghadikolaei K, Abdulalian E, Ng W-K. Evaluation of the proximate, fatty acid and mineral composition of representative green, brown and red seaweeds from the Persian Gulf of Iran as potential food and feed resources. Journal of food science and technology. 2012;49(6):774-780.
19. Vijay K, Balasundari S, Jeyashakila R, et al. Proximate and mineral composition of brown seaweed from Gulf of Mannar. International Journal of Fisheries and Aquatic Studies. 2017;5(5):106-112.
20. Folake OB, Abiodun AJ, Oluwatomiwo IR. Evaluation of Proximate Composition of Biscuits Produced from Wheat (Triticum aestivum l.) and Sorghum (Sorghum Bicolor [L.] Moench) Composite Flour. Elixir Food Science 2018;122 (1):51652-51656
21. Riviello-Flores M, Arévalo-Galarza M, Cadena-Iñiguez J, et al. Nutraceutic Characteristics of the Extracts and Juice of Chayote (Sechium edule (Jacq.) Sw.) Fruits. Beverages. 2018;4(2):1-11.
22. Osgood ND, Dyck RF, Grassmann WK. The inter- and intragenerational impact of gestational diabetes on the epidemic of type 2 diabetes. American Journal of Public Health. 2011;101(1):173-179.
23. Ragasa CY, Biona K, Shen C-C. Chemical constituents of Sechium edule (Jacq.) Swartz. Der Pharma Chemica. 2014;6(5):251-255.
24. Sateesh G, Hussaini SF, Kumar GS, et al. Anti-Ulcer Activity of Sechium Edule Ethanolic Fruit Extract. The Pharma Innovation. 2012;1(5).
25. Moriano ME, Cappa C, Alamprese C. Reduced-fat soft-dough biscuits: Multivariate effects of polydextrose and resistant starch on dough rheology and biscuit quality. Journal of Cereal Science. 2018;81:171-178.
26. Nogueira AdC, Steel CJ. Protein enrichment of biscuits: a review. Food Reviews International. 2018;34(8):796-809.
27. Patel AS, Kar A, Pradhan RC, et al. Effect of baking temperatures on the proximate composition, amino acids and protein quality of de-oiled bottle gourd (Lagenaria siceraria) seed cake fortified biscuit. LWT. 2019;106:247-253.
28. Ifediba Donald I. Evaluation of Minerals, Vitamins and Phytochemicals in High Fiber Biscuits Produced from Blends of African Breadfruit, Maize and Coconut Flours. International Journal of Advances in Scientific Research and Engineering. 2018;4(3):86-99.
29. Okunlola GO, Jimoh MA, Olatunji OA, et al. Proximate analysis, mineral composition, and antioxidant properties of bitter leaf and scent leaf. International Journal of Vegetable Science. 2019; 25(4):346-354.
30. Wijendran V, Bell SJ. Relationship of Dietary Sodium, Potassium and The Sodium-to-Potassium Ratio to Blood Pressure. J Med-Clin Res & Rev. 2019;3(5):1-5.05.

Trihalomethane Presence in Tap Water, Mahasarakham Province, Thailand

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Abstract

Context: Tap water supply production plants (WSPP) in Thailand currently use chlorination to remove algae and bacterial compounds. The production of tap water may result in its contamination with trihalometanes (THMs), with may be carcinogenicable.This cross-sectional study aimed to determine the preserve of THMs in tap water at the WSPP, Mahasarakam Provincial Water Work Authority of Thailand in order to determine the safety of tap water at the studied plant. We collected tap water samples at 8 points: Raw water, Water after pre-chlorination, Water after precipitation, Water after filtered, Tap water, water 2,4, 6 kilometers from the WSPP. We collected a total of 240 samples, examined each water sample by GC-ECD to determine the presence of THMs. Four types of algae were observed in Raw water: Chlorophyta, Cyanophyta, Bacillariophyta, and Euglenophyta. Our study finding revealed the presence of $CHCl_3$, $CHCl_2Br$ and $CHBr_3$ in tap water but the levels present where consumers obtained tap water did not exceed safe levels. The risk assessment of cancer estimated from THMs in DFTM at the maximum concentration was 6.75 E-05 and 6.49 E-05 which does not exceed the safe value defined by the WHO. Therefore, we conclude tap water at the study site is safe for consumption. Further studies are needed to determine THMs levels may be reduce further in an economical manner.

Keywords: *Trihalomethanes (THMs), pre-chlorination, water supply production plant, Tap water*

Introduction

Clean water is important for human survival, good health, agriculture, industry, transportation and other uses[1,2]. Humans need approximately 100-200 liters per capita per year in urban communities[3]. Sources of raw water (RW) include river, reservoirs, groundwater and rainwater. However, RW is often contaminated with plant nutrients, such as nitrate and phosphate, from urban and agricultural sources, resulting in the growth of several types of algae[4].

When RW is fed into a water supply processing plant (WSPP), it can reduce the efficiency of the setting tank due to the buoyant force of the algae causing the filter sand to become clogged faster requiring washing more frequently[5]. Changes in chemical properties (conductivity, hardness, alkalinity, and dissolved oxygen (DO)[6], physical properties (temperature and turbidity)[7] and increases in organic matter content (phosphate and nitrate compounds)[8] result from surface plant production, resulting in algal slime that must be cleaned up[9]. Water pipelines may become clogged due to algae growing in low-light areas[2]. Algae contaminated water in the pipelines results in bad taste water, bad smelling water, changes in water color and the presence of toxic substances harmful to consumers[4]. Some

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algae may be toxic, such as *Microcystis aeruginosa*, *Cylindrospermopsis raciborskii* (Woloszynska) Seenayya & Subba Raju, *Anabaena* spp, and *Oscillatoria* spp, which can increase the risk for liver cancer[10].

Pre-chlorination defined as adding chlorine to the water priorto water treatment process, is currently used to cheaply remove algae and disinfect RW at WSPP in Thailand. Pre-chlorination results in by-products of the process, including trihalometanes (THMs), such as chloroform ($CHCl_3$), bromodichloromethane ($CHCl_2Br$) and bromoform ($CHBr_3$)[11,12], which in high concentration may be carcinogenic[13], may affect reproductive capacity, child delivery, blood circulation and possibly the liver and kidney[14]. The United States Environmental Protection Agency (EPA) has determined THMs should not exceed 80 µg/L[15] and the World Health Organization has stated THMs should not exceed 100 µg/L in tap water[16].

High level of chlorine used for pre-chlorination may result in high levels of THMs [17] but low levels of chlorine may result in continuing contamination of the water with organic substances. In this study we aimed to determine presence of and concentrations of THMs and the types and amounts of algae and physical quality of water being treatment a WSPP in Mahasarakam province, Thailand in order to determine the safety of tap water at the study location.

Materials and Method

We conducted this study during September 2017 -February 2018.

The water samples for the study were collected at 8 points; 1st point: Raw water (RW) prior to treatment, 2nd point: water after pre-chlorination (CW), 3rd point: water after precipitation (SW) (the formation of a solid in a solution during a chemical reaction), 4th point: water after filtering (FW) (slow sand filter), 5th point: tap water (TW) immediately upon leveling the WSPP, 6th point: water at 2 kilometers from the WSPP (DW1), 7th point: water at 4 kilometres from the WSPP (DW2), 8th point: water at 6 kilometres from the WSPP (DW3).

At each sample site, the water was sampled 5 times over the 6 month study period. Each water samples was examined as follows: the concentration of algae was measured using a haemocytometer following the whole count method[18].The physical and chemical qualities of the water studied were: turbidity, pH, temperature, electrical conductivity, hardness (by Ethylene Diamine Tetra Acetic Acid or EDTA titration, amount of dissolved oxygen in the water (by azide modification), oxygen consumed (by permanganate method), and nitrate level (by brucine method). The 2nd–8th point samples were analyzed for the type and amount of THMs by gas chromatography, Electron Capture Detector type (GC-ECD). The water quality was analyzed following the Standard Method for the Examination of Water and Wastewater, 20th Edition[19].

Cancer Risk Estimation: We estimated the cancer risk from the consumption of the studies samples following the method of the US-EPA[20].: This research found a risk of cancer from exposure due to the consumption of water from DFTMs from 3 kinds of THMs, including $CHCl_3$, $CHCl_2Br$ and $CHBr_3$. The gastrointestinal tract risk was modified based on the Thai population's average weight of 55 kg, average age = 64 years[21] amount of water consumption = 3 L/person/ day[22].

The substitution in Equation 1 then creates Equation 2 with the slope factor value representing the cancer potential of 3 types of THMs following the tracts of substance exposure into the body. The formula for the risk assessment of cancer is shown in Equation 2.

$$CDI = \frac{(CW)(IR)(EF)(ED)}{(BW)(AT)} \quad \frac{(CW)(IR)(EF)(ED)}{(BW)(AT)} \qquad (1)$$

Risk of cancer = (Total amount of substance exposure) (Slope factor value) (2)

where CDI = Chronic daily intake (mg/(kg·day))

AT = Average time (day)

BW = Body weight (kg)

IR = L/day

CW = Concentration of substance in water (mg/L)

ED = Exposure duration (year)

EF = Exposure frequency (event/year)

Results

Types and concentrations of algae isolated from study sites: Four types of algae were detected in RW: Chlorophyta, Cyanophyta, Bacillariophyta, and Euglenophyta at concentrations of 3,746, 647, 207 and

156 cells per liter, respectively; after treatment in TW the concentrations of algae in tap water were 230, 0, 0 and 0 cell per liter, respectively (Table 1).

Table 1: Algae isolated at study sites in wate

Algae types	Concentrations of algae in cells/ liter of water				
	RW	CW	SW	FW	TW
Cyanophyta (strains)	647	154	52	0	0
Chlorophyta	3,746	1,533	285	312	230
Bacillariophyta	207	78	0	0	0
Euglenophyta	156	0	0	0	0
Total	4,755	1,765	337	0	230

Remark: Raw water (RW), Water after pre-chlorination (CW), Water after precipitation (SW), Water after filtered (FW), Tap water (TW)

Type and concentrations of THMs at study sites: The types and concentrations of THMs where water was accessed by customers were: $CHCl_3$ (37 µg/L at DW1, 39 µg/L at DW2, 38 µg/L at DW3), $CHCl_2Br$ (14 µg/L at DW1, 14 µg/L at DW2, 14 µg/L at DW3), $CHBr_3$ (14 µg/L at DW1, 13 µg/L at DW2, 9 µg/L at DW3). None of these excessed safe acceptable standard thresholds for $CHCl_3$ (< 300 µg/L), $CHCl_2Br$ (< 60 µg/L), $CHBr_3$ (< 100 µg/L) (Table 2).

Table 2:Types and concentrations of THMs at study sites

Site sample collected	Concentrations of THMs isolated in µg/L		
	$CHCl_3$	$CHCl_2Br$	$CHBr_3$
RW	ND	ND	ND
CW	107	32	17
SW	53	20	15
FW	44	15	14
TW	112	20	16
DW1	37	14	14
DW2	39	14	13
DW3	38	14	9
Acceptable standard threshold	**300**	**60**	**100**

Remark: trihalometanes (THMs),chloroform ($CHCl_3$), bromodichloromethane ($CHCl_2Br$) and bromoform ($CHBr_3$), Raw water (RW), Water after pre-chlorination (CW), Water after precipitation (SW), Water after filtered (FW), Tap water (TW), water at 2 kilometers from the WSPP (DW1), water at 4 kilometres from the WSPP (DW2), water at 6 kilometres from the WSPP (DW3)

Cancer Risk Assessment: According to our calculations, the highest concentrations of $CHCl_3$, $CHCl_2Br$ and $CHBr_3$ at the place of consumption were 112 µg/L, 32 µg/L, 17 µg/L giving cancer relative risk ratio of 1.30 per 100,000 populations, 4.9 per 100,000 populations and 0.6 per 100,000 populations, respectively (Table 3), where the acceptable cancer relative risk ratio is < 1.0 per 1,000 populations (20). With the same calculation, the other risk factors, such as $CHCl_2Br$ and $CHBr_3$, were 14 and 14 µg/L for cancer risk ratios of 4.86E-05 and 5.85E-06, respectively.

Table 3: Estimated cancer risk due to exposure to THMs

THMs detected	Maximum Concentration in µg/L	Cancer Relative Risk Ratio Per 100,000 population
$CHCl_3$	39	1.3
$CHCl_2Br$	14	4.9
$CHBr_3$	14	0.6
Total		6.8

Discussion

This study clarifies the impacts of pre-chlorination on removing algae in the WSPP process and from the consumption of drinking water from DFTMs. This study indicates the risk of cancer consumers are exposed to through THMs in the drinking water from DFTMs possibly directly affects consumers, such as people who live near the university. In addition, 4 algae species Chlorophyta, Cyanophyta, Bacillariophyta, and Euglenophyta were found in this study and might affect human health, as Carmichael and Falconer[23] have stated that the primary agent associated with health risks is prolific cyanobacteria growth, which is associated with nutrient-rich waters, warm temperatures and sufficient light[24,25]. Cyanobacteria are known to produce acute hepatotoxins, cytotoxins, neurotoxins, gastrointestinal disturbances, and respiratory and allergic reactions[24,26]. The principle cyanobacteria toxin considered in drinking water guidelines is microcystin-LR. Falconer[26] reported a provisional drinking water guideline of 1 µg/L for the US, while Canada recently approved a guideline concentration of 1.5 µg/L. Microcystin-LR specifically targets the liver, kidney and small intestine[27] and causes acute hepatotoxicosis. The physical and chemical qualities of water in this study of the WSPP were impacted

by turbidity, and the colloidal particles that might cause turbidity can also harbour pathogenic microorganisms, thereby making disinfection ineffective.

THM formation relies on several factors including the concentration and nature of natural organic matter, raw water quality, disinfection contact time, temperature, pH, quality of water and chlorine dose[28]. The THM concentration less than the standard value was not due to chlorination alone and may also be caused by many other factors, such as organic compounds, free-chlorine, and a lower pH, which may cause THM formation[29]. Our study found less $CHBr_3$ in CW, echoing the results of Pardakhti et al[30], Summerhayes et al[31], Uyak[17]. The lifetime cancer risk for THM exposure (multiple toxicants may result in additive effects, and interactive effects may be synergistic or antagonistic) from high to low concentration for a series of $CHCl_3$,$CHCl_2Br$ and $CHBr_3$is averaged[32].

The assessment results show that the substance with the maximum concentration is $CHCl_3$. However, when the cancer risk is assessed, the most carcinogenic substances are $CHCl_2Br$ and $CHCl_3$. As these results indicate, cancer risk may differ among various geographic areas because the THMs may be different or because other water contaminants are also present. More comprehensive water quality data must be collected or simulated to improve exposure assessment in epidemiological studies. There should be regular awareness of the possible harm from exposure to THMs in drinking water from DFTMs. Even though the 3 types of THMs were detected less frequently, THMs in the WSPP and DFTMs should be monitored to ensure the safety of water consumers. Therefore, the monitoring and maintenance of DFTMs should be implemented correctly and applied to tap water[33]. A method should be developed for detecting THMs using a low-cost device that permits fast monitoring of concentrations without the need for complex analysis in laboratories[34] (Manlika and Phongsi, 2007). Lee notes that boiling water or exposing it to the sun by opening the lid of a container for 20-30 minutes until the water is odourless removes chlorine[35].

Conclusions

The result of this study found that the efficiency of pre-chlorination for removing number of each type of algae in raw water at the WSPP such as pre-chlorination, precipitation filtration system and post-chlorination processing until acceptable level of the algae be reduced. Nevertheless twice chlorination treatment to reduced algae but seems to be increased impacted residual risk of THMs which less than upper limited threshold level founded.

Conflict of Interest: Nil

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Ethical Clearance: Research does not involve human or animal subjects.

References

1. Luksamijarulkul P, Pumsuwan V, Pungchitton S. Microbiological quality of drinking water and using water of a Chao Phya river community, Bangkok. Southeast Asian J Trop Med Public Health 1994; 25: 633-7.
2. Vollaard AM, Ali S, Smet J. A survey of the supply and bacteriologic quality of drinking water and sanitation in Jakarta, Indonesia. Southeast Asian J Trop Med Public Health 2005; 36: 1552-61.
3. Tanthulawes M. Waterworks engineering. 1st ed. Bangkok: Chulalongkorn University Printing House; 1999.
4. Thongtan T. Algae in the water supply production process at Samsen Water Supply Producing Plant [Dissertation]. Bangkok: Chulalongkorn University; 2002.
5. Poston HW, Gamet MB. Effect of algae on filter runs with Great Lakes Water. J Am Water Works Assoc 1964; 56: 1203-16.
6. Juttner F. Physiology and biochemistry of odorous compounds from freshwater cyanobacteria and algae. Water Sci Technol1995; 31: 69-78.
7. Li L, Gao N, Deng Y, Yao J, Zhang K. Characterization of intracellular & extracellular algae organic matters (AOM) of Microcystic aeruginosa and formation of AOM-associated disinfection byproducts and odor & taste compounds. Water Res 2012; 46: 1233-40.
8. Leloup M, Nicolau R, Pallier V, Yéprémian C,

Feuillade-Cathalifaud G. Organic matter produced by algae and cyanobacteria: Quantitative and qualitative characterization. J Environ Sci 2013; 25: 1089-97.

9. Scheffer M, Rinaldi S, Gragnani A, Mur LR, Nes EH. On the dominance of filamentous cyanobacteria in shallow, turbid lakes. Ecology 1997; 78: 272-82.
10. Dawson RM. The toxicology of microcystins. Toxicon 1998; 36: 953-62.
11. World Health Organization (WHO). Environmental health criteria 216: disinfectant and disinfectant by-product. Geneva: WHO; 2000.
12. United States Environmental Protection Agency (US-EPA). Guidelines for carcinogen risk assessment. Washington, DC: US-EPA; 1999.
13. Bellar TA, Lichtenberg JJ, Kroner RC. The occurrence of organohalides in chlorinated drinking waters. J Am Water Works Assoc 1974; 66: 703-6.
14. Panyakapo M, Phaophuri P. Risk assessment of cancer from trihalomethanes exposure from tap water and swimming pool. Silpakorn University Journal 2007; 27: 138-63.
15. United States Environmental Protection Agency (US-EPA). Guiding Principles for Monte Carlo Analysis (EPA/630/R-97/001). Washington, DC: US-EPA; 1997 [Cited 2018 Jan 19]. Available from: https://www.epa.gov/sites/production/ files/2014-11/ documents/montecar.pdf.
16. World Health Organization (WHO). Guidelines for drinking-water quality. 4th ed. Geneva: WHO; 2011.
17. Uyak V. Multipathway risk assessment of trihalomethanes exposure in Istanbul drinking water supplies. Environ Int 2006; 32: 12-21.
18. Phiraphornpisan Y. Fresh water algae in the Northern region of Thailand. 1st ed. Chiang Mai: Chotana Print; 2005.
19. American Public Health Association (APHA). Standard method for the examination of water and wastewater. Washington, DC: American Public Health Association, American Water Works Association and Water Environmental Federation; 1998.
20. United States Environmental Protection Agency (US-EPA). Risk assessment guidance for superfund: volume 1-human health evaluation manual (Part A). Washington, DC: US-EPA; 1989.
21. Inthranon K. Ergonomics. Bangkok: Chulalongkorn University Printing House; 2005.
22. World Health Organization (WHO). How much water is needed in emergencies. Geneva: WHO; 2011 [Cited 2018 Jan 19]. Available from: http://www.who.int/water_sanitation_health/ publications/ 2011/WHO_TN_09_How_much_ water_is_needed.pdf?ua=1
23. Carmichael WW, Falconer IR. Diseases related to freshwater blue-green algal toxins, and control measures. In: Falconer IR, ed. Algal toxins in seafood and drinking water. San Diego, CA: Academic Press; 1993: 187-209.
24. Carmichael WW. Assessment of blue-green algal toxins in raw and finished drinking water. Denver, CO: AWWA Research Foundation and American Water Works Association; 2001.
25. Reynolds CS. The ecology of freshwater phytoplankton. Cambridge: Cambridge University Press; 1984.
26. Falconer IR. An overview of problems caused by toxic blue-green algae (Cyanobacteria) in drinking and recreational water. Environ Toxicol 1999; 14: 5-12.
27. Falconer IR. Measurement of toxins from blue-green algae in water and foodstuffs. In: Falconer IR, ed. Algal toxins in seafood and drinking water. San Diego, CA: Academic Press; 1993: 165-75.
28. Nikolaou AD, Golfinopoulos SK, Lekkas TD, Kostopoulou MN. DBP levels in chlorinated drinking water: effect of humic substances. Environ Monit Assess 2004; 93: 301-19.
29. Chawla RC, Varma MM, Balram A, Murali MM, Natarajan P. Trihalomethane removal and formation mechanism in water. Washington, DC: DC Water Resources Research Center University of the District of Columbia; 1983: 2-5.
30. Pardakhti AR, Bidhendi GRN, Torabian A, Karbassi A, Yunesian M. Comparative cancer risk assessment of THMs in drinking water from well water sources and surface water sources. Environ Monit Assess 2011; 179: 499-507.
31. Summerhayes RJ, Morgan GC, Lincoin D, et al. Spatio-temporal variation in trihalomethanes in New South Wales. Water Res 2011; 45: 5719-26.
32. Hsu CH, Jeng WL, Chang RM, Chieng LC, Han BC. Estimation of potential lifetime cancer risks for trihalomethanes from consuming chlorinated

drinking water in Taiwan. Environ Res 2001; 85: 77-82.

33. Do M, Ratanapan C, Suksaroj T. Health risk from exposure to trihalomethanes in swimming pools. J Pub Health Dev 2011; 9: 208-22.
34. Manlika Panyakapo and Phongsi Phaophuri. Risk assessment of cancer from Trihalomethanes exposure from tap water and swimming pool. J Silpakorn University2007; 27 (1),138-63.
35. Lee JH, Chan CC, Chung CW, Ma YC, Wang GS, Wang JD. Health risk assessment on residents exposed to chlorinated hydrocarbons contaminated in groundwater of a hazardous waste site. J Toxicol Environ Health A 2002; 65: 219-35.

Development of Strategic Implementation Indicators for Nursing Organizations at Community Hospitals in Thailand

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Abstract

Background: Strategy implementation is the most important stage of strategic management to achieve organizational goals. Top Nursing Management Team (TNMT) was clear strategic planning while the implementation stage of the strategy is still unclear, so they need the knowledge to assess the components and indicators of the strategy implementation stage.

Aim: To develop indicators of strategy implementation for nursing organization at community hospitals

Method: They study was descriptive quantitative research. The samples of this study were the 332 top nursing management team members from 26 community hospitals in Thailand. The concept of strategy implementation was based on Pearce and Robinson (2000) which consists ope rationalization of strategy and institutionalization of strategy adopted from the Kobuti's strategy implementation questionnaire using the back-translation method with monolingual testwith the following steps: 1) forward translation from the original English in to Thai 2) review of the translated version by reviewers 3) backward translation from Thai into English 4) comparison of the original version and the back-translated version 5) content validity testing by five experts, in nursing management field, with a CVI at one 6) determining the internal consistency reliability with thirty TNMT members from community hospitals, with a Cronbach's Alpha Coefficient at 0.95, and 7) testing of the construct validity by using factor analysis to extract indicators from the strategy implementation then confirmation the indicators by using confirmatory factor analysis with 332 top nursing management team at community hospitals.

Results: The strategy implementation indicators of nursing service organizations at community hospitals have two components with 10 indicators:1) ope rationalization of strategy (factor loading =0.81) including development of specific functional tactic, determining policy to guide decisions, creating to clear objective and allocation resource 2) institutionalization of strategy (factor loading = 0.87) including creating a culture relevant strategy, personnel arrangement with appropriate skill, demonstration leadership in driving the strategy, matrix system review, organizational restructuring relevant with strategy.

The development strategy implementation instrument was congruent with the empirical data (CMIN/df=1.32,RMR=.02 GFI=.98, AGFI=0.96, RMSEA=0.03,CFI=.99).

Conclusion: The development strategy implementation instrument can measure the strategy implementation of nursing organizations at community hospitals. It should be used to assess the efficiency of strategy implementation stage.

Keywords: *Strategic implementation, Indicator, Nursing organization,Community hospitals*

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Introduction

In Thailand, the government intends to develop the bureaucratic system in accordance with the

Royal Decree on Criteria and Procedures for Good Governance, B.E. 2546 for the organization to be effective, being capabilities and being international standards achievement.[1] Strategic management is the administrative principle that gives the organization direction,being an effective guide line for strategic implementation.[2,3]

Strategy implementation is a critical key to transforming the strategic implementation into action.[3] From a literature review of the strategy implementation concept, Pearce and Robinson's strategy management concept explain strategy implementation by operationalization of strategy and institutionalization of strategy.[2] Top management team is an important role in driving the strategy into organizational practice transforming the strategy into action only ten percent of organization accomplished.[3]

The nursing organization has a strategic plan covering all four stages, namely strategy formulation strategic planning implementing the strategy and monitoring and evaluation.[4] In nursing organization of the community hospital, the nursing organization management committee play roles as a top management team. The TNMT have to management the strategies by co-formulating and co-planning a strategic hospital committee, selection the grand hospital strategies which were related to nursing organizational issues. After receiving the strategic plan, TNMT transferred a strategy plan by meeting and booklet distribution, then controlling and evaluation stages of strategy management by monitoring the operationalization of each unit in each trimester of the fiscal year, and evaluation of an action plan by the end of the fiscal year. As the strategy implementation measurement is a potential role to achieve the nursing organization goal, the top nursing management team should have tools to measure strategy implementation.

Presently, the strategic implementation indicators have not been studied in nursing organizations at community hospitals. From strategy management was not clear in the strategy implementation stage it was an incomplete process, only meeting and booklet distribution. To fill the gaps of knowledge of the strategic implementation studies in the field of nursing organization especially in the community-hospital level, the aim of this study to develop a tool that helps top nursing management team to assess the implementation of the strategies to nursing units in community hospitals.

Method

The population used in this research is 2,158 the TNMT members in large-size community hospitals. Determining sample size by using the sample calculation from the formula of Krejcieand Morgan, determine the population representation at the 95% confidence level and the tolerance level 0.05% to get complete information.[6] The researchers then adjusted the size of the group according to the formula of Gupta and the faculty by calculating the dropout rate of ten percent.[7] The sample group in this study was 362 people with cluster and simple sampling.

Indicator Development: The researcher developed and tested the quality of strategic implementation indicators of nursing service organization based on concept's Pearce & Robinson.[2] Using Kobuthi's strategic implementation questionnaire which five type likert scale along with back- translation method with six steps as follows: 1) forward translation from English to Thai 2) review of the translated version by reviewer 3) backward translation from Thai to English. The researcher sent questionnaires to the experts who are not the same person as the translator in the first step and never seen the questionnaire original set 4) comparison of the original version and the back-translated version. At this stage, the researcher and advisor jointly verify the correctness of the language to consider appropriately for both language and culture and adjust questions to suit the context of a large community hospital upwards.[8]

5) Conducting content validity, this study had five experts considering the consistency between the question and the operational definition of variables. Content validity index (CVI) was using for consideration of overall content validity and index for index content validity (I-CVI) for scales equals one.[9] 6) The preliminary tryout of the items was conducted with 30 top nursing management team. Data were used to calculate the instrument's components reliability by using Cronbach's Alpha Coefficient was 0.95. Conducting statistical data analysis was performing explanatory factor analysis and confirmatory factor analysis.

Statistics: The data were analyzed using the following statistical analysis: 1) descriptive statistics were used to determine means and standard deviations, 2) exploratory factor analysis was used to organize components of strategic implementation, 3) confirmatory factor analysis was performed to test for the goodness of fit of the structural model of the factors, weights were

assigned to constructing the indicators and empirical data to determine the weights of the main variables used in constructing the indicators, and 4) Cronbach's Alpha Coefficient provided a measure of the internal consistency of the scale and describes the extent to which all the items in a test measure the same construct.

Results

Three hundred and thirty-two top nursing management member of nursing organization responded to answer the self-administered questionnaire (response rate = 91.71%). Most of the participants were female (98%), a half was 50 years old and older (59%), and master's degree level was 27.4 percent. The study found that the three high-level of Mean of strategic implementation indicators for nursing organization were 1) nursing organization has policies that adequately guide decision making established programs and procedures of how things are done 2) all nursing units make their contribution to strategy implementation, and 3) all nursing units have short term objectives (mean= 3.91,3.86, 3.85) respectively (Table 1).

Table 1: Means and standard deviations of strategic implementation indicators for nursing organizati

No	Indicators	Mean	SD
1	Nursing service organization has policies that adequately guide decision making established programs and procedures of how things are done.	3.91	.63
2	All nursing units make their contribution to strategy Implementation.	3.86	.71
3	All nursing units have short term objectives.	3.85	.72
4	Strategy development is combined with resources allocation that adequately supports the activities.	3.78	.71
5	Strategy implementation uses a metric system that | includes regular reviews, financial and non-financial data.	3.58	.73
6	Able leadership with talent that drives initiative to implement strategy is demonstrated	3.75	.70
7	Staff with the right skills are deployed to implement high priority strategic initiatives	3.73	.71
8	A culture that is aligned with the strategy of the organization is in functional.	3.78	.65
9	We have in place an organizational structure that enables employees to effectively execute their strategic roles.	3.71	.69
10	The organization has aligned rewards and incentives with the achievements of individual and organizational objectives	3.51	.77

Data suitability was tested in line with the conditions of statistical data analysis. Factor analysis found significant Bartlett's Test of Sphericity (p-value < 0.01), the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) of .93 meaning the variables were related. The data had high suitability for analysis using factor analysis statistics.[10]

According to the exploratory factor analysis, the strategic implementation indicators of nursing service organization had ten indicators with two components.The components of strategic implementation consisted of:1) six indicators in the institutionalization of strategy and 2) four indicators in operational of strategy. The percentage of total variance accounted for the factors could be explained at 72.19 percent (Table 2).

Table 2: Eigenvalues, percentage of variance and number of indicators of each component of strategic implementation

Component name	Eigen value	Percentage of variance	Percentage of cumulative	Number of indicators
1. Institutionalization of strategy	5.959	59.59	59.59	6
2. Operationalization of strategy	1.260	10.26	72.19	4

When considering the factor loading according to each component, it was found that operationalization of strategy consists of four variables with factor loading from .74 - .90 with a statistical significance of .01 for all of them. The variable with the highest factor loading was that all nursing units made their contribution to strategy

implementation. The institutionalization of strategy consisted of six variables with factor loading from .70 - .87 with a statistical significance of .01 for all of them. The variable with the highest factor loading was a culture that was aligned with the strategy of the organization was in functional. (Table 3)

Table 3: Factor loadings of strategic implementation indicators for nursing organization.

No	Indicators	Factor loading
Operationalization of strategy		0.87
1	All nursing units make their contribution to strategy Implementation.	.90
2	We have policies that adequately guide decision making established programs and procedures of how things are done.	.82
3	All nursing units have short term objectives.	.76
4	Strategy development is combined with resources allocation that adequately supports the activities.	.74
Institutionalization of strategy		**0.81**
5	A culture that is aligned with the strategy of the organization is in functional.	.87
6	Staff with the right skills are deployed to implement high priority strategic initiatives	.86
7	Able leadership with talent that drives initiative to implement strategy is demonstrated	.81
8	Strategy implementation uses a metric system that includes regular reviews, financial and non-financial data.	.77
9	We have in place an organizational structure that enable employees to effectively execute their strategic roles	.76
10	The organization has aligned rewards and incentives with the achievements of individual and organizational objectives	.70

Confirmatory factor analysis found the strategic implementation model to be consistent with the evidence-based data as a perfect fitby considering chi-square statistics equal at .097 CMIN/df= 1.36, RMR=.013, GFI= .98, AGFI = 0.96, RMSEA =0.03, CFI = .99. The results showed that the component of strategy ope rationalization was more relationship with the strategic implementation than the component of strategy institutionalization. (Table 4).

The data was tested by determining the internal consistency of ten strategic implementation indicators of nursing organization. Cronbach's Alpha Coefficient for the entire set after construct validity analysis was at 0.93. Cronbach's Alpha Coefficient in each component was at 0.88 – 0.91 and item analysis and inter-item correlation had values of 0.44 – 0.77. Corrected item – total correlation was at 0.67 – 0.80.

Table 4: Statistics from analysis of relationships between variables ofstrategic implementation component models of nursing service organization at community hospitals.

Component	Component factor	Factor loading	R^2
Operationalization of strategy	4	0.87	.76
Institutionalization of strategy	6	0.81	.65

CMIN/df= 1.36,RMR=.013, GFI= .98, AGFI = 0.96, RMSEA =0.03, CFI=.99.

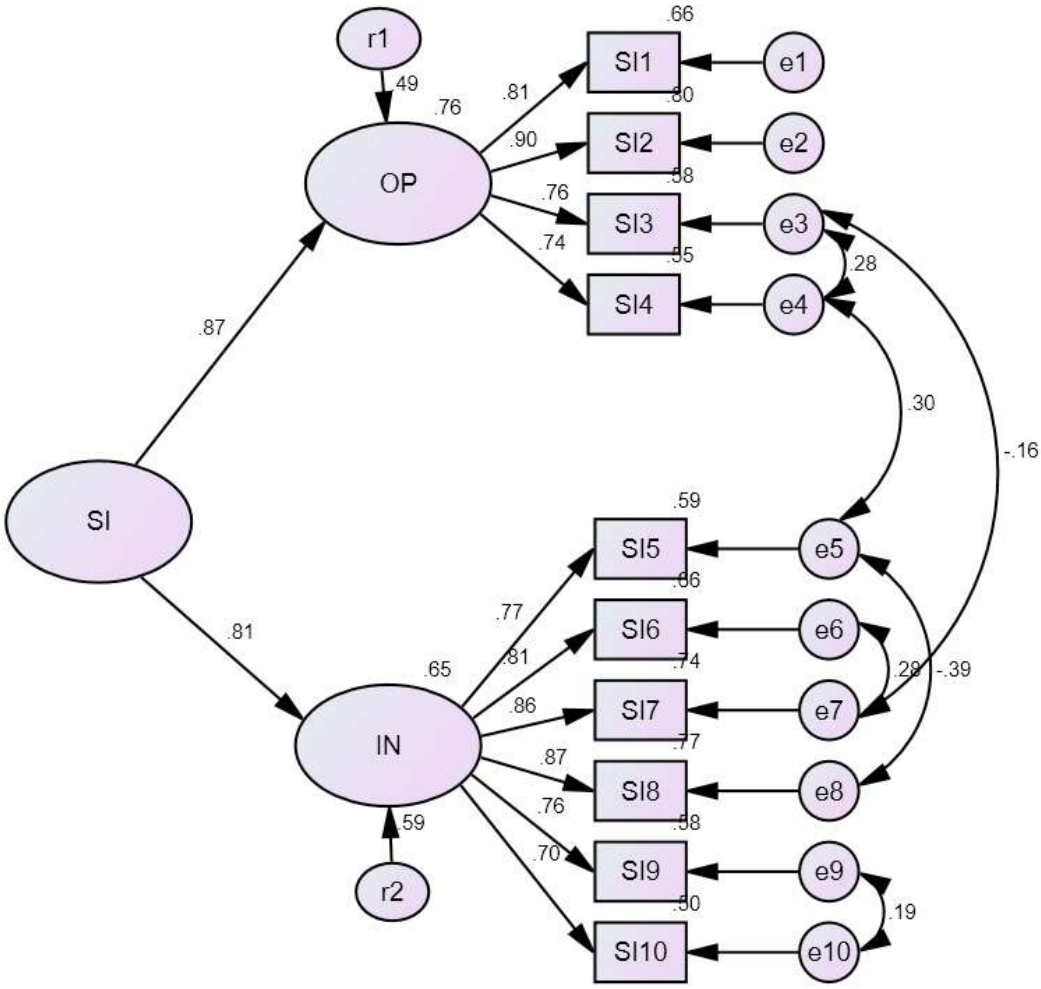

Figure 1: Secondary Confirmatory factor analysis model of strategic implementation of the nursing organization in community hospitals.

Discussion

This study found that the strategy implementation of nursing organizations in community hospitals had two components, namely ope rationalization of strategy and institutionalization of strategy. It was similar to the strategy implementation concept ofPearce & Robinson (2003),as well as the Najagi and Kombo'sstudy[11], which studied strategy implementation in commercial banks in Kenya. Likeas Kobuti's study, which studied in firms listed on the Nairobi Securities Exchange of Kenya.[12]and similar toSimon and Ronoh'study,which studiedstrategy implementation in non- govermentalorganizations.[13]

Ope rationalization of strategy component of nursing organization had four indicators including: 1) all nursing units make their contribution to strategy Implementation, 2) nursing organization policies that adequately guide decision making established programs and procedures of how things are done, 3) all nursing units have short term objectives and 4) strategy development is combined with resources allocation that adequately supports the activities. This component was different from Kobuti's study that ope rationalization of strategy consisted with five indicators which one more indicator was the strategy implementation uses a metric system that includes regular reviews, financial and non-financial data[12]. On the contrary, Simon and Ronoh'study the strategy ope rationalization had two indicators including allocation of resources, staff involvement and operating procedures.

From this study, institutionalization of strategy component had six indicators including: 1) a culture that is aligned with the strategy of the organization is in functional, 2) staff with the right skills are deployed to implement high priority strategic initiatives, 3) able leadership with talent that drives initiative to implement strategy is demonstrated, 4) strategy implementation uses a metric system that includes regular reviews, financial and non-financial data, 5) organizational structure that enable employees to effectively execute their strategic roles, and 6) the organization has aligned rewards and incentives with the achievements of individual and organizational objectives. Kobuti's study hadonly five indicatorsbecause one indicator was moved to the strategy operationalization component. In contrast, Simon and Ronoh'sstudy had one more indicator of the strategy institutionalization component that wasthe indicator for communication and reward systems.

Strategic implementation indicator of nursing organization has an acceptable level of content trust and reliability. The results of the structural validity testing found that both components could explain the total variance of 72.19 percent. Ope rationalization and institutionalization of strategy enableto describe 76.00 % and 65.00% respectively. Strategic implementation concept of Peace and Robinson (2003) used in business organizations and Non-Governmental Organizations of Kenya and can adapted for use in the context of nursing organizations community hospitals in Thailand.

Conclusion

Implementation: Strategy implementation indicators of nursing organizations at the community hospitals in Thailand had structural accuracy and consistent with the strategic management concepts of Pearce and Robinson. Top nursing management team should focus on the order of factor loading of each element from the highest to the lowest, namely ope rationalization of strategy and institutionalization of strategy accordingly. This study reveals new knowledge of strategic implementation indicators for nursing organizations. Top nursing management team can be used to assess the implementation of the strategy. It alsocan be expanded research studied and impliedthese strategies for nursing organizations in other hospital typessuch as general hospitals or private hospitals.

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Conflict of Interest: The authors have no conflicts of interest.

Ethical Clearance: Ethical clearance was taken from the ethical committee of Christian University of Thailand (registration no. N.25/2561) on June 26, 2019. The protected samples were obtained as personal information and ethical concerns which included informed-consent and maintaining confidentiality. They had the right to cancel participation in the study at any time without any impact on participants.

References

1. Royal Decree on Principles and Procedures for Good Governance in 2003 (2003, 9 October 2003). Government Gazette, Volume 120, Section 100K, Page 1-16.
2. Pearce J, Robinson R. Strategic management: formulation, implementation and Control. 8th ed. New York: Irwin McGraw-Hill; 2003.
3. Kaplan RS, Norton DP. The Balanced Scorecard: Translating Strategy into Action. Boston; 1996.
4. Boonyoung N. Nursing strategic planning. TJNC. 2010; 25(2): 18-27. (in Thai)
5. Brislin RW. The wording and translation of research instruments. In Lonner WJ & Berry JW (Editors), Field method in cross-cultural research Newbury Park, CA: Sage Publications; 1986.pp. 137-164.
6. Krejcie, Robert V., and Daryle W. Morgan. "Determining sample size for research activities." Educ Psychol Meas.1970; 30(3): 607-610.
7. Gupta, K., Attri, J., Singh, A., Kaur, H., & Kaur, G. Basic concepts for sample size calculation: Critical step for any clinical trials. Saudi Journal of Anesthesia. 2016; 10(3): 328-331.
8. DeVellis RF. Scale Development: Theory and Application. 3rd ed. Thousand Oaks, CA: Sage; 2012.
9. Polit DF, Tatano Beck C. Nursing Research. Generating and Assessing Evidence for Nursing Practice. Wolters Kluwer Health, Philadelphia; 2007.
10. Hair JF, Black WC, Babin BJ & Anderson RE. Multivariate Data Analysis. 7th ed. New Jersey: Pearson Education Limited; 2014.
11. Njagi L, Kombo H. Effect of Strategy Implementation on Performance of Commercial Banks in Kenya. EJBM. 2014;6(13):62-8.

12. Kobuti,E. Corporate governance, strategy implementation, industry competition and performance of companies listed on the narobi securities exchange[Dissertation].University of Nairobi; 2018.
13. Simon KS, Ronoh DK. Strategy Implementation and Performance of Non-Governmental Organizations in Kericho County, Kenya. MOS. 2017; 4(3):34-42.on

Medication Safety Climate Perception among Registered Nurses in a University Hospital, Thailand

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Abstract

Background: Medication safety climate perception among registered nurses is one important factor involved in patient safety from medical care activities, since nurses are in direct contact with patients at all steps during their stay in hospital.

Objectives: To assess level of medication safety climate perception and identify related factors among registered nurses in a university hospital.

Methodology: A descriptive study was conducted. Sample size was calculated as 706 samples. The questionnaire was composed of 3 parts 1) general information, 2) nursing drug administration perception and 3) medication safety climate questionnaire, for which the Cronbach's alpha is 0.89. Data were collected through an online questionnaire. Descriptive statistics, 95%CI, Chi-squared, independent sample t-test and multiple linear regression were applied for data analysis.

Results: The response rate was 95.32%. More than half of nurses had age in the range 23-36 years old. Almost half of sample had working experience of less than 10 years. The mean score of medication safety climate perception was 3.57 (SD 0.29) (95%CI:3.54, 3.59). This study found factors related to medication safety climate perception as age group (β 0.05 95%CI: 0.01,0.09) and nursing drug administration perception (β 0.32 95%CI: 0.28,0.44).

Conclusion: This study provides an understanding of medication safety climate perception among nurses and to strengthening medication safety climate perception, the nursing drug administration activities are recommended. Also, young nurses are suggested as targets for an intervention group.

Keywords: *Medication safety climate perception, Registered nurse.*

Introduction

The concept of "safety climate" was first used to improve safety in various high-risk sectors. It was shown that a high safety climate level in service units performing high-risk operations[1], such as hospitals, led to adverse events to patients. The concept of safety climate is shared by all hospital staff, especially nurses, and their perceptions of the priority of safety at their unit and the organization at large, especially in situations

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where safety competes with other performance facets such as care medication administration and its quality.

The term 'safety climate' has been widely discussed in the literature in the area of patient safety, it has been used as a synonym for culture. Safety climate may be defined as the temporal indicator of the institution's state of safety culture, and it may be measured by individual perceptions of the organization's attitudes regarding safety culture[2].The implementation of safety culture in health care institutions may have a direct association with the decrease in adverse events and mortality, resulting in improvements in the quality of health care[3].

In the process of medication management and medication safety, nurses are one of the professionals who have direct contact with patients. The roles of clinical nurses in medication management are complex and multifaceted, including administering medication safely and efficiently, assessing and monitoring for desirable and unwanted effects, discharge planning, and providing patient education[4]. Thus, in terms of patient care among nursing professionals, care involves a potential for error and some degree of risk to patient safety is inescapable[4].

A previous study demonstrated that the perception of nurses about patient safety decreases the medication error rate, and the highest level of perception is for the dimension of managing safety risks[5]. In addition, nurse perceptions of the safety climate in Australian acute hospitals found nurses held positive attitudes towards job satisfaction, followed by the teamwork climate which leads to developing a hospital safety intervention[6]. However, there have been few studies in medication safety climate perception among registered nurses in Thailand. Besides, the university hospital in Khon Kaen University provides tertiary care, in which the hospital policy focuses on a culture of safety towards patients, which highlights the importance of tailoring and targeting quality improvement initiatives at all level. The program initiative deploys medication error prevention intervention, such as the system of Computerized Physician Ordering Entry (CPOE), Dispensing Robot and an improved drug distribution system in wards. However, in the part of human error prevention, a medication safety climate perception assessment is needed, which will provide fruitful information about implemented strategies to improve patient safety, reducing medication error and developing the culture of safety in organizations.

Objectives: This study aims to assess the medication safety climate perception level and identify factors related among registered nurses in a university hospital.

Materials and Method

A descriptive study was conducted among registered nurses who work full time at In Patients Department(IPD)of Srinagarind Hospital, Faculty of Medicine, Khon Kaen University. Inclusion criteria were being registered nurses who had worked for more than six months and exclusion criteria were being registered nurses with health or mental health problems causing inability to communicate with others.

Sample size was calculated using the Win Pepi Program. Based on simple random sampling technique, estimated for a mean of perceived safety climate from pilot study among 30 nurses of 3.8 (SD 0.7), confidence level 95%, acceptable difference 0.5% of the mean, thus, the sample size required was 706 samples.

The study tool was a questionnaire composed of 3 parts 1) general information, 2) nursing drug administration perception and 3) medication safety climate questionnaire. The part of nursing drug administration perception measured by Likert scale which consisted of 14 items adopted from the study of Armutlu M.et al[7]. A reliability test found Cronbach's alpha coefficient was 0.75 and content validity was reviewed and tested by three Thai experts. The highest mean score being 5. A high level of nursing drug administration perception refers to a mean score of 3.5 and over.

In the part of medication safety climate questionnaire was permitted by the study of Kantilal K.et al[8] which had been translated into Thai language by the back-translation technique[9]. This part consisted of 9 dimensions of medication safety climate:1) teamwork,2) safety climate, 3) job satisfaction, 4) stress recognition,5) perceptions of management, 6) working conditions,7) organizational learning-continuous learning, 8) feedback and communication about errors and 9) management support for medication safety. Before, conducted actual data collection, this part had been reliability and validity checked by three Thai experts and found Cronbach's alpha coefficient as 0.89. The scoring of this part was between 1-5 levels, high perception of medication safety climate was the score close to 5.

Data were collected through an online questionnaire

for 2 months, a link to the web survey was e-mailed to the registered nurse sample from the list compiled by the Srinagarind Hospital Risk Management Committee. E-mail reminders were sent two weeks after the invitation e-mail. The data was transferred into the SPSS of Khon Kaen University licensed for data analysis. The statistical used were frequency, percentage, mean, SD, 95% CI, Chi-squared, independent sample t-test and multiple linear regression analysis.

Results

The response rate was 95.32%. The sample nurses were more females than males. More than half of nurses had age in the range 23-36 years old. The most of sample was single, the highest education level had completed bachelor degree in nursing, and almost half of them had working experience less than 10 years.(Table 1).

Table 1: Characteristics of sample nurses (n=673)

Variable	Number	Percentage
Gender		
Male	36	5.35
Female	637	94.65
Age (years old) Min. 23, Max. 58	Mean 33.42 (SD 8.44)	
Age group		
23-36 years old	493	73.25
36.1-52 years old	137	20.36
52.1 years old and over	43	6.39
Marital status		
Single	401	59.58
Married	252	37.45
Divorced/separated/widowed	20	2.97
Education level		
Bachelor	604	89.75
Master's degree and higher	69	10.25
Working experience in hospital		
Less than 1 year	16	2.38
1-5 years	205	30.46
>5-10 years	232	34.47
>10-15 years	77	11.44
>15-20 years	36	5.35
20 years and over	107	15.90

Nursing Drug Administration Perception: This study found the highest mean score of nursing drug administration perception were the role of nurses in drug administration must comply with professional and international standards and severe level of drug errors was reviewed by nursing team for continuous quality improvement. (Table 2)

Table 2: Nursing drug administration perception by items (total score = 5)

Item	Mean (SD)		95%CI
1. The important role of nurses in drug administration must comply with professional and international standards	4.64	0.52	4.59,4.67
2. Practice management of patients based on 5 R principles for drug admin. safety in ward	4.47	0.67	4.41,4.51
3. My hospital always allows patients / relatives to participate in the drug administration process to increase safety	4.07	0.82	4.00,4.13
4. Policy/manual/practice guidelines necessary to be up to date for modern drug administration	4.21	0.67	4.15,4.25
5. Good communication and co-operation on drug administration among nurses and other affiliated staff in hospital	4.22	0.57	4.17,4.26
6. Easily inquire about drug administration information when encountering problems	4.14	0.61	4.08,4.17
7. Regularly organizing activities to develop knowledge / potential in the safety of drug administration for the nursing team	4.25	0.56	4.20,4.28
8. Relevant suggestions on drug administration from the committee/auditor were reviewed to develop and improve for more drug safety quality	4.28	0.62	4.21,4.31
9. Difficult to speak up if you encounter a problem with drug administration errors	2.51	1.22	2.44,2.62
10. When reporting drug administration errors, reporters are often affected or blamed	2.70	1.20	2.63,2.81
11. Severe level of drug errors was always reviewed by nursing team for continuous quality improvement	4.52	0.60	4.46,4.55

Item	Mean (SD)		95%CI
12. Few drug administration errors due to a well-established drug errors prevention system in the hospital	4.20	0.63	4.14,4.24
13. The implementation of drug-related technology systems can help reduce drug administration errors	3.92	0.80	3.86,3.98
14. You are satisfied with the support of the nursing administrators in drug errors surveillance	4.06	0.66	4.00,4.10
Total	4.01	0.36	3.98,4.04

Medication Safety Climate Perception: This study found the highest mean score of medication safety climate perception were working conditions, organizational learning-continuous learning and feedback/communication about errors. (Table 3).

Table 3: Distribution of medication safety climate perception by item

Item	Mean (SD)		95%CI
1. Teamwork	3.85	0.35	3.82,3.88
2. Safety climate	3.93	0.36	3.90,3.96
3. Job satisfaction	4.05	0.61	4.00,4.09
4. Stress recognition	3.69	0.99	3.62,3.77
5. Perceptions of management	3.62	0.37	3.59,3.65
6. Working conditions	4.15	0.50	4.11,4.19
7. Organizational learning-continuous learning	4.37	0.52	4.33,4.41
8. Feedback/communication about errors	4.17	0.58	4.13,4.21
9. Management support for medicationsafety	3.90	0.50	3.86,3.94
Total mean score of medication safety climate perception	3.57	0.29	3.54,3.59

Factors related to medication safety climate perception among registered nurses: This study found that age group, working experience in hospital and nursing drug administration perception were significantly related to medication safety climate perception. (Table 4)

Table 4: Factors related to medication safety climate perception among registered nurses

Factor	Medication Safety Climate Perception			
	n	mean	SD	p-value
Gender				
Male	36	3.53	0.39	0.399
Female	637	3.58	0.29	
Age group				
23-36 years old	493	3.55	0.29	0.008*
36.1-52 years old	137	3.60	0.30	
52.1 years old and over	43	3.69	0.26	
Marital status				
Single	401	3.56	0.29	0.242
Married	252	3.58	0.29	
Divorced/separated/widowed	20	3.67	0.23	
Education level				
Bachelor	604	3.57	0.29	0.121
Master's degree and higher	69	3.63	0.28	
Working experience in hospital				
1-10 years	221	3.56	0.29	0.027*

Factor	Medication Safety Climate Perception			
	n	mean	SD	p-value
>10-15 years	232	3.54	0.31	
15 and over	220	3.61	0.28	
Nursing drug administration perception				
Low level	52	3.24	0.30	<0.001*
High level	621	3.60	0.28	

When controlling other related factors, this study found age group and nursing drug administration perception statistically significant related to medication safety climate perception. (Table 5)

Table 5: Multivariate analysis of factors related to medication safety climate perception

Factors	Standardized coefficients (B)	95% Confidence intervalfor β		t	p-value
		Lower bound	Upper bound		
Age group	0.05	0.01	0.09	2.091	0.037*
Working experience in hospital	0.01	-0.03	0.04	0.126	0.900
Nursing drug administration perception	0.32	0.28	0.44	8.888	<0.001*
Constant	2.82				
Adjusted R-squared	0.11				
F	29.86				
P-value	<0.001				
n	673				

Discussion

This study results confirmed by the study at Alexandria Main University Hospital[10] which found medication safety climate perception among nurses at a high level. However, the study found medication safety climate perception higher than the accredited hospitals in South Korea[11]. Due to the difference in a nurse sample age group, which is lower than 36 years old, and the hospital characteristics.

This study found medication safety climate perception among nurses at a high level, due to the responsibility of nurses for the safety of their patients, especially, the division of nursing strongly supported medication administration safety training programs and activities, such as, in-house training, communication about guiding principles for medication safety and the medication safety monthly monitoring by senior and head nurse. In addition, the university hospital policy was strongly support medication safety by set the strategies to encourage and promote practices such as a quality and safety training program for nurses, medication safety training on technology, reporting system for medication errors, communication and data feedback to team. Moreover, the root cause analysis was always reviewed in harm to severe level cases of medication errors by the nurses' team and Risk Management Committee, doctors, pharmacists for continuous quality improvement.

In the part of age group, this study found age group related to nurses' perceptions of the medication safety climate. This study confirmed the Fasolino[12], which revealed that age was related to the medication error among nurses, in particular the medication error incidence was higher among the young nurse group. Moreover, the age of nurses and their working experience was significantly associated with medication administration errors.

Medication administration is the most important, complex and the most vital process of nursing care in the medication management system, which requires the right knowledge and function of a competent nurse. Medication administration is defined as preparing, giving and evaluating the effectiveness of prescription and nonprescription medications[13]. This study found the highest mean score was nurses perceived their role under professional and international standards and severe level of drug error was always reviewed by the nursing team.

Due to nursing being a professional career which

responsibility to prevent, evaluate and report side effects or adverse drug events. Nurses also play a major role in reducing medication errors, and frequently administer medications in patients' healthcare settings. Therefore, the nurses' role is the last line of defense to safeguard against medication errors, as administration is the last part of the medication process[4]. Consequently, professional and international standards are always recognized by nurses for medication administration safety, which leads to a high level of perception.

Even though, the measurement of medication safety climate perception is a subjective evaluation; it relies on the nurses' perception, mood and attitude which all change over time. However, the strength of this study was a high response rate, which indicated an answer to the research question. The implications of this study will be used to improve the medication safety climate in Srinagarind Hospital and other similar hospital contexts.

Conclusion

This study found the medication safety climate perception among nurses at a high level. When controlling others related factor, multiple linear regression revealed significant factor were nurse age group and nursing drug administration perception. Intervention need to be considered to modify these significant factors and intervention should be provided to the young age nurses.

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References

1 Zohar D, Livne Y, Tenne-Gazit O, Admi H, Donchin Y. Healthcare climate: a framework for measuring and improving patient safety. Crit. Care Med. 2007;35(5):1312-17.

2 González-Romá V, Peiró JM, Lloret S, Zornoza A. The validity of collective climates. J Occup Organ Psychol 1999;72(1):25-40.

3 Naveh E, Katz-Navon T, Stern Z. Treatment errors in healthcare: a safety climate approach. Manage Sci 2005;51(6):948-60.

4 Al-Youssif SA, Mohamed LK, Mohamed NS. Nurses' experiences toward perception of medication administration errors reporting. IOSR-JNHS 2013;1(4):56-70.

5 Jang HE, Song Y, Kang HY. Nurses' perception of patient safety culture and safety control in patient safety management activities. J Korean Acad Nurs Adm 2017; 23(4):450-9.

6 Soh S-E, Morello R, Rifat S, Brand C, Barker A. Nurse perceptions of safety climate in Australian acute hospitals: a cross-sectional survey. Australian Health Review 2017;42(2):203-9.

7 Armutlu M, Foley M-L, Surette J, Belzile E, McCusker J. Survey of nursing perceptions of medication administration practices, perceived sources of errors and reporting behaviours. Healthc Q Tor Ont 2008;11(3):58-65.

8 Kantilal K, Auyeung V, Whittlesea C, Oborne A. Medication safety climate questionnaire: development and psychometric analysis. Journal of Health Science2015;3(1):1-10.

9 Brislin, RW. Back-translation for cross-cultural research. Journal of Cross - Cultural Psychology 1970;1(3):185-216.

10 Hashish EAA, El-Bialy GG. Nurses' perceptions of safety climate and barriers to report medication errors. Life Sci J 2013;10(1):2160–8.

11 Lee E. Safety climate and attitude toward medication error reporting after hospital accreditation in South Korea. Int J Qual Health Care 2016; 28(4):508–14.

12 Fasolino T, Snyder R. Linking nurse characteristics, team member effectiveness, practice environment, and medication error incidence. J Nurs Care Qual 2012; 27(2):E9-16.

13 Ayorinde MO, Alabi PI. Perception and contributing factors to medication administration errors among nurses in Nigeria. IJANS. 2019;11:1-8

Characteristics of Outpatient Pre Diabetes Dr. Dody Sarjoto Hospital, Maros Regency, South Sulawesi, Indonesia

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Abstract

Introduction: Prediabetes is a condition that increases blood glucose levels but does not meet the criteria for Diabetes Mellitus. The International Diabetes Federation (IDF) is estimated that 6.7% of the adult population with prediabetes in the world and in 2040 reached 7.8% of the population. The purpose of this study was to determine the characteristics of outpatient prediabetes patients in the Internal Medicine polyclinic Dr.Dody Sarjoto Hospital 2018-2019.

Material and Method: Analytical research design with a cross sectional approach, the study population of outpatients in the polyclinic in Dr. Dody Sarjoto Hospital, 143 sample numbers according to the specified variables, using secondary data, were analyzed using Chi Square and Fisher's Exact.

Findings and Discussion: The highest proportion of prediabetes to age 40-50 years (58.7%), female sex (73.4%), general high school education (58.7%), with a family history of DM (81.1%), the highest prediabetes is prediabetes combination (41.3%).

Conclusion: Characteristics of outpatient prediabetes in the clinic Dr.Dody Sarjoto Hospital The highest frequency of prediabetes based on age is 40-50 years as many as 84 (3.5%), the highest occupation in respondents who do not work is 81 people (56.6%), the highest level of education at school Intermediate General is 84 (58.7%) and based on family history of DM the highest frequency is 116 people (81.1%).

Keywords: *Fasting glucose, Prediabetes, Tolerance*

Introduction

Pre diabetes is a world health problem that must be a concern for all of us. Basically pre diabetes has a higher prevalence than the incidence of diabetes itself, according to the International Diabetes Federation it is estimated that 6.7% of the adult population with prediabetes or equivalent to 318 million population under 50 years, one third between the ages of 20 and 39 years. It is estimated that up to 2040, 7.8% of the adult population will suffer from pre diabetes, equivalent to 480 million adult populations of the world population[1]. while in Indonesia it is predicted that 10% of the population in Indonesia (33 provinces) will experience pre diabetes[2].

The term prediabetes describes the condition of an increase in elevated blood sugar levels but does not

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yet meet the diagnostic criteria for Diabetes Mellitus. Prediabetes is if found fasting blood glucose levels between 100-125 mg / dl this is also called interference of fasting glucose and or an increase in blood sugar levels after 2 hours of loading (75 mg glucose) between 140-199 mg/dl or also called impaired glucose tolerance (IGT) or a combination of both, namely an increase in fasting blood glucose levels and blood sugar levels 2 hours after loading[3]. According to several studies that prediabetes can develop type 2 diabetes mellitus between 3-10 years[4].

Prediabetes in the course of the disease has three possibilities namely 1/3 cases will become type 2 DM, the next 1/3 will remain prediabetes, and the remaining 1/3 will be able to return to normoglycemia. Prediabetes has a 2-10-fold risk factor for Diabetes Mellitus (DM) so early identification is needed in the prevention of the incidence of type 2 DM and its complications[5]. There are 2 risk factors in outline in prediabetes namely risk factors that can be changed and cannot be changed. Risk factors that can be changed for example obesity, physical activity, nutrition and irreversible risk factors such as genetic, age, gestational diabetes, these risk factors will increase complications such as aterosclerosis, heart disease and other macrovascular diseases[6]. Prediabetes with high blood fat and insulin resistance can increase metabolic syndrome. thereby increasing the risk of heart disease and premature mortality[7].

The purpose of this study was to determine the characteristics of Prediabetes sufferers who are outpatient in the Polyclinic of the disease in the hospital Dr. Dody Sarjoto, Maros Regency.

Material and Method

The research design was cross sectional approach, the type of research was descriptive analytic to know the description of prediabetes characteristics from age, sex, education, occupation, family history of diabetes, in Dr. Dody Sarjoto, Maros, South Sulawesi hospital patients.

Sampling with Purposive Population Sampling method, the study sample is all outpatients who seek treatment at the disease clinic in the hospital Dr. Dody Sarjoto starting in April 2018-April 2019 as many as 2,150 patients, after the inclusion and exclusion criteria, the total sample of 143 people data collected from secondary data obtained from the medical record book of Dr. Dody Sarjoto hospital which is then selected based on inclusion and exclusion criteria.

The inclusion criteria are: male and female aged between 18-70 years, fasting blood glucose levels 100-125 mg/dl and blood glucose levels 2 hours after loading (postprandial) values 140-199 mg/dl. Exclusion criteria are: DM sufferers, Severely ill, currently pregnant. Data collected were processed using a computer using the SPSS program, presented in the form of narratives and tables, analyzed using the chi-square test and Fisher's test.

Findings and Discussion

Based on table 1 shows that the highest age of prediabetes at the age between 40-50 years is as many as 84 people (3.5%). the lowest is age <28 years, which is as many as 5 people (3.5%). The highest percentage of prediabetes in patients who did not work was 81 people (56.6%) and at the highest level of prediabetes education in high school education and the lowest in junior high school education, a history of diabetes milletus DM showed the highest percentage of 116 people (81,1%), Prediabetes is a condition where blood sugar levels rise above normal but have not entered criteria as Diabetes Mellitus, in the table above (table 1) Prediabetes increases in old adulthood, 40-50 years, this high prevalence because at that age has occurred the aging process (aging) causes the production of enzymes that bind insulin begin to be disrupted and there is a change in cell permeability and the response of the cell nucleus to the hormone insulin this condition allows for an increase in blood glucose levels / hyperglycemia[8]. In this study the frequency of prediabetes increased in women this is because women generally have less muscle mass than men so it is easy to experience insulin resistance in the muscles both moderate and severe[9].

Table 1: Frequency distribution of characteristics based on Age, Gender, Education Family history of DM in prediabetes patients (n = 143)

Characteristics of respondents	Frequency	Percentage (%)
Age		
<28 years	5	3.5
29 years to 39 years	13	9.1
40 years to 50 years	84	58.7
> 51 years old	41	28.7
Gender		
Male	38	26.6
Female	105	73.4
Occupation		

Work	62	43.4
Not Working	81	56.6
Qualification		
Diploma 1 - Diploma 3	21	14.7
Bachelor degree - Doctor	28	19.6
Junior high school	10	7.0
Senior High School	84	58.7
Family History DM		
Yes	116	81.1
No	27	18.9

The frequency of prediabetes increases in patients who do not have a job (permanent work), this happens because they do not do routine physical activities along with work schedules, so they sit more at home and watch television (TV, Youtube, social media, etc.) this behavior increase the risk of prediabetes because it is usually accompanied by food. at the high frequency level of education in high school graduates, this is presumably because in Indonesia the largest graduates are public high schools so that many respondents are in such education. History of DM in parents has a risk of prediabetes in their children, this is in accordance with the table above, respondents who have a family history of DM, the frequency is 116 people (81.1%), this is consistent with the multicenter study by Wagner in Germany showed that family history of DM was significantly associated with the risk of developing prediabetes (OR = 1.4 with 95% CI = 1.27: 1.54, p <0.001). Family history of DM has an increased risk for suffering from prediabetes around 40%[10].

Table 2: The highest types of prediabetes

Type of prediabetes	Frequency	Percentage(%)
Combined fasting glucose disorders and impaired glucose tolerance	59	41,3
Glucose disorders Fasting	57	39,9
Impaired glucose tolerance	27	18,9
Total Responden	143	100,0

Table 2 shows the highest frequency in mixed prediabetes namely fasting glucose disorders and glucose tolerance disorders of 59 people (41.3%) and the lowest in the frequency of glucose tolerance disorders of 27 people (18.9%). in mixed prediabetes, there is a combination of physiological disorders in both peripheral tissues and major metabolic organs such as the liver so that micro / macrovascular complications following dyslipidemia can be the result of this condition. the incidence of prediabetes both is increasing throughout the world not least in developed countries, especially in Indonesia there has been an almost threefold increase in prediabetes from about 10% in 2007 for urban populations 20 to 29.9% in the same population in 2013[11], It is suspected that the occurrence of mixed prediabetes due to lifestyle changes due to the influence of urbanization, this is certainly a warning of the dangers of predibetes which are risk factors for the onset of diabetes mellitus in the future.

Conclusions

The highest frequency of prediabetes based on age is 40-50 years as many as 84 (3.5%), based on the highest occupation of respondents who are not working by 81 people (56.6%), based on the highest level of education in high schools by 84 (58.7%) and based on family history of diabetes mellitus DM the highest frequency of 116 people (81.1%).

Conflict of Interest; There is no conflict of interest to be declared.

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Ethical Clearance: This study was approved by the head of the hospital Dr. Dody Sarjoto Maros Regency, South Sulawesi.

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References

1. Cho NH, Shaw JE, Karuranga S, Huang Y, da Rocha Fernandes JD, Ohlrogge AW, et al. IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. Diabetes Res Clin Pract [Internet]. 2018;138:271–81. Available from: https://doi.org/10.1016/j.diabres.2018.02.023
2. Soewondo P, Pramono L a. Prevalence, characteristics, and predictors of pre-diabetes in Indonesia. Med J Indones. 2011; 20(4):283–94.
3. Kumar P, Mallik D, Mukhopadhyay DK, Sinhababu A, Mahapatra BS, Chakrabarti P. Prevalence of diabetes mellitus, impaired fasting glucose, impaired glucose tolerance, and its correlates among police personnel in Bankura District of West

Bengal. Indian J Public Health. 2013;57(1):24–8.

4. Twigg SM, Kamp MC, Davis TM, Neylon EK, Flack JR. Prediabetes: A position statement from the Australian Diabetes Society and Australian Diabetes Educators Association. Med J Aust. 2007;186(9):461–5.
5. Veera RB, Alekhya K, Kavitha D, Annapurna A. Assessment of Pre-Diabetes in Young Adults of Age 18-40yrs in Andhra University College of Pharmacy, Visakhapatnam. Indian J Pharm Pract. 2012;5(2):53–6.
6. Vijayakumar G, Manghat S, Vijayakumar R, Simon L, Scaria LM, Vijayakumar A, et al. Incidence of type 2 diabetes mellitus and prediabetes in Kerala, India: Results from a 10-year prospective cohort. BMC Public Health. 2019;19(1):1–10.
7. Pandey U, Midha T, Rao YK, Katiyar P, Wal P, Kaur S, et al. Anthropometric indicators as predictor of pre-diabetes in Indian adolescents. Indian Heart J [Internet]. 2017;69(4):474–9. Available from: http://dx.doi.org/10.1016/j.ihj.2017.06.006
8. Robles-Ordaz MD, Gallegos-Aguilar AC, Urquidez-Romero R, Diaz-Zavala RG, Lavandera-Torres MG, Esparza-Romero J. Prevalence of prediabetes and modifiable factors in an ethnic group of Mexico: The Comcáac Project. Public Health Nutr. 2018; 21(2):333–8.
9. Stein JH, Asthana A, Smith SS, Piper ME, Loh WY, Fiore MC, et al. Smoking cessation and the risk of diabetes mellitus and impaired fasting glucose: Three-year outcomes after a quit attempt. PLoS One. 2014;9(6).
10. Wagner R, Thorand B, Osterhoff MA, Müller G, Böhm A, Meisinger C, et al. Family history of diabetes is associated with higher risk for prediabetes: A multicentre analysis from the German Center for Diabetes Research. Diabetologia. 2013;56(10):2176–80.
11. Kemenkes RI. Riset Kesehatan Dasar Tahun 2018. Kementrian Kesehat Republik Indones. 2018;1–100.

Factors Affecting Satisfaction and Necessity of Suicide Prevention Program

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Abstract

Purpose: The purpose of this study is to supplement the overall system of the projects and to seek improvement plans by analyzing factors affecting the satisfaction and necessity of the suicide prevention project operated in district C of Korea.

Method: The subjects recruited 15 cities and counties suicide prevention projects operators in district C, and a total of 113 people's data were collected and 112 data were analyzed excluding one data with insufficient responses. The data were analyzed with descriptive statistics, multiple regression analysis, and a principal components analysis by a varimax rotation.

Results: Satisfaction with suicide prevention projects was higher when goal achievement was higher (β=.355, p<.001),better project operation (β=.311, p<.001), and better partnership (β=.306,p<.001), and these three factors are explaining 77% of satisfaction. The necessity of suicide prevention project was higher when the goal achievement was higher (β=.518,p<.001), and when the partnership was better (β=.514,p<.001), the administrative support was less (β=-.145,p=.042), and these three factors are explaining 74% of the necessity.

Conclusion: Through this study, it was found that set realistic project goals and systematic project operation and communication and cooperation among members of the region to achieve it was important to enhance the satisfaction of suicide prevention projects.

Keywords: *Suicide prevention, satisfaction, necessity*

Introduction

The suicide rate in Korea was 24.3 per 100,000 people as of 2017,[1] with an average of 34.1 people committing suicide per day.[2] It ranks second behind Lithuania in suicide rates in OECD countries, more than twice higher than 11.58 out of 100,000 people which is average in 33 OECD countries .[3] The suicide rate in Korea's district C was 31.7 per 100,000 people in 2017, It is the area with a high suicide rate compared to other regions, even it is the number one suicide rate among the regions in Korea as well .[1] Especially the district C's aging index is 119.6 and an aging population ratio of 17.15,[4] which has many elderly populations and a high elderly suicide rate. District C's higher the age-standardized suicide rate is 26.2,[5] higher than the age-standardized suicide rate of 23.2 for the district D,[5] which is similar to district C's the aging index (116.1), and the aging population ratio (15.83).[4]

Korea established 'comprehensive mental health measures' in 2016 and set a policy goal of 'safe social realization without suicide' in 2018,[6] and the local autonomous entity is also proceeding various suicide prevention projects with a focus on the community.[2] In the district C, since the pilot project was carried out in 2011 as a rural type suicide prevention project for

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3 years, and since 2015, it has expanded to the entire district C and has been promoting suicide prevention projects. Suicide prevention projects are needed to be operated systematically and efficiently by kept up with these suicide prevention policies of the government or the region. However, analysis has not been made on the contents and satisfaction of the operated project to date. For the successful operation of the project and expansion of the project in the future, systematic supplementation is needed through structural analysis such as the difficulties and requirements of the project operation appreciated by the project operators. Therefore, this study was conducted to identify factors of impact on the satisfaction and necessity of suicide prevention projects operating in district C to find ways to improve them so that tangible results of suicide prevention projects can be derived in the future.

Method

Subjects: This study was convenience sampling targeted to experts who were operating suicide prevention projects in 15 cities and counties in district C, fully explaining the purpose of the research and subjected who agree to participate in the research in the written consent. The number of samples, when the significance level .05, power 90%, average level of effect size .15, and input variable were 4 in regression analysis using G*Power 3.0 program, was 108 appropriate number of subjects. The questionnaire was distributed to that human subjects and 113 were retrieved. Among them, 112 questionnaires were included in the final analysis except for one with an insufficient answer.

Instruments: The research tool was developed questionnaire items for each area by the researcher based on the literature review and the meeting with the currently proceeding suicide prevention project working group as there was no existing developed tool. To improve the content validity of the questionnaire, the researcher modified some questionnaire items through an advisory meeting with two mental health professionals with more than 15 years of experience in the mental health center and one mental health professional with more than five years of experience and developed and used them as the final question.

The satisfaction and necessity of the project were measured on a five-point scale. The satisfaction has consisted of five items and the necessity has consisted of four items. The project promotion process was a total of nine questionnaire items and classified into two factors based on Eigen value 1 as a result of a principal component analysis by varimax rotation in order to verify its construct validity. The first factor was named 'Administrative support' as four items, and the second was named 'Partnership' as five items. These two factors are explaining 78.18% of the project promotion process. The reliability of the internal consistency of the project promotion process tool was 'Administrative support' Cronbach's α=.92, 'Partnership' Cronbach's α=.91, and overall, Cronbach's α=.94.

The result of factor analysis in the eight items related to Post-project outcome, six items out of a total of eight items were classified as Eigen value 5.72 as the first factor. This first factor named 'Goal attainment'. Two items were Eigen value 0.72, and classified as the second factor. The Second factor named 'Project operation'. These two factors are explaining 80.53% of the variate of post-project outcomes. The reliability of the internal consistency of the post-project outcomes tool was the 'Goal attainment' factor Cronbach's α=.95, the 'Project operation' Cronbach's α=.74, overall items Cronbach's α=. 94.

Data Collection: Data collection of this study was conducted for about two months from January 2019 to February 2019. This survey was conducted on suicide prevention project operators in 16 mental health centers in 15 cities and counties in district C. The purpose and intention of this study were explained, and an online questionnaire or self-reporting questionnaire was provided to those who voluntarily agreed to participate in the study with written consent and let completed it themselves. Subsequently, 113 data were collected, and 112 data were used for data analysis, except for one copy with an insufficient answer.

Data Analysis: The collected data were processed computerized statistics by using SPSS/WIN 19.0 program.Descriptive statistics were obtained on the general characteristics. Factor analysis was conducted as a principal component analysis by varimax rotation on the survey tools of the study subjects. Factors that affect the satisfaction and necessity of suicide prevention projects were analyzed through stepwise multiple regression analysis.

Results

General Characteristics of Subjects: The general characteristics of subjects who responded to this suicide

prevention operation are as follows in (Table 1). In gender, Women were 94.5%, in age, 50~59 were 64.5%, in the workplace, health care clinics were 71.8%, and in the experience, over 20years were 57.3% that show the largest number.The region where the suicide occurred after the project operation was 11.3 % of the respondents.

Table 1: General characteristics of subjects N=112

category	subcategory	n	%
sex	male	6	5.5
	female	103	94.5
age	20-29	3	2.7
	30-39	24	21.8
	40-49	11	10.0
	50-59	71	64.5
	60-69	1	.9
type of work place	community public health center	4	3.6
	branch office of the community health center	22	20.0
	community mental health center	5	4.6
	health care clinic	79	71.8
work period (year)	<5	27	24.5
	5≤□<10	6	5.5
	10≤□<15	7	6.4
	15≤□<20	7	6.4
	20≤	63	57.3
whether or not there have been suicides since the operating of the program	no	94	88.7
	yes	12	11.3

Satisfaction and necessity of the project: The satisfaction of the suicide prevention project was an overall average of 3.57±.77, among them, the highest with project promotion process of 3.69±.86, and the post-project outcome of 3.69±.86, and the lowest with 3.15±.95 for the mentoring project. The necessity of suicide prevention projects was an overall average of 3.75 ±.91, among them, the highest with the program necessity of 3.85 ±.96, and the lowest with overall project necessity of 3.65 ± 1.09 (Table 2).

Table 2: Satisfaction and necessity of the project

Category		Mean	SD	M±SD
Satisfaction	Overall project satisfaction	3.63	1.00	3.57±.77
	Promotion process satisfaction	3.69	.86	
	Project contents satisfaction	3.72	.89	
	Mentoring project satisfaction	3.15	.95	
	Post-project outcome satisfaction	3.69	.86	
Necessity	Overall project necessity	3.65	1.09	3.75±.91
	Program necessity	3.85	.96	
	Resident's position program necessity	3.79	.96	
	Program continuity necessity	3.72	.98	

The project promotion process and the post-project outcome: In the process of project promotion, 'partnership' was the higher satisfaction than 'administrative support' among the two factors. In the "administrative support" factor, the satisfaction of "administrative support and cooperation" was the highest at 3.51±.99, while that of "resource support" was the lowest at 3.27±1.05. The 'partnership' had the highest 'resident collaboration' with 3.71±.91, and 'citizens participatory excellence' was the lowest with 3.42±1.02 (Table 3).

The 'goal attainment' part of the post-project outcome was 3.64±.75 on the overall average, and the satisfaction of the part that contributed to 'improving happiness and decreasing depression after the project' was the highest at 3.82±.89, and the lowest part of the satisfaction was 'overall satisfaction judged by experts' at 3.40±.86. The overall average of 'project operation' was 3.49±.85 and the highest 'appropriateness of budget execution' was 3.62±.92 among them. The overall average of 'project operation' was 3.49±.85 and the highest 'appropriateness of budget execution' was 3.62±0.92 among them. The 'goal attainment' factor was 3.64±0.75, which was higher than the 'appropriateness of budget execution' factor of 3.49±0.85 (Table 3).

Table 3: The satisfaction of project promotion progress and post-project outcome.

Category	Factor	Content	Mean	SD	Mean	SD
Project promotion process	Administrative support	Administrative support and cooperation	3.51	.99	3.35	.91
		Budgetary Support	3.28	1.06		
		Resource support	3.27	1.05		
		Process of converging the project discussion	3.37	.98		
	Partnership	Resident collaboration relationship	3.71	.91	3.56	.82
		Administrative-Residents-Experts Cooperation	3.56	.94		
		Program configuration plan	3.59	.99		
		Human resources recruitment	3.56	.96		
		Citizens participatory excellence	3.42	1.02		
Post-project outcome	Goal attainment	Overall goal attainment judged by experts	3.40	.86	3.64	.75
		Change in the perception of suicide prevention	3.58	.83		
		Contribution to Improving happiness and decreasing depression	3.82	.89		
		Improve community awareness or relationships	3.75	.85		
		Increasing interest in improving one's mental health	3.78	.82		
		Increasing interest in the perception of suicide crisis on others	3.57	.82		
	Project operation	Appropriateness of budget execution	3.62	.92	3.49	.85
		Efficiency of project operation	3.45	.97		

Project satisfaction and necessity impact Factors: To identify factors affecting the satisfaction and necessity with the suicide prevention project in this study, the main predictive variables of this study, administration, partnership, goal attainment, and project operation were used as independent variables and stepwise multiple regression was conducted (Table 4). As a result of testing the assumptions of the regression model, the homoscedasticity was found and the Durbin-Watson statistic for the verification of the independence of the residuals was 2.06-2.09, which satisfied the assumption of independence. Also, the normality was verified by showing the normal distribution as a result of examining the P-P plot for the normality test of the error terms. The results of confirming the multicollinearity between the independent variables showed that the variance inflation factor (VIF) was between 2.520 and 2.662 in satisfaction, 2.093-2.990 in necessity so there was no multicollinearity. Therefore, it is believed that this research model has satisfied all assumptions for regression analysis.

The factors affecting the satisfaction of the project were the goal attainment (β*=.355, p=<.001*), project operation (β*=.311, p=<.001*), partnership *(β=.306, p=<.001*), and the most influential variable was the goal attainment of the post-project outcome parts. In other words, the higher the goal attainment and the better the project operation and partnership, the satisfaction with the suicide prevention project has been shown to be

higher. This is explaining 77.0 % of satisfaction with suicide prevention project with the three factors.

Table 4: Factors affecting satisfaction of suicide prevention project

Variables	B	*β*	t	*p*
constant	.237		1.311	.193
goal attainment	.365	*.355*	4.893	<.001
project operation	.281	*.311*	4.112	<.001
partnership	.288	*.306*	4.097	<.001
F=123.73, p<.001, *Adj* R^2=.770				

The factors affecting the necessity of suicide prevention projects were the goal attainment (β=.518, p=<.001), partnership (β=.514, p=<.001), administrative (β=-.145, p=.042), and the most influential variable was the goal attainment among the post-project outcomes. So, the necessity of suicide prevention project was shown as high when the higher the goal, the better the partnership, and the less administrative support. This is explaining 74.0 percent of necessity with suicide prevention project with the three factors(Table 5).

Table 5: Factors affecting necessity of suicide prevention project.

Variables	B	*β*	t	*p*
constant	-.097		-.427	.263
goal attainment	.629	*.518*	7.349	<.001
partnership	.571	*.514*	6.108	<.001
administrative	-.144	*-.145*	-2.056	.042
F=105.09, p<.001, *Adj* R^2=.740				

Discussion

This study attempted to present data on the improvement direction of the 'suicide prevention project' by analyzing factors that affect the satisfaction and necessity of suicide prevention projects conducted in district C. The study found that project operators perceived the need for suicide prevention projects higher than satisfaction. The part with the highest satisfaction among the project satisfactions was about the 'project contents', but the part with the lowest satisfaction was the 'mentoring project', which is because the mentoring project is a way for the general public, not experts, to be mentors and provide one-on-one management of suicide risk groups, so it is believed that the project operators are under pressure to have to monitor several mentors and manage not only the mentor's education but also the response to mentees. In the necessity part, the 'necessity of program' was the highest at 3.85, so it is recognized that the program operated with the village unit needs to be operated continuously. On the other hand, there are various types of projects that are currently operating due to the lowest 'need for the overall project', so it is necessary to strengthen only essential project parts and exclude the area where the burden of other work is increased or supplement it.

The project promotion process shows that 'administrative support' is lower than 'partnership', so it is necessary to present a common resource that can be used as a regional unit so that the limitations of resource utilization in the region can be supplemented and to have a system so that operators can utilize it only. The cost analysis of the budget necessary for the project operation should be supported for the appropriate budget is allocated and performance is shown. Also, the reason why citizens' participatory excellence of the 'partnership' factor has low is that the cooperation and communication of the residents, the rationality of communication and etc may have affected the process[7]so when promoting the project, it is necessary to encourage participation and come up with collaborative measures through meetings and discussions among various officials and residents.

The highest satisfaction among the results after the project can be interpreted as reaching some of the expected effects of the suicide prevention project due to 'improving happiness and decreasing depression after the project'. But the part of 'increasing interest in the perception of suicide crisis on others', which is the lowest satisfaction relatively, is related to the goal in mentoring project or gatekeeper training project, so it is thought that it will need to improve awareness and publicize related to the interest in residents in order to achieve outcome of this part. As the satisfaction with 'efficiency in project operation' is the lowest, measures should be taken to complement the autonomy of budget execution and to increase efficiency in project operation.

The common impact factor on the satisfaction and necessity of the suicide prevention project is goal attainment and partnership, so the appropriate project goal setting before the project and the business contents should be promoted accordingly. Also, it shows the importance of communication and collaboration among the members of the community. Other factors that affect satisfaction are project operations, requiring supplementation to ensure that the budget is properly invested and operated. In necessity, the administrative

shortage has emerged as the major factor, so the allocation of resources to underprivileged areas is necessary. It is expected that it can complement the systematic composition and operation of suicide prevention projects in district C through this study.

Conclusions

As a result,it was found that set realistic project goals and systematic project operation and communication and cooperation among members of the region to achieve it was important to enhance the satisfaction of suicide prevention projects.

Ethical Clearance: Not Required

Source of Funding: Self

Conflict of Interest: Nil

References

1. Korean Statistics Information Service. 2018 e-indicator of province : suicide rate [Internet]. 2018 [cited 2019 Jan 16]. Available from http://kosis.kr/statHtml/statHtml.do?orgId=101 & tblId=DT_1YL21121 & vw_cd=MT_GTITLE01 & list_id=112 & seqNo= & lang_mode=ko & language=kor & obj_var_id= & itm_id= & conn_path=MT_GTITLE01
2. Central Suicide Prevention Center. Analysis of suicide rate in world. Korea Suicide Prevention Center Research Brief; 2018, 3: 1-27.
3. Organization for Economic Cooperation and Development. Suicide rate [Internet]. 2015 [cited 2019 Jan 16]. Available fromhttps://www.oecd-ilibrary.org/social-issues-migration-health/suicide-rates/indicator/english_a82f3459-en
4. Korean Statistics Information Service. e-indicators of provence [Internet]. 2018 [cited 2019 March 3]. Available fromhttp://kosis.kr/statHtml/statHtml.do?orgId=101 & tblId=DT_1YL0000 & vw_cd=MT_GTITLE02 & list_id=35 & seqNo= & lang_mode=ko & language=kor & obj_var_id= & itm_id= & conn_path=MT_GTITLE02
5. Korea Suicide Prevention Center. Korea suicide rate [Internet]. 2018 [cited 2019 March 3]. Available fromhttp://spckorea-stat.or.kr/korea03.do
6. Ministry of Health and Welfare. 2018 Guide book of Mental Health Service.Seoul: MOHW, 2018.
7. Yang JH, Han YS. A study on the evaluation of neighborhood-making projects supported by administration: concentrated on the projects of happy neighborhood making in 2012. Journal of the Regional Association of Architectural Institute of Korea; 2013, 15(3): 101-10.

Effect of an Educational Program on Knowledge and Practices of Alzheimer Patient's Caregivers

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Abstract

Background: Alzheimer disease is a condition that causes abnormal changes in the brain, disturbing memory, and other mental abilities. Currently, over 50 million people worldwide live with Alzheimer disease, which is the most common form of dementia and the fifth leading cause of death.

Objective: The purpose of the current study is to assess the effect of an educational program on knowledge and practices of Alzheimer patient's caregivers.

Design: A quasi-experimental one-group pretest-posttest with three months follow-up design was used.

Setting: the study was conducted in three elderly nursing homes in Amman, Jordan.

Sample: a purposive sample of 50 caregivers from the selected elderly nursing homes were included.

Results: Alzheimer patient's care givers showed a significant gain in knowledge and improved practice after program implementation with highly statistically significant differences between pre, post, and three months at p-value <0.01.

Conclusions: Findings demonstrated that Alzheimer caregivers' education program can effectively provide knowledge and improve practice among caregivers.

Recommendation: Conduct future studies to determine the best method of education and training for Alzheimer patient's caregivers.

Keywords: *Alzheimer disease, Alzheimer caregivers, Educational Program. Alzheimer caregivers' knowledge, Alzheimer caregivers' practice*

Introduction

Alzheimer disease (AD) and other dementias are a global public health concern. Currently, over 50 million people worldwide live with AD, which is the most common form of dementia, and the fifth leading cause of death.[1] AD is a condition that causes abnormal changes in the brain, disturbing memory, and other mental abilities. The standard first symptom of AD is the loss of memory; as the disease progresses, the loss of reasoning, language, decision-making ability, and other critical skills make crossing day living incredible without help from others.[2]

In the Arab region, the percentage of older adults (60 years or more) is projected to climb to 19 % in 2050 compared to 7 % in 2010.[1] The number of older adults is projected to increase from 22 million in 2010 to 103 million by 2050 in Arab countries.[3]Recently, the number

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of Alzheimer patients in the Arab area is increasing due to increased longevity and improvement in the health care system. Nevertheless, the region needs to conduct the policies and educational programs to promote caregivers practices in nursing homes and community, as well as increase the level of awareness about AD.[3]

Caring with AD patients can be demanding, because it is a progressive disease, and caregivers must accept additional responsibilities to provide care, with limited or no training. Alzheimer Association(2017)reported that everyday caregiving tasks include instrumental activities of daily living, such as household tasks, finances, and medication management, in addition to basic activities of daily living, such as bathing, grooming, dressing, Toileting and eating. Moreover, inadequate education and challenging work environments contributed to higher turnover rates. Alzheimer Disease facts and figures(2018)reported that training programs to improve the quality of Alzheimer care in nursing homes and hospitals have positive benefits and recommended that the content of educational programs should focus more on knowledge and skills related to caring for individuals with Alzheimer and other dementias.

In Jordan, according to the Department of Statistics (2017), the percentage of population Age 65+ years is 3.7%. Furthermore, the percentage of older adults (60+) will be increasing over the coming years to a projected rate of 8.6% by the end of 2030 and 15.8% by the end of 2050.[7] Although the number of elderlies is increasing in Jordan, there is no precise estimate of AD, none of the health authorities release community figures on the numbers of people with AD.[1] Nevertheless, according to the report of the National Centre for Human Rightsin Jordan (2017), there are no specific qualifications of caregivers, and most of them do not have any qualifications to work in the elderly homes. Hence, the role of a community health nurse is essential in assisting the caregivers of Alzheimer patients in providing proper care for these patientsand maintain the Alzheimer patients independent in everyday life as possible.

Aim of the Study: the current study aims to assess the effect of an educational program on knowledge and practices of Alzheimer patient's caregivers.

Research Hypothesis: Caregivers' knowledge will be increased, and reported practices will be improved after the implementation of the educational program.

Material and Method

Design: A quasi-experimental one-group pretest-posttest with three months follow-up design was used

Setting: This study was conducted in three elderly homes in Amman, Jordan. These homes were selected randomly.

Sampling: A purposive sample of 50 caregivers from elderly homes who fulfilled the inclusion criteria were included in the study. Inclusion criteria required participants to be working for at least 8 hours per day, five days per week, with at least three months' experience in their job. The data was collected within five months, from January 2019 to May 2019.

Tools and Data Collection: Data of this study was collected through Alzheimer Caregivers' knowledge and reported practices questionnaire, which was developed by the researcher based on an extensive review of national and international literature to assess Alzheimer caregivers' knowledge and reported practices. It consists of three parts:

Part I: It includes Five questions related to demographic characteristics of caregivers of Alzheimer patients related to gender, age, education level, experience and previous training about Alzheimer.

Part II: This part includes 40 questions to assess Alzheimer patient's caregivers' knowledge related to definition and risk factors, stages, symptoms, and method of treatment and care. Each question has a three-point Likert scale with responses choices ranging between: Agree (2),Disagree (1),I don't know (0). Caregivers who got< 50% were considered as having poor knowledge, while those who got from 50 to < 70%, were considered as having fair knowledge, and those who got >70% were considered as having good knowledge, the questionnaire used before, immediately, and three months after the implementation of the program.

Part III: This part aims to assess the reported practice of Alzheimer patient's caregivers. It includes 46 questions in six subscales: bathing, dressing,grooming, toileting, feeding, and communication. Each question has three points Likert scale with response choices ranging between: Agree (2)Disagree (1), I don't know (0). Caregivers who got < 50% were considered as having poor practice, while those who got from 50 to < 70%

were considered as having satisfactory practice, andthose who got >70% were considered as having a good practice, the questionnaire was used before, immediately, and three months after the implementation of the program.

Validity & Reliability: Five experts from the community health nursing department, Cairo university were asked to check the tools for content validity, including clarity, wording, format, and overall appearance of the tools. Modifications were made according to the panel judges.The tool was tested for reliability using Cronbach's Alpha 0.76

Data Collection: Datacollected for the study before theeducational programimplementation, all caregivers completed informed consent, demographic characteristics, then the pretest conducted for assessment of the knowledge, and reportedpracticesof caregivers. Posttest had conducted immediately and three months after the educational program implementation for all caregivers.

The time spent to fill the questionnaires ranged between 10-15minutes (pre and posttest).The program was implemented separately in each elderly home. The study sample was divided into three groups based on the availability of the caregivers, with the mean of 6 caregivers in each group. The duration of each session was about 30 minutes.Teaching method and media included weregroup discussions, videos, case scenarios, andpower point presentations. The program was implemented on 6 sessions from the first of January 2019 to the end of January 2019

Data Analysis: Statistical Package for the Social Sciences (SPSS)program, version 20. Numerical data were expressed as means and standard deviations. Quantitative data were expressed as frequencies and percentages. Comparison between pretest, posttest, and 3 months follow up test was done by using t-test and ANOVA

Result

Table 1: Mean scores of Alzheimer patient'scaregivers' knowledge pre- post and three months after implementation of the education program(n=50).

Knowledge items	Pre-program		Post-program		3 months later (Follow up)		F test
	Mean	SD	Mean	SD	Mean	SD	P-value
Disease definition & risk factors	8.14	3.69	15.70	3.48	14.98	3.21	107.17
							.000**
Disease stages	8.58	2.98	11.76	2.20	10.98	1.83	25.09
							.000**
Signs and symptoms	14.32	5.08	18.70	5.54	18.20	3.91	16.72
							.000**
Method of treatment and care	12.98	3.90	20.36	4.25	18.08	3.81	80.793
							.000**
Total score	44.02	12.21	66.52	13.71	62.24	10.04	95.58
							.000**

F test = repeated measures ANOVA ** statistically highly significant value p<.01

Table (1)reveals that knowledge means cores increased in the post, and 3 months after the program implementation,with highly statistically significant relationship among them, (p=.000).

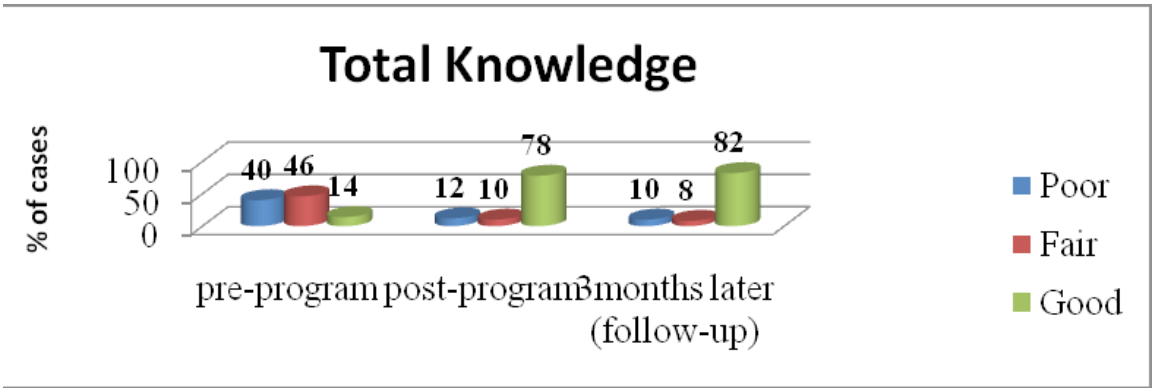

Figure (1): Percentage distribution of Alzheimer patient's caregivers' level of knowledge scores before and after program implementation and 3 months later (n=50).

Table 2: Mean scores of Alzheimer patient's caregivers' reported practice pre-post and three months after implementation of the education program(n=50).

Reported practice Items	Pre-program		Post-program		3months later (Follow up)		F test
	Mean	SD	Mean	SD	Mean	SD	P-value
Bathing	8.92	2.776	12.16	2.582	12.02	2.045	42.377
							.000**
Dressing	8.54	2.525	11.64	2.848	11.46	2.224	29.884
							.000**
Grooming	9.72	2.365	11.96	2.539	11.62	2.165	17.517
							.000**
Toileting	8.16	2.958	11.72	2.770	10.98	1.790	37.178
							.000**
Feeding	8.50	2.750	12.28	2.322	11.50	2.341	35.287
							.000**
Communication	12.12	4.322	18.24	4.601	17.38	3.933	31.758
							.000**
Total score	55.96	12.60	78.00	15.84	74.96	11.58	56.87
							.000**

F test = repeated measures ANOVA ** statistically highly significant valuep<.01

Table (2) reveals that reported practice mean scores increased in the post, and 3 months after the program implementation, with highly statistically significant relationship among them. (p =.000).

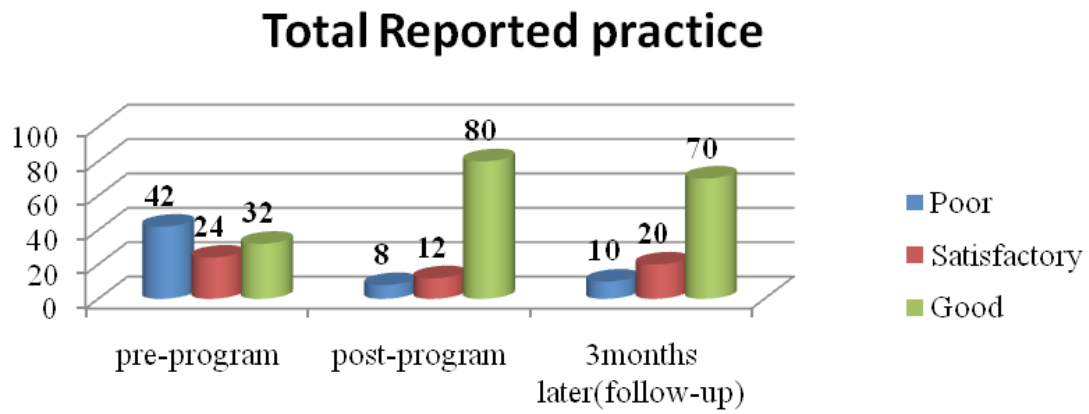

Figure (2): Percentage distribution of Alzheimer patient'scaregivers' level of reported practice scores before and after program implementation and 3 months later (n=50)

Discussion

Caregivers in a nursing home have to face the unique features of Alzheimer disease, such as impaired communication, disorientation, confusion, and behavioral changes, and required training to increase their understanding of caregiving. The need for sufficient training for caregivers working with Alzheimer patients has been identified in the literature to understand the disease betterand improve practice among caregivers.[9] Discussion of the study findings are categorized under thefollowing parts:

First part: Assessment of the Alzheimer patient's caregivers'knowledge pre/post and three months after education program implementation:

Regarding the knowledge of Alzheimer patient's caregivers in the present study, more than three- quarters of caregivers had a good level of knowledge immediately and three months after program implementation (Figure1), with a statistically significant difference of caregivers'knowledge scores before, immediately and three months later(Table1). This improvement in caregivers' knowledge may be due to the effect of the education program on caregivers, which indicates the effectiveness of the program. This result is in agreement with a study conducted by Yusoff et al.[10], Malysia, who found a significant improvement in knowledge about dementia and its management among health care staff post-trainingprogram.Also, the previous result is supported byEl-Kattan et al.[11], Cairo, who revealed that there was a significant improvement in knowledge among formalcaregivers after the training program. Such similarities in the results suggested that education and training programs for Alzheimer patient's caregivers in nursing homes had a positive effect on their knowledge related to Alzheimer disease.

Second Part: Assessment of Alzheimer patient's caregiversreported practices pre/post and three months of education program implementation:

More than three-quarters of the caregivers had a good level of reported practice immediately and three months after program implementation (Figure2), with a statistically significant difference before, immediately, and three months later (Table2). This improvement in caregivers' practice may be dueto the positive effect of the program, which improved caregivers'practices immediately and 3months after the program.This result iscompatible with a study conducted by El-Kattan et al.[11],Cairo, who indicated that highly statistically significant improvement amongcaregivers practices level after the training program.Moreover, the result is in agreement with astudy conducted by Dobbs et al.[9], USA, who found thatthenursing home staff gained more confidence in caring for dementia patients after a training program. These similarities in results suggest thatnursing home policies should focus on providing training and supporting programs for Alzheimer patient's caregivers to enable them to provide proper care.Finally, the results of this study justified the hypothesisthat caregivers' knowledge increased, and reported practice improved after implementation of the educational program.

Conclusion

Based on the study results, it can be concludedthat knowledgeand reported practices of Alzheimer caregivers had been improved after program implementationwithstatically significance differences between pre, post, and three months later.

Recommendation: According to the result, the following recommendations are suggested:

-Conducting continuing education programsfor Alzheimer caregivers in the nursing homes to promote their knowledge and practicesand evaluate these programs to stand upon deficiencies and priorities that need improvements.

-Conduct future studies to determine the best method of education and training for Alzheimer patients' caregivers.

Ethicalconsideration: The researcher emphasized that participation in the study was entirely voluntary, written informed consent was obtained from each participant, after explanation of the study objectives and procedures. Anonymity and confidentiality were assured. Participants were assured that all data would not be reused in another research without taking the permission of the participants.

Source of Support: Self

Conflict of Interest: None

References

1. Hodson R. Alzheimer's Disease. Nature. 2018;559(7715).
2. United Nations. Ageing in ESCWA Member States: Third Review and Appraisal of the Madrid International Plan of Action on Ageing. Beirut. 2017;
3. Yaghmour SM, Bartlett R, Brannelly T. Dementia in Eastern Mediterranean countries: A systematic review. Dementia [Internet]. 2018;0(0):1–27. Available from: journals.sagepub.com/home/dem
4. Alzheimer's Association. Alzheimer's Disease Facts and Figures. Alzheimers Dement [Internet]. 2017;13:325–73. Available from: https://www.alz.org/documents_custom/2017-facts-and-figures.pdf
5. Alzheimer's Association. Alzheimer's Disease Facts and Figures. Alzheimers Dement. 2018;14(3):367–429.
6. Department of Statistics J. Jordan in Figures [Internet]. 2017. Available from: http://dosweb.dos.gov.jo/ar/products/statistical-yearbook2017
7. Help Age International. Help age International. 2015; Available from: http://www.helpage.org/global-agewatch/population-ageing-data/country-ageing-data/?country=Jordan
8. The National Centre for Human Rights. Second Peridoic Report on the status of eldrly rights in Jordan. Jordan. 2017;
9. Dobbs D, Hobday J, Roker R, Kaas MJ, Ph D, Molinari V, et al. Certi fi ed nursing assistants' perspectives of the CARES activities of daily living dementia care program. Appl Nurs Res [Internet]. 2019;39(January 2017):244–8. Available from: https://doi.org/10.1016/j.apnr.2017.11.016
10. Yusoff S, Koh C, Aminuddin MM, Krishnasamy M, Suhaila M. Initial Evaluation of the Training Programme for Health Care Professionals on the use of Malaysian Clinical Practice Guidelines for Management of Dementia. East Asian Arch Psychiatry. 2013; 23:91–102.
11. El-kattan BAE, El-afandy AMO, El-fatah WOA. Training of Formal Caregivers Dealing with Alzheimer Diseased Patients at Helwan City Cairo Egypt. Am J Nurs Sci. 2017;6(3):146–58.ults

To Evaluate the Correlation of Stature with Hand & Foot Width in Subjects

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Abstract

Background: Estimation of stature by different method has a significant importance in the field of forensic investigations. The present study was conducted to assess correlation of hand and foot width with stature.

Materials and Method: The present study was conducted on 185 students of both genders. Stature was measured as vertical distance from vertex to the floor in mid-sagittal plane. Hand width was measured from base of 5th to 2nd metacarpal using a standard vernier caliper. Foot width was measured from base of 1st to 5th metatarsal using standard vernier caliper.

Results: The mean height of males was 176.2 cm and in females was 158.4 cm. The difference was significant ($P< 0.05$). The mean right hand width in males was 7.6 cm and in females was 6.5 cm, left hand width in males was 7.4 cm and in females was 6.2 cm. The difference was significant ($P< 0.05$). The mean right foot width in males was 8.7 cm and in females was 8.1 cm, left foot width in males was 8.3 cm and in females was 7.6 cm. The difference was significant ($P< 0.05$).

Conclusion: Authors found that there was positive correlation of stature with hand and foot width in subjects.

Keywords: *Hand, Foot, Stature*

Introduction

Estimation of stature has a significant importance in the field of forensic anthropometry.[1] Establishing the identity of an individual from mutilated, decomposed, & amputed body fragments has become an important necessity in recent times due to natural disasters like earthquakes, tsunamis, cyclones, floods, man-made disasters like terror attacks, bomb blasts, mass accidents, wars, plane crashes etc and homicides. It is important both for legal & humanitarian reasons. Stature is one of the most important elements in the identification of an individual.[2,3]

Hand Length (HL) and Hand Breadth (HB) have been extensively used in research to estimate stature of individuals for identification and have received scant attention from forensic anthropologists. This is due to the established strong correlation between stature and hand dimension.[4]

Literature review suggests that many studies have been undertaken to demonstrate that it is possible to calculate stature through regression equation from hand length & hand breadth. Amirsheybani, et al[5] demonstrated hand length as good predictor of body surface area. Thus it can be extracted that relationship of hand length & hand breadth with various measurements

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of the human body have been studied but none of the studies provide information regarding the correlation between two of them. The present study was conducted to assess correlation of hand and foot width with stature.

Materials and Method

The present study was conducted in the department of Anatomy in MGM Medical College, Aurangabad. It comprised of 185 students of both genders. Ethical approval was obtained from institutional ethical committee prior to the study.All patients were informed regarding the study and written consent was obtained.

General information such as name, age, sex etc. was recorded. A thorough physical examination was performed in all subjects.

Stature was measured as vertical distance from vertex to the floor in mid-sagittalplane. Hand width was measured from base of 5th to 2nd metacarpal using a standard vernier caliper.Foot Width was measured from base of 1st to 5th metatarsal using standard vernier caliper. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table I: Assessment of height of subjects

Height (cm)	Mean	DF	Mean square	F	Sign.
Male	176.2	1	8523.4	176.2	0.001
Female	158.4				

Table Ishows that mean height of males was 176.2 cm and in females was 158.4 cm. The difference was significant (P< 0.05).

Table II: Assessment of hand width of subjects

Width (cm)	Right	Left	DF	Mean square	F	Sign.
Male	7.6	7.4	1	8511.2	162.9	0.001
Female	6.5	6.2				

Table IIshows that mean right hand width in males was 7.6 cm and in females was 6.5 cm, left hand width in males was 7.4 cm and in females was 6.2 cm. The difference was significant (P< 0.05).

Table III: Assessment of foot width of subjects

Width (cm)	Right	Left	DF	Mean square	F	Sign.
Male	8.7	8.3	1	8586.2	171.1	0.001
Female	8.1	7.6				

Table IIIshows that mean right foot width in males was 8.7 cm and in females was 8.1 cm, left foot width in males was 8.3 cm and in females was 7.6 cm. The difference was significant (P< 0.05).

Table IV: Correlation of stature with hand and foot width of subjects

Pair	r	P
Stature & Hand width	0.726	0.02
Stature & foot width	0.681	0.01

Table IV shows positive correlation of stature with hand and foot width. The difference was significant (P< 0.05).

Discussion

Hand length and hand breadth has been studied extensively in relation to various body measurements but the correlation between these two variables has not yet been studied.[6] It is well established that bilateral symmetry exist in human population i.e. the difference between the measurements of the left and right side of the human body thus standard range was predicted for both the sides of the hand. Many different body parts can be used in the estimation of stature.[7]Certainlong bones & appendages can be aptly used in the calculation of height of a person. Many studies have shown the correlation of stature with body appendages & with long bones. But there are inter-racial & inter-geographical differences in measurements & their correlation with stature. What may be true for one race or one region may not be true for the other.[8]Present study was conducted to assess correlation of hand and foot width with stature.

In present study mean height of males was 176.2 cm and in females was 158.4 cm. The mean right hand width in males was 7.6 cm and in females was 6.5 cm, left hand width in males was 7.4 cm and in females was 6.2 cm.Sanli et al[9]evaluated a possible correlation between stature of an individual & six parameters; hand-length, hand-width, foot-length, foot-width, forearm length & knee-to-ankle length individually in a local population. A sample of 300 medical students; 147 male

& 153 female was considered & measurements were taken for each of the parameters. It was found that all the six parameters showed a correlation with stature but at different degrees (significance calculated through the paired t-test). Forearm-length showed the highest degree of correlation (r = 0.6558) followed by foot-length (r = 0.6102). Knee-to-ankle length showed the lowest degree of correlation (r = 0.2086). Mathematical formulae for estimating stature were developed for each of these parameters through basic linear regression.

We found that mean right foot width in males was 8.7 cm and in females was 8.1 cm, left foot width in males was 8.3 cm and in females was 7.6 cm. There was positive correlation of stature with hand and foot width. Manoonpol et al[10] in their study two hundred subjects comprising of 100 males and 100 females in 20-30 years age group were included. Dimensions of hands and feet viz: hand length, hand breadth, foot length and foot breadth were measured independently on left and right side of each individual using a sliding caliper. Stature of individuals was measured with the help of a stadiometer. Statistical analysis indicated that the bilateral variations were insignificant for all the measurements except foot breadth among females ($p<0.001$). The paired sample t-test showed that the statistical difference between males and females was highly significant for all the measurements ($p<0.001$). The correlation between the stature and various parameters studied in males and females were found to be positive and statistically highly significant. Linear and multiple regression equation for stature estimation were calculated separately for males and females.

Conclusion

Authors found that there was positive correlation of stature with hand and foot width in subjects.

Conflicts of Interest: The authordeclare that there is no conflict of interest regarding the publication of this paper.

Source of Funding: Self

Ethical Clearance: Ethical clearance has been taken from Institutional Ethical Committee

References

1. Dayal MR, Steyn M, Kuykendall KL. Stature estimation from bones of South African Whites. South African Journal of Sciences. 2008;104:124-28.
2. Philip TA. Formulae for estimating stature from foot size by regression method. Journal of Indian Academy Forensic Medicine. 1990;12(2):57-62.
3. Saxena SK. A study of correlation and estimation of stature from hand length, hand breadth and sole length. AnthropolAnz. 1984;42:271-76.
4. Robbins LM. Estimating height and weight from size of footprints. Journal of Forensic Science. 1986; 31:143-52.
5. Philip TA. Footsize for predicting stature of males. Journal of Indian Academy of Forensic Science. 1988; 27:30-39.
6. Giles E, Vallandigham PH. Height estimation from foot and shoeprint length. Journal of Forensic Science. 1991;36:1134-51.
7. Ozaslan A, Iscan MY, Ozaslan I, Tugcu H, Koç S. Estimation of stature from body parts. Forensic Sci Int. 2003;132(1):40-45.
8. Jasuja OP, Singh G. Estimation of stature from hand and phalange length. Journal of Indian Academy of Forensic Medicine. 2004; 26:100-06.
9. Sanli SG, Kizilkanat ED, Boyan N, Ozsahin ET, Bozkir MG, Soames R, et al. Stature estimation based on hand length and foot length. Clinical Anatomy. 2005;18:589-96.
10. Manoonpol C, Sricharoenvej S, Soparat K, Saelim K. Correlation and estimation of stature from foot size of Thai adults. Siriraj Medical Journal. 2005;57:1-10.

Health Risk Assessment on the Glyphosate Exposure of Knapsack Sprayers

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Abstract

Context: Herbicide poisoning has been increasing among agriculturists in the northeast of Thailand. The aim of this cross-sectional study was to assess the health risk of glyphosate exposure among knapsack sprayers. A health risk assessment matrix was applied to 243 sprayers by considering the extent of glyphosate exposure per year according to the actual amount of glyphosate (48 %w/v) dispensed and frequency of exposure. In addition, use of personal protective equipment (PPE) was taken into account. The second component of the risk matrix was the severity of the recorded adverse effects in the same group. The results revealed that 76.95% of sprayers were slightly exposed (100 to 499 milliliters of glyphosate used per year) and 57.20% wore at least four types of protection, comprised from any of the following types: gloves, mask, boots, trousers, long-sleeved shirt, and others. A majority had a slight likelihood of glyphosate exposure (69.14%) and a minority experienced a mild level of adverse symptoms (17.28%), including rash, dizziness and headache. Some sprayers (36.20%) had a health risk of glyphosate exposure higher than an acceptable level, which might explain the adverse health effects of long-term exposure. This health risk assessment tool combined with PPE usage of a herbicide applicator would be useful for the health surveillance program.

Keywords: *Glyphosate, Health risk assessment, PPE, Sprayer*

Introduction

Health effects from the application of herbicide is a current problem among Thailand's farmers. From 2011-2017, herbicide was the most imported of all pesticides used for agriculture; the highest quantity and value of herbicide was reported in 2017 by the Office of Agricultural Data. Glyphosate is widely known and is a herbicide intensively used by farmers to control weeds and to increase production. The highest amount of glyphosate-isopropylammonium was imported in 2018 and its use is likely to increase further[1,2].

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Generally, glyphosate is considered to be a non-selective herbicide. The commercial formulations of glyphosate contain surfactants that vary in nature and concentrations that increase pure glyphosate toxicity, and are known by a variety of names[3]. Glyphosate toxicity inhibits cytochrome P450 (CYP) enzymes in mammals, and could be a factor in the following diseases: obesity, depression, autism, Alzheimer's disease, Parkinson's disease, multiple sclerosis, cancer, cachexia, infertility and malformation development[4].

Hence, the International Agency for Research on Cancer (IARC) determined that glyphosate was probably carcinogenic to humans (group 2A), and the case control studies of occupational exposure in the USA, Canada and Sweden showed an increased risk of non-Hodgkin's lymphoma[5]. Occupational exposure to glyphosate was associated with a high risk of cutaneous melanoma[6].

Although pure glyphosate probably has low toxicity, it is increased by the volume of surfactants in

formulations marketed for domestic use. Consequently, farmers are occasionally exposed to glyphosate formulations more than in other careers while working on mixing and loading applications, and other processes. In France, detected glyphosate reached a peak of 9.5 μg/L in the urine samples of farmers who sprayed glyphosate[7]. The highest concentration of atmospheric glyphosate (42.96 $\mu g/m^3$) was measured in the air of the operator's breathing zone[8]. Therefore, workers exposed to glyphosate though the inhalation route excreted glyphosate in the urine. Reported cases of the toxic effects of pesticides from 2007-2013 were found predominantly in the northeastern region of Thailand[9].

Thailand's farmers' attitudes toward pesticide knowledge, behaviors using pesticides, and use of personal protective equipment (PPE) have been unsafe with regard to occupational practices of pesticide use[10]. Health risk behaviors regarding agrochemical use have been a lack of attention to safety precautions and the use of inappropriate protective equipment[11]. Currently, there are no glyphosate regulations or standards in occupational health and safety, which is concerning with regard to the health effects on farmers exposed to glyphosate. Hence, the aim of this study was to apply a health risk assessment matrix by considering the likelihood of glyphosate exposure combined with personal protective equipment (PPE) use behavior and adverse effects to predict farmers' risk and create guidelines for health surveillance.

Material and Method

Data Collection: The study was designed as a cross-sectional study and carried out from November to December 2019; the sample was chosen from 487 farmers who performed pesticide application and whose information was in the Nampong district office of Public Health record. From these farmers, 243 farmers were eventually chosen to be included in the study; this number was calculated under the known number of population in a small size[12], and by using a previous finding of proportion of glyphosate detection in urine of 0.60[13]. Data was collected by using a questionnaire on personal data, health effects, application information and personal protection equipment. The second tool was an applied risk matrix for health risk assessment, which consisted of two parts: likelihood of glyphosate exposure and severity of subsequent symptoms from exposure to glyphosate. The section on PPE use was an additional component used to assess any decrease in the likelihood of exposure[14].

Health Risk Assessment Tool: In the present study, the likelihood of glyphosate exposure (amount of pure glyphosate multiplied by spraying frequency per year) was divided into four levels of scoring according to the quantity of glyphosate applied per year: score of 1: below 100 milliliters; score of 2: 100-499 liters; score of 3: 500-1000 milliliters; and a score of 4: above 1000 milliliters. PPE use behavior was classified as one of four scores: score of 0: wearing at least four types of PPE comprised from rubber gloves, N95 /carbon mask, boots, trousers, long-sleeved shirt or others; score of 1: wearing at least four types of PPE comprised from any type of gloves, mask, boots, trousers, long-sleeved shirt or others; score of 2: at least three types of PPE comprised from any type of gloves, mask, boots, trousers, long-sleeved shirt or others; and score of 3: at least two types of PPE comprised from any type of gloves, mask or others. Therefore, four levels of likelihood of glyphosate exposure according to quantity of glyphosate applied and use of PPE were calculated by using a behaviour score combination as follows: level 1 is a low likelihood of exposure (score: 1-2), level 2 is a slight likelihood of exposure (score: 3-4), level 3 is a moderate likelihood of exposure (score: 5-6) and level 4 is a high likelihood of exposure (score: 7).

Severity of glyphosate toxicity experienced six months after application was assessed by using a symptom questionnaire which looked at the adverse health effects according to four criteria: level 1 is no symptoms expressed, level 2 is mild symptoms (headache, dizziness, rash, cough, numbness, stuffy nose, sore throat, hand irration, itchy skin, drowsiness, fatigue and xerostomia), level 3 is moderate symptoms (nausea, vomiting, chest pain, oliguria, skin burning, burning-stinging-itchy eyes, eczema, blurred vision, exfoliation and diarrhea) and level 4 is severe symptoms (wheezing, hematemesis, kidney failure, pneumonia, shock and syncope). Finally, the likelihood and severity of glyphosate exposure scores were applied in the health risk assessment matrix[14], in which four resulting risk levels were calculated: level 1 is acceptable risk (score: 1-2), level 2 is low risk (score: 3-4), level 3 is medium risk (score: 6-9) and level 4 is high risk (score:12-16).

Results

The results revealed that a majority of the 243 farmers (88.07%) were male. The participants' ages

ranged from 50 to 69 years old, with an average age of 53.0±9.19 years. A majority of farmers (73.25%) had completed primary school and 45.68% of participants had an average income of about 50,855 baht per year. The farmers' glyphosate spraying experience was divided into periods of 5 to 10 years (43.62%), 11 to 20 years (25.93%), less than 5 years (18.11%) and more than 20 years (12.35%). The percentage of farmers who sprayed glyphosate as non-employees was 69.14%, while 28.40% sprayed as both non-employees and employees and 12.35% sprayed only as employees. Approximately 60.49% of farmers had a frequency of exposure which was below five times per year, with an average frequency of 9.64 times per year.

Glyphosate exposure according to application amount and PPE use: The majority of farmers who participated in this study (76.95%) had an applied glyphosate (48%w/v) amount per year resulting in a score of 2, while a minority had an applied amount resulting in a score of 3 and a score of 1, respectively, as shown in Table 1.

Table 1: Glyphosate amount exposed to from application (quantity per year)

Score	Glyphosate exposure (milliliters)	Number (%)
1	< 100	19(7.82)
2	100-499	187(76.95)
3	500-1000	30(12.35)
4	>1000	7(2.88)

The PPE that was most widely worn was a combination of four types of PPE, from any type of gloves, mask, boots, trousers, long-sleeved shirt or others, worn by 57.20% of farmers, while overall, the best combination tended to be one comprised from rubber gloves, N95 /carbon mask, boots, trousers, long-sleeved shirt and others, worn by 5.76% of farmers, as shown in Table 2.

Table 2: Personal protective equipment usage behavior

Score	PPE usage	Number(%)
0	at least four types of PPE comprised of rubber gloves, N95 / carbon mask, and two other types	14(5.76)
1	at least four types of PPE comprised of any type of gloves and three other types	139(57.20)
2	at least three types of PPE comprised of any type of gloves and two other types	42(17.28)
3	at least two types of PPE comprised of any type of gloves, mask or others	48(19.75)

Health risk Assessment: The participants were assessed with regards to the likelihood of glyphosate exposure according to quantity of glyphosate applied combined with PPE use. Accordingly, the likelihood of glyphosate exposure was found to be slight in 69.14% of cases, moderate in 20.99% of cases, and low in 9.05% of cases, as shown in Table 3.

Table 3: Likelihood of exposure according to quantity of glyphosate used and PPE

Likelihood	Number(%)
Low	22(9.05)
Slight	168(69.14)
Moderate	51(20.99)
High	2(0.82)

The severity of health adverse effects with regard to symptoms associated with glyphosate usage was assessed by using a questionnaire, and it was found that 186 (76.54%) of the farmers had a history of glyphosate exposure but no signs or symptoms of poisoning. The other 42 (17.28%) farmers had mild symptoms, of which the three main symptoms expressed were rash (9.47%), dizziness (8.23%) and headache (7.82%), while the most reported moderate symptom was burning-stinging-itchy eyes (4.12%), as shown in Table 4.

Table 4: Severity of adverse symptoms among sprayers

Mild symptom	Number(%)	Moderate symptom	Number(%)
Headache	19(7.82)	Nausea	2(0.82)
Dizziness	20(8.23)	Vomiting	3(1.23)
Rash	23(9.47)	Oliguria	1(0.41)
Cough	7(2.88)	Skin burning	3(1.23)

Mild symptom	Number(%)	Moderate symptom	Number(%)
Numbness	2(0.82)	Burning-stinging-itchy eyes	10(4.12)
Stuffy nose	14(5.76)	Eczema	3(1.23)
Sore throat	1(0.41)	Exfoliation	1(0.41)
Hand irritation	1(0.41)	Diarrhea	2(0.82)
Itchy skin	1(0.41)		
Drowsiness	1(0.41)		
Fatigue	1(0.41)		
Xerostomia	1(0.41)		

Therefore, 155 (63.79%) of the participating farmers had an acceptable level of risk, 25.51% had a low level of risk, 10.70% had a medium level of risk and no farmers were found to have a high level of risk in the present study, according to the matrix in which health risk assessment was combined with personal protective equipment usage (PPE), as shown in Table 5.

Table 5: Matrix of health risk assessment combined with PPE usage among sprayers

Severity of symptoms	Likelihood of exposure; number(%)				Risk		
	Low(1)	Slight(2)	Moderate(3)	High(4)	Score	Risk	Level
Severe(4)	0	0	0	0	12-16	High	4
Moderate(3)	1(0.41)	8(3.29)	6(2.47)	0	6-9	Medium	3
Mild(2)	4(1.65)	26(10.69)	12(4.94)	0	3-4	Low	2
None(1)	17(6.99)	134(55.15)	33(13.58)	2(0.82)	1-2	Acceptable	1

Discussion

Farmers mix amounts of pure glyphosate (48% w/v) which are quite low in knapsack containers. Most farmers use backpack sprayers with a volume capacity of 10 to 20 liters[15]. More than half of the farmers in the present study had a spraying frequency of less than five times per year, probably resulting in a low level of annual exposure among the participants. More than half of the farmers exhibited good behavior with regard to PPE usage, which agreed with a study in eastern Thailand which reported that 80% of farmers had a high level of self-protection by wearing mask, glasses, rubber gloves, trousers, long-sleeved shirt, boots and hat while spraying[16]. In northern Thailand, farmers who applied herbicide did not use PPE such as gloves, mask and goggles all the time, while some farmers also used them improperly and lacked attention with regard to protective equipment[17,18]. In one Thai study, it was found that less than half of the Thai farmers knew that they should use PPE while spraying[19], while the study also reported that almost half of the farmers exhibited unsafe behavior in the use of PPE[20]. While spraying, workers either did not have access to a filter mask or did not want to wear it in hot weather conditions, indicating use was unbearable[21]. In our study, about one fifth of the farmers exhibited improper usage of PPE, which led to an increased likelihood of glyphosate exposure.

In northern Thailand, another study found that the highest percentage of farmers with health effects were those who exhibited mild symptoms of headache, dizziness and rash or roseola symptoms after pesticide application[22]. This study found that farmers expressed burning-stinging-itchy eyes and skin burning as per previous reports[23].

In this study, the fact that severe symptoms were not found may be since pure glyphosate has very low toxicity to humans in short-term exposure. However, acute effects caused by glyphosate have been reported, such as drowsiness, vomiting, sore throat and an alert mental state which may result in suicide attempts and accidents[24].

In the present study, a health risk assessment combined with PPE usage showed that some sprayers were at risk of long-term adverse health effects. The sprayers had a low to medium level of health risk according to actual amounts of glyphosate dispensed,

frequency of exposure, and behavior in the use of PPE. Therefore, primary health care centers should be able to assess the health risks of herbicide application among farmers through health surveillance programs.

Conclusion

Conflict of Interest: There is no conflict of interest in this paper.

Source of Funding: This research was funded by the Graduate School (no. 601H110), Khon Kaen University.

Ethical Clearance: The study received ethical approval from the Khon Kaen University ethics committee in human research, Khon Kaen University (HE 612297).

References

1 Benbrook MC. Trends in glyphosate herbicide use in the United States and globally. Environ Sci Eur. 2016; 28(3):1-15.

2 Conrada A, Schröter-Kermani C, Hoppe HW, Rüther M, Pieper S, Kolossa-Gehring M. Glyphosate in German adults – Time trend (2001 to 2015) of human exposure to a widely used herbicide. Int J Hyg Environ Health. 2017; 220(1):8-16.

3 Bradberry MS, Proudfoot TA, Vale AJ. Glyphosate Poisoning. Toxicol Rev. 2004; 23(3):159-167.

4 Samsel A, Seneff S. Glyphosate's Suppression of Cytochrome P450 Enzymes and Amino Acid Biosynthesis by the Gut Microbiome: Pathways to Modern Diseases. Entropy. 2013;15:1416-1463.

5 Quarles W. Glyphosate Toxicity—Smoke or Fire. the IPM Practitioner. 2016;XXXV (5/6):1-7.

6 Fortes C, Mastroeni S, Segatto MM, Hohmann C, Miligi L, Bakos L, et al. Occupational exposure to pesticides with occupational sun exposure increases the risk of cutaneous melanoma. JOEM. 2016;58(4):370-375.

7 Mesnage R, Moesch C, Grand RLG, Lauthier G, Vendômois JSD, Gress S, et al. Glyphosate exposure in a farmer's family. JEP. 2012;3:1001-1003.

8 Morshed MMD, Omar D, Mohamad BR, Wahed BAbdS. Determination of glyphosate through passive and active sampling method in a treated field atmosphere. Afr J Agric Res. 2011;6(17):4010-4018.

9 Tawatsin A, Thavara U, Siriyasatien P. Pesticides used in thailand and toxic effects to human health. MRA. 2015;3:1-10.

10 Sapbamrer R. Pesticide Use, Poisoning, and Knowledge and Unsafe Occupational Practices in Thailand. New Solut. 2018; 28(2):283–302.

11 Kaewboonchoo O, Kongtip P, Woskie S. Occupational Health and Safety for Agricultural Workers in Thailand: Gaps and Recommendations, with a Focus on Pesticide Use. New Solut. 2015; 25(1):102–120.

12 Sarakarn P. Fundamentals of biostatistics and data analysis : STATA10. 1th ed. Khon Kaen: Khon Kaen University presses; 2015.

13 Acquavella FJ, Alexander HB, Mandel SJ, Gustin C, Baker B, Chapman P, et al. Glyphosate Biomonitoring for Farmers and Their Families: Results from the Farm Family Exposure Study. Environ Health Perspect. 2004;112(3):321-326.

14 Chaiklieng S. Health surveillance at workplace. 1th ed. Khon Kaen: Khon Kaen University presses; 2019.

15 Toe MA, Ouedraogo M, Ouedraogo R, Ilboudo S, Guissou IP. Pilot study on agricultural pesticide poisoning in Burkina Faso. Interdiscip Toxicol. 2013;6(4):185–191.

16 Thongtummachart N, Buayen S, Sawornkiattikul D. Evaluation and comparison of self-protection behaviors of farmers on pesticides usage in eastern provinces of Thailand. Journal of Health Science. 2018; 27(3):433-442.

17 Wongwichit D, Siriwong W, Robson GM. Herbicide Exposure to Maize Farmers in Northern Thailand:Knowledge, Attitude, and Practices. J. Med. Med. Sci. 2012;3(1):34-38.

18 Raksanam B, Suklim N, Songthap A. Model development to reduce pesticide risk behaviors among rubber farmers in Khogyang Community, Trang, Thailand. European Journal of Research on Education. 2014; 2(2):101-108.

19 Norkaewl S, Siriwongl W, Siripattanakul S, Robson M. Knowledge, attitude, and practice(KAP) of using personal protective equipment (PPE) for chilli-growing farmers in huarua a sub-district, mueang district, ubonrachathani province, Thailand. J Health Res. 2010; 24(suppl 2):93-100.

20 Rezaei R, Damalas AC, Abdollahzadeh G. Understanding farmers' safety behaviour towards

pesticide exposure and other occupational risks: The case of Zanjan, Iran. Sci Total Environ. 2018;616–617:1190-1198.

21 Andrade-Rivas F, Rother HA. Chemical exposure reduction: Factors impacting on South African herbicide sprayers' personal protective equipment compliance and high risk work practices. Environ Res. 2015;142:34–45.

22 Sapbamrer R, Damrongsat A, Kongtan P. Health impact assessment of pesticide use in northern thai farmers. J. Environ. Res. 2010;33 (1):1-11.

23 Sapbamrer R, Hongsibsong S, Sittitoon N. Health Impacts of Pesticide Uses: Case Study in Garlic Farmer, Phayao Province. Naresuan University J Sci Technol. 2018; 26(1):21-29.

24 Han J, Moon H, Hong Y, Yang S, Jeong Wj, Lee KS, et al. Determination of glyphosate and its metabolite in emergency room in Korea. Forensic Sci Int. 2016; 265:41-46.

To Assess Correlation of Stature with Hand & Foot Length

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Abstract

Background: Human stature is an anatomical complex of linear dimensions,including skull, vertebral column, pelvis and lower extremities. The present study was conducted to assess correlation of stature with hand & foot length.

Materials and Method: The present study was conducted on 185 students (males- 81, females- 104) in the age group of 18-24 years. Stature, hand length and foot length was measured in all subjects with the help of digital verniercalipers.

Results: Themean height of males was 172.3 cm and females was 156.8 cm. The difference was significant (P< 0.05). The mean right hand length in males was 18.6 cm and in females was 16.5 cm, left hand length in males was 18.3 cm and in females was 16.2 cm. The difference was significant (P< 0.05). The mean right foot length in males was 28.7 cm and in females was 22.5 cm, left foot length in males was 28.3 cm and in females was 22.1 cm. The difference was significant (P< 0.05). A positive correlation of stature with hand and foot length was found.

Conclusion: Authors found a positive correlation of stature with length of hand and foot in subjects.

Keywords: *Hand, Foot, Stature*

Introduction

In forensic anthropology, determination of sex, age and stature is the foremost task for establishing the biological profile of an individual,which may consequently lead to a positive personal identification. In case of dismembered bodies, this task is more complicated so it is important to search for method that can be used for estimating the above mentioned basic individual characteristics.[1]

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Human stature is an anatomical complex of linear dimensions,including skull, vertebral column, pelvis and lower extremities,so that it is assumed that significant associations exist between the total stature and these individual body parts.[2]

Human beings are considered to be bilaterally symmetrical. However, there is an asymmetry in the length of the feet irrespective of sex or handedness. Hand has been used as a tool for estimating the area of burn injury.[3] The area of palmar surface of one's hand has been estimated to be 1% of the body surface area. When hand length was compared with the body weight for both males and females there were a curvilinear relationship which was not far from being linear.[4] The hand length has therefore been considered as an excellent predictor of body surface area and body mass. Change of foot length and width with age has been reported in a few

anthropometric studies in literature. The foot length and width were found to be increasing significantly on weight bearing between 3 and 18 years of age and in both genders.[5]The present study was conducted to assess correlation of stature with hand & foot length.

Materials and Method

The present study was conducted in the department of Anatomy in MGM Medical College, Aurangabad.It comprised of 185 students (males- 81, females- 104) in the age group of 18-24 years. All patients were informed regarding the study and written consent was obtained. Ethical approval was obtained from institutional ethical committee prior to the study.

General information such as name, age, sex etc. was recorded.A thorough physical examination was performed in all subjects.

Stature was measured as vertical distance from vertex (thehighest point on the top of head) to the floor in midsaggitalplane with subject standing barefooted, onan even floor and the head being oriented in theFrankfurt's plane. Stature was measured with the helpof Stadiometer (Anthropometer).Hand length was measured as the straight distance from mid-point of a lineconnecting the styloid processes of radius and ulnato the anterior-most projection of the skin of the middlefinger. It was measured with the help of digital verniercalipers.Foot length was measured as the distance from themost posterior point of the heel to the most anterior point of thelongest toe.Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

Results

Table I: Assessment of height of subjects

Height (cm)	Mean	DF	Mean square	F	Sign.
Male	172.3	1	8563.2	171.3	0.001
Female	156.8				

Table I shows that mean height of males was 172.3 cm and in females was 156.8 cm. The difference was significant (P< 0.05).

Table II: Assessment of hand length of subjects

Length (cm)	Right	Left	DF	Mean square	F	Sign.
Male	18.6	18.3	1	8564.7	172.6	0.001
Female	16.5	16.2				

Table II shows that mean right hand length in males was 18.6 cm and in females was 16.5 cm, left hand length in males was 18.3 cm and in females was 16.2 cm. The difference was significant (P< 0.05).

Table III: Assessment of foot length of subjects

Length (cm)	Right	Left	DF	Mean square	F	Sign.
Male	28.7	28.3	1	8572.5	175.1	0.001
Female	22.5	22.1				

Table III shows that mean right foot length in males was 28.7 cm and in females was 22.5 cm, left foot length in males was 28.3 cm and in females was 22.1 cm. The difference was significant (P< 0.05).

Table IV: Correlation of stature, hand and foot length of subjects

Pair	R	P
Stature & Hand length	0.71	0.01
Stature & foot length	0.65	0.01

Table IV shows positive correlation of stature with hand and foot length. The difference was significant (P< 0.05).

Discussion

Hand length and foot length has been studied extensively in relation to various body measurements but very few studies were available to predict the correlation between these two variables.[6]A numberof studies have presented the relation between stature, foot lengthand foot breadth among different human populations utilizing linearand multiple regression equations. Foot measurements,such as foot navicular and malleoli height were used for the firsttime in Ozaslan et al[7] to estimate stature and sex. Severalstudies have attempted to derive regression equations from measurementsof footprints and foot outlines. Although upperextremities are not part of this complex, previous research hasshown that the dimensions of upper extremities are also associatedwith stature to some degree. A number of studies on therelationship between hand measurements

and stature to calculate population-specific regression equations have been reported. It needs to be taken into the consideration that the equations derived from one population cannot be used for other populations as the body dimensions show ethnic variation due to here detrained environmental conditions.[8] The present study was conducted to assess correlation of stature with hand & foot length.

In present study mean height of males was 172.3 cm and in females was 156.8 cm. We found that mean right hand length in males was 18.6 cm and in females was 16.5 cm, left hand length in males was 18.3 cm and in females was 16.2 cm.

Uhrova et al[9]assessed the stature, hand length, hand breadth, foot lengthand foot breadth of 250 young Slovak males and females, aged 18–24 years by standard anthropometric procedures. The results revealed significant sex differences in hand and foot dimensions as well as in stature($p < 0.05$). There was a positive and statistically significant correlation between stature and all measurementsin both sexes ($p < 0.01$). The highest correlation coefficient was found for foot length in males($r = 0.71$) as well as in females ($r = 0.63$). The results of this study indicate thathand and foot dimensions can be used to estimate stature for a Slovak individual for the purpose of forensic investigation.

We found that mean right foot length in males was 28.7 cm and in females was 22.5 cm, left foot length in males was 28.3 cm and in females was 22.1 cm. We found a positive correlation of stature with hand and foot length. The difference was significant ($P< 0.05$).Fawzy et al[10] included a total 400 healthy and normal adult medical students (200 male and 200 female) between age group 18-25 years with no obvious deformities or previous history of trauma to the hands or feet. The hand length and foot length of both the sides of individuals were measured with the help of sliding calipers and spreading calipers respectively and the data was analyzed statistically for correlation. **Results:** The correlation between hand lengths and foot lengths found to statistically highly significant on both sides in both sexes with p value < 0.0001. Correlation coefficients between hand lengths and foot lengths were higher for females than males.

Conclusion

Authors found a positive correlation of stature withlength of hand and foot in subjects.

Conflicts of Interest: The author declare that there is no conflict of interest regarding the publication of this paper.

Source of Funding: Self

Ethical Clearance: Ethical clearance has been taken from Institutional Ethical Committee

References

1. Amirsheybani HR, Crecelius GM, Timothy NH, Pfeiffer M, Saggers GC, Manders EK. The natural history of growth of hand. Part II: Hand length as a treatment guide in paediatric trauma patients. J. Trauma 2000; 49(3):457–460.
2. Chong JC, Leung SSF, Leung AKL, Guo X,, Sher A, Mak AFK. Change of foot size with weight bearing. Clin. Orthop. 1997; 342:123–131.
3. Peker T, Turgut HB, Anil A, Ulukent, SC. An examination of the relationship between foot length, T1, T2, T3, T4, T5 (toe lengths), ankle circumference and calf circumference of Turkish University students aged between 17 – 25 years. Morphologie1997; 81(254): 13–18.
4. Ashley Montagu MF. A handbook of anthropometry. USA: Charles C Thomas; 1960; 3-13.
5. Jasuja OP, Singh G. Estimation of stature from hand and phalange length. JIAFM. 2004; 26(3):100-106.
6. Oberoi DV, Kuruvilla A, Saralaya KM, Rajeev A, Ashok B, Nagesh KR et al. Estimation of stature and sex from foot print length using regression formulae and standard foot print length formula respectively. JPAFMAT 2006; 6:5-8.
7. Ozaslan A, Karadayi B, Kolusayin MO, Kaya A, Huseyin A. Predictive role of hand and foot dimensions in stature estimation. Romanian Journal of Legal Medicine 2012; 20:41-46.
8. Babu RS, Deepika v, Potturi BR. Estimation of stature from foot length. International Journal of Pharmacy and Biological Sciences 2013; 03:266-270.
9. Uhrová P, Benˇuš R, Masnicová S. Stature estimation from various footdimensions among Slovak population. J Forensic Sci 2013;58:448–51.
10. Fawzy IA, Kamal NN. Stature and body weight estimation from variousfootprint measurements among Egyptian population. J Forensic Sci2010;55:884–7.

Teenage Girl Dating Experience: A Qualitative Study

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Abstract

Background: During puberty, most teenagers' sexual activities are increasing due to the hormonal changes. In this period, adolescents usually begin to approach other individuals of the opposite sex marked by mutual recognition of both the advantages and disadvantages of each individual.

Objective: The purpose of this study is to observe the positive and negative impacts of dating experienced by junior high adolescents, specifically girls.

Method: This qualitative research used a descriptive phenomenology method. The population was schoolgirl registered in the "X" Junior High School in Cipayung Community Health Center, East Jakarta, Indonesia. The sample of this study was twelve schoolgirls selected through a purposive sampling technique. This study conducted a Focus Group Discussion in order to collect data for this study.

Results: Four themes were identified in this study, namely (1) the meaning of relationship or dating, (2) the reasons for dating, (3) the impression of dating, and (4) the expectation in undergoing a relationship.

Conclusion: The findings suggest that health promotion programs can put their effort into preventing juvenile delinquency from dating.

Keywords: *Dating, health adolescence, negative impact,positive impact, relationship*

Introduction

The adolescence stage starts from 10 to 13 years old or considered secondary school students. During this period, adolescence begins their puberty in which there is a transition from childhood to adulthood. Puberty is a rapid change in physical maturity, which includes bodily and hormonal changes that mainly occurred during early adolescence. Moreover, puberty is marked by the maturity of the reproductive organs.[1]

Biology changes in puberty contribute to the increasing integration of sexuality into attitudes and behavior in pre-adulthood.[1] Teenage girls will fully attempt to become fully-grown women, while boys will try their best to become men as best as they can. The girls usually will behave affectionately, sensitively, attractively, and speak smoothly, while the boys usually will behave in assertive, arrogant, cynical, and aggressive ways because they realize such behaviors can boost their sexuality and attractiveness. Teenage sexual activity also increases along with the occurrence of hormonal changes during puberty.

Adolescents normally begin to know about dating during this period. Dating is an activity of identifying and familiarizing two individuals of the opposite sex characterized by the recognition of both the advantages and disadvantages of each individual.[2] A survey on adolescent reproductive health finds that Indonesian adolescents' first date is commonly at the age of 12 years old.[3] Dating is a term to describe two adolescence individuals associated with a high level of affectionate.[4] Dating is synonymous with premarital relationships though the assumption is not entirely correct. Most people are thinking of dating as a period of identifying each other, knowing, and acknowledging each other before.

There are two types of dating, namely, healthy and unhealthy dating. A healthy relationship ideally may affect each individual's physical, psychological condition, and social needs. Meanwhile, unhealthy dating involves any sexual encounters or activities, including kissing, necking, stroking, and sexual intercourse. Today, the dating behavior is quite distressing as well as increasingly permissive. There are also 92% of adolescents reportedly holding hands while dating. 82% of adolescents have kissed, while 63% of adolescents have caressed each other. These behaviors lead them to sexual interaction.[3] Each teenager has different perspectives to dating; some follow the trend, some are plain curious, where some admit as being in love.

Material and Method

The research is qualitative with the phenomenological approach. Data was collected after passing the ethical test from the Polytechnic of the Ministry of Health Jakarta III. The data collection strategy employed in this study was an in-depth interview. Participants were twelve subjects, carefully selected using the purposive sampling technique. Criteria include: girl students of junior high within the cluster of Puskesmas Cipayung, East Jakarta, aged between 12-15 who have never been dating and a relationship for at least one month, showed consent of full involvement, as well as be able to share their dating experiences in Bahasa Indonesia.

The Colaizzi approach was used in the data analysis with the steps as follows: (1) describing the to be studied phenomena; (2) collecting descriptions of the phenomena through participant interview process; (3) analyzing all participants' responds as well as identifying keywords through screening of significant participant statements with the phenomenon under study; (4) finding the meaning of each keyword; (5) organizing the meaning that has been identified into several themes; (6) integrating all research results into narratives.

Fundings: Data analysis found four themes related to the teenage girls' experience of dating in junior high school. The themes are the participants' view on dating, reasons for having a boyfriend, the impact of having a boyfriend, and expectation in having a boyfriend.

Participants' Views on Dating: All participants revealed that boyfriends are close friends whom they like and love. Participants' understandings are illustrated as follows:

"I'd say boyfriend is one's closest friend ..." (P1, P2, P3, P10)

"A boyfriend is a guy we like ..." (P2, P4, P6, P9, P11)

"For me, a boyfriend is someone who is really nice, and care about me..." (P5, P8, P11)

"A boyfriend is when we like a guy, and that guy likes us back..." (P7, P10, P12)

Most participants interpreted her boyfriends as close friends, someone whom she likes, and she cares. These interpretations are similar to the term indicated in the Bahasa Indonesia Dictionary, where boyfriend (or girlfriend) is a close friend of the opposite sex and has a relationship based on love. This definition is similar to the findings which revealed that a girlfriend or boyfriend is a close friend who loves and cares. The emergence of affection in the opposite sex among adolescents and curiosity to try something new. Among adolescents today, it is no longer an out of bounds thing to explore a special relationship commonly referred to as 'dating'.[5]

The term dating is identical with love and affection. Both are considered as stimuli or motives for dating. The term love in the Bahasa Indonesia Dictionary, which is interpreted as; dear really; very love; captivated; (between men and women); Eager to; very hopeful; miss; kl distressed (worried). Implicitly the meaning of the word is difficult to pin down into its true meaning. This difficulty is related to love as an emotion. Various emotions, such as fun, scary, sad or something else will arise when you feel love. Besides being difficult to define, the word love is also difficult to measure. So both love and love have interrelated meanings, like interpreted love and love interpreted like, where adolescents pour out love and love earlier in dating activities . Boyfriends become a very proud identity, teenagers will be proud and confident if they already have a boyfriend. Conversely teenagers who do not have a boyfriend are considered less sociable and outdated. Therefore, looking for a girlfriend among adolescents is not only a biological need but also a sociological need, so it is not surprising, that now the majority of teenagers already have a special friend called "PACAR".

Reasons to Have a Boyfriend: Almost all participants understand the reason for having a boyfriend, that is, as a place for sharing and encouraging. The participant statement describing the participant's

understanding of the reasons for having a boyfriend is as follows:

"A good boyfriend, I think, for instance, whenever I feel tired, he's kinda the go-to place to let all the burden out. Fed up with things at school? Friends? He's the place to be. Got upset? Then again, he kinda lightens me up... "(P4, P5, P7, P8, P9, P10, P11, P12)

Participant go an a date for a number of reasons, e.g, a boyfriend is where she seeks encouragement. Reasons having boyfriend proposed b ome experts are media socialization where the dating helping interaction will occur, telling each other as friends with other people.[1] Teenage dating has become trendy. Teenagers who do not date are seen as less sociable or romantically outcast, thus among teenagers, going on a date is rather a necessity.

The reason why many teenagers date is the need for a friend to talk personal things with and to seek someone who might help them solve problems is substantial. It's not uncommon for some teenagers to get into dating from a talk. Teenagers share with each other the problem they experienced and give each other pieces of advice. This leads to a connection, where eventually a more serious relationship ensued. The presence of a significant other helps to ease the burden, solve problems, kill boredom, and straighten mind. He may also help to keeps her life motivated and managed so as to add more meanings to her life.[1,11,12]

There were several causes of adolescent dating, including the influence of the globalization era that facilitated information from anywhere that could be received quickly including information on adolescent relationships, weakened environmental control, shifting family values and functions, lack of parental attention and reduced communication in the family, decreased ability of perception and interception of religious and cultural values, lack of directional method of sexual education for adolescents, and the high desire of adolescents to try something new.[6]

Teenagers tend to shut parents and feel more comfortable talking about problems her and ask for opinions to friends or peers. Teens who begin to close in the elderly affect social attitudes and teenagers as if separated from the supervision of parents. These teens will be more comfortable and listen more to what their peers say than to listen to what their parents say.This is in line with research into factors relating to the behavior of adolescent mining areas, namely family, peers and school transitions.[7]

Teenagers think that their peers could understand them better. They believe that parents do not know what they wanted. To them, parents often restrict them from doing everything they want. Teenagers dislike control; they are in an age of experimenting where they like to try new things. This is coherent with the study that there is an effect of education using audiovisual media and leaflets on improving the knowledge and attitudes of overweight adolescents wherein engaging information, to adolescents, is easier for them to learn, follow and imitate.[8]

Impact of Having a Boyfriend: Almost all participants understand the effects of dating. The participants accounted as follows:

Negative Impact: *"Sometimes, I feel annoyed by him, he is so unpredictable... so irritating" (P2, P8)*

"My boyfriend can be bothering. At one time, all of a sudden he held me, I went silent, and then kissed me. I was afraid by that time since kissing is forbidden"(P4, P9, P11)

"We often argue, because he won't let me hanging with other boys. Since then, I had to tell him where I was going, so frustrating. He drives me crazy sometimes"(P1, P5, P12)

Positive impact: *"... going to school becomes more exciting" (P3, P6, P7)*

"... having a boyfriend makes me want to achieve good scores" (P10)

These participants' accounts are coherent with study in which he reveals several positive and negative impacts of dating, including:[6] 1) an individual's life achievement can be accomplished depending on someone gets support and enthusiasm from a boyfriend, on the contrary achievements will decrease if there are problems that are quite heavy and interfere with concentration in learning, 2) Association with peers can be more widespread or vice versa narrows. Relationships will be narrowed when a pair of lovers spend more time together. The longer a person will depend on his partner and close themselves from the association of other friends, 3) Dating affects the type of activity in filling spare time. Activities to fill spare time can be more varied if the dating activities are

carried out with things such as joint sports, gardening, raising animals and so on .

Moreover, 4) A date can give a sense of security, calmness, and comfort. Emotional relationships that form in dating will lead to a feeling of security, and comfort if gone well. However, if feelings of comfort and security are received through merely physical intimacy then what arises is not love but lust. Thus the need for a work to limit themselves, and 5) Stress. Differences in characteristics will make the relationship with a girlfriend sometimes faced with problems that can make us stressed because of thoughts that are too excessive for the relationship being lived. There are 26% of junior high school students who have ever engaged in sexual activities. This is due to the lack of proper sex education and the youth's own curiosity from seeing or reading from the internet.[9]

The expectation of Having a Boyfriend: All participants expressed their expectation of having a boyfriend. Some participants stated their expectations would be able to maintain relationships, which could make themselves a better individual. The description of the participant's expectations can be seen as follows:

"I hope it'll last longer... we could be more mature ..." (P1, P2, P5, P6, P7, P8)

"... if possible, I hope we can get married later" (P3, P4)

"I hope my boyfriend can make me a better person..." (P5, P7, P9, P10, P11, P12)

To support the previous notion, revealed eight dating functions, namely 1) Dating as a recreational period, 2) Dating as a social status and achievement, 3) Dating as social needs, 4) Dating as a vessel in fulfilling intimacy, 5) Dating as a normative adjustment, 6) Dating as individuals' expression, 7) Dating as an identity development, and 8) Dating as a period of choosing a potential life partner.[10]Adolescent's pattern of thinking revolves around the fact that they are invincible and invulnerable[13].

Conclusion

The reasons for having a boyfriend are to share feelings and to encourage each other. The positive impacts of dating or having a boyfriend are: improved learning achievement, expanded social needs and connection, improved adulthood development, getting more connected with each other. Meanwhile, the negative impacts of having an unhealthy relationship are damaged learning achievement and limited opportunities for social connections. In general, dating may limit social interaction with a strong stigma on sexual activities while dating and highly correlated to severe stress. Adolescents expect to be able to maintain their relationships longer and to be a better self in the future.

The school has adopted preventive and promotive activities that can improve the students' health status and may prevent them from juvenile delinquency as the result of unhealthy dating. Family is encouraged to maintain communication between parents and their children, for the children can be more open and more comfortable with their families. Family can also give education and understanding of religious matters to present to children about religious rules and laws. Health professionals must also improve health promotion activities for adolescents, especially in sexual misconduct. Further study may proceed empirically on the effectiveness of health promotion programs for adolescents to determine the successes and obstacles in the implementation of the program.

Conflict of Interests: The author shave noconflictofinteresstodeclare.

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Ethical Clearance: Ethical approval taken from Health Polytechnic Jakarta III committee.

References

1. Santrock JW. Adolescence. 15th edition. McGraw-Hill Companies; 2013.
2. Iwan. Masturbation. Yogyakarta: C.V Andi offset; 2010.
3. KPAI. The First Dating of Indonesian Children Age 12 Years. 2012; Downloaded from http: KPAI First Dating Indonesian Children Age 12 Years.
4. Soyomukti N. Introduction to General Philosophy. Jog jakarta: AR. Ruzz media; 2011
5. Israwati. Student's premarital sexual behavior at the College of Management and Computational Science in Kendari (case study). 2013; retrieved from http://repository.unhas.ac.id/
6. Hakim L. The Teenage World Dating Phenomenon.

Riau: Zanafa Publishing; 2014.

7. Rahmayanti D, Damayanti EAF, Santi E. Factors Affecting Risk Behavior in Youth Mining Areas. World Nursing 2019;7(1): 41-47.
8. Meidiana R, Simbolon D, Wahyudi A. Effects of Education through Audio Visual Media on the Knowledge and Attitudes of Overweight Adolescents. Journal of Health 2018; 9 (3): 478-484 (Online) http://ejurnal.poltekkes-tjk.ac.id/index.php/JK.
9. Mukhtar, M., Setiawati, E., & Norlena. 2016. The relationship of sex education provided by parents and / or teachers with sex activities carried out by adolescents at SMPN 22 Banjarmasin. Journal of Health, Volume VII, Number 2, pp. 238-241.
10. Dariyo A. Psychology of Youth Development. Bogor: Ghalia Indonesia; 2004.
11. Karniyanti NK, Lestari MD. The role of self-control and assertiveness in attitudes towards premarital sexual behavior in late adolescent girls in Bangli. Journal of Udayana Psychology 2017;5 (1):72-85.
12. Maya sari F, Hadjam MNR. Adolescent sexual behavior in dating in terms of self-esteem based on gender. Journal of Psychology 2000; 2:120-127.
13. Pooja M, Aneesh KP. Personal fableness and perception of risk behaviors among adolescents. Indian Journal of Public Health Research & Development. 2018; Volume (9), Issue (10): 1-5. DOI:10.5958/0976-5506.2018.01305.0

Diet Compliance Against Blood Pressure Control in Hypertensive Patients in Tegalgundil public Health Center, North Bogor District: A Longitudinal Study

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Abstract

Background: One contributing factor of deaths due to uncontrolled hypertension is dietary disobedience because food affects blood pressure. Thus, Dietary Approach to Stop Hypertension for Indonesian (DASHI) is recommended, because it can control blood pressure in hypertensive patients.

Objectives; This study aims to investigate the impact of DASHI diet adherence on systolic blood pressure (SBP) and diastolic blood pressure (DBP) changes in hypertensive patients.

Material and Method: We performed a longitudinal study from May to September 2017 using primary data and non-random sampling method with purposive sampling. The data on blood pressure, food intake, physical activity, medication adherence, stress levels, smoking habits, routine blood pressure checks and routine weighting habits was collected via interviews, questionnaires and measurements.

Result: For SBP, the first- and second-month average measurement in non-adherent respondents of the DASHI diet was 145.68 and 148.82 mmHg, respectively. Conversely, the third-month average measurement in obedient respondents was 137.88 mmHg. For DBP, the first-, second- and third-month average measurement in non-adherent respondents was 88.61, 87.84 and 84.48 mmHg, respectively.

Conclusion: This study establishes a difference in SBP and DBP changes depending on the DASHI diet compliance based on the comparison of measurement results, including the first- and second-month measurement compared to third after controlling smoking and medication compliance covariates.

Keywords: *compliance, hypertension, blood pressure*

Introduction

In Indonesia, a high incidence of hypertension is a major health-related challenge mostly found in primary health care. In 2013, Riskesdas reported that hypertension is one of the health-related problems with a high prevalence of 25.8%. In urban communities, such as Bogor, hypertension is mostly attributed to lifestyle. A study in Bogor revealed that the incidence of hypertension based on the sodium consumption was affected by the high consumption of fat and sugar, lack of vegetable consumption and physical activity, increasing age, sex (male) and the severity of smokers.[1] This unhealthy lifestyle in hypertensive patients results in uncontrolled hypertension and eventually death. About 40% of deaths caused by hypertension are out of control, and patients are unaware of their hypertensive condition. Regular administration of anti-hypertensive drugs and modification of their lifestyle is recommended.[2] Of note, uncontrolled hypertension is a measurement performed on patients who receive anti-hypertensive treatment

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with SBP and DBP>140 mmHg and >90 mmHg, respectively, based on an average of three measurements at different examinations.[3]Reportedly, the management and control of blood pressure in hypertensive patients can be executed by treatment and triggering some strict lifestyle changes.[4]

Several studies of the Dietary Approach to Stop Hypertension (DASH) intervention revealed that lifestyle changes could be a factor in decreasing blood pressure in hypertensive patients.[5] Thus, this study aims to investigate the impact of DASHI diet adherence on SBP and DBP changes in hypertensive patients.

Method

In this longitudinal design study, we collected data for each variable at ≥2 specific time-points. Data collection was performed at Tegal Gundil Health Center, Bogor Utara sub-district, Bogor, on five periods, from May to September 2017.Sampling was performed using non-random sampling method with purposive sampling. We selected this method based on the study population that fulfilled the inclusion criteria. The number of subjects in this study (n = 96) fulfilled the minimum sample size evaluated according to the different hypothesis test of two proportions. The selection of the study sample was based on eligible subjects meeting the inclusion criteria of hypertensive patients who routinely controlled their condition for the last 6 months and aged 25–65 years. We collected data by interviewing respondents directly using the provided instruments. Data collection included questionnaires about respondents' characteristics, interviews about physical activity, stress level, smoking habit, routine blood pressure measurement, weight weighing and medication adherence. Patients' blood pressure was measured using a sphygmomanometer, whilst data on compliance was obtained via interviews of respondents based on the questionnaire and Semi-Quantitative Food Frequency Questionnaire. Further, we analysed data using repeated measures ANOVA test and multivariate analysis covariance GLM (MANCOVA).

Repeated measures ANOVA was used to determine the DASHI diet compliance by comparing differences in the SBP and DBP over time in hypertensive patients, namely in the DASHI diet group and those who did not comply with the DASHI diet. Conversely, GLM MANCOVA was used to determine the effect of DASHI dietary adherence on differences in the SBP and DBP after adjusting for the influence of covariate variables.

Results

1. **SBP and DBP Based on Three Measurements:** The three measurements of the SBP revealed that the highest and lowest average blood pressure was 148.41 and 138.96 mmHg in the second- and third-month, respectively. The repeated measures ANOVA at 95% confidence level obtained p value of 0.000 or <0.05, suggesting a change in the SBP at three measurements. For DBP at three measurements, the average lowest and highest DBP were found to be 84.24 and 87.80 mmHg in the third- and first-month, respectively.

2. **SBP and DBP at Three Measurements Based on the DASHI diet compliance:** The SBP examination revealed that 52 respondents were quite obedient to the DASHI diet and were 44 were not. The average SBP measurement in non-compliant and compliant respondents of the DASHI diet was 145.68 and 145, 148.82 and 148.06 and 140.23 and 137.88 mmHg in the first-, second- and third-month, respectively.

   The DBP examination revealed that 52 respondents were quite adherent to the DASHI diet, whereas 44 were not. The average DBP measurement of non-compliant and compliant respondents on the DASHI diet was 88.61 and 87.12, 87.84 and 85.90 and 84.48 and 84.04 mmHg in the first-, second- and third-month, respectively.

3. **Pairwise Comparisons Test:** The difference between the first- (145.31 mmHg) and second-month (148.41 mmHg) SBP measurement was not statistically significant ($p > 0.05$), with a blood pressure increase of 3.094. Conversely, the difference between the first- (145.31 mmHg) and third-month (138.96 mmHg) SBP measurement was statistically significant ($p < 0.05$), with a blood pressure decrease of 6.354. Further, the difference between the second- (148.41 mmHg) and third- (138.96 mmHg) SBP measurement was statistically significant ($p < 0.05$), with a blood pressure decrease of 9.448.

   The first- (87.8 mmHg) and second-month (86.72 mmHg) DBP exhibited no statistically significant difference ($p > 0.05$), with a blood pressure decrease of 1.01. Additionally, the first- (87.8 mmHg) and third-month (84.24 mmHg) DBP was significantly different ($p < 0.05$), with a blood pressure reduction of 3.563. Further, the difference between the second- (86.72 mmHg) and third-month (84.24 mmHg) DBP

measurement was significant ($p< 0.05$), with a blood pressure reduction of 2.552.

Overall, there was no effect of the DASHI diet compliance (quite obedient and disobedience) on differences in the SBP and DBP ($p > 0.05$; Table 1).

The effect of DASHI diet compliance on the measurement of the first-month SBP (145.34 mmHg) compared with second-month (148.4 mmHg) revealed no significant difference ($p > 0.05$), with a blood pressure increase of 3.097 (Table 2). The effect of the DASHI dietary adherence on the first-month SBP measurement (145.34 mmHg) compared with the third-month (139.05 mmHg) revealed significant differences ($p < 0.05$), with a blood pressure decrease of 6.285. Further, the effect of the DASHI diet compliance on second- (148.438 mmHg) and third-month (139.05 mmHg) SBP revealed significant differences ($p < 0.05$), with a blood pressure decrease of 9.382.

The effect of the DASHI diet compliance on the first- (87.86 mmHg) and second-month (86.87 mmHg) DBP revealed significant differences ($p > 0.05$), with a blood pressure reduction of 0.992. Additionally, the effect of the DASHI dietary adherence on the first- (87.86 mmHg) and third-month (84.25 mmHg) DBP revealed significant differences ($p < 0.05$), with a blood pressure reduction of 3.607. Further, the effect of the DASHI dietary adherence on the second- (86.87 mmHg) and third-month (84.25 mmHg) DBP revealed significant differences ($p < 0.05$), with a blood pressure decrease of 2.615.

4. **MANCOVA Test:** The MANCOVA GLM analysis revealed an effect of DASHI diet compliance on differences in SBP after covariate control of smoking habits ($p < 0.05$; Table 3). Further, we observed the effect on DBP differences after covariate compliance with medication and smoking habits ($p < 0.05$; Table 4).

Table 1: Pairwaise Comparisons Test Based on DASHI Diet Compliance

Blood Pressure	DASHI dietary compliance	Mean	p-value	95%CI	
				Min	Max
Systolic	Disobedience	144.909	0.661	-4.439	6.692
	Quite obedient	143.647		-6.692	4.439
Diastolic	Disobedience	86.977	0.334	-1.349	3.931
	Quite obedient	85.686		-3.931	1.349

Table 2. Pairwaise Comparisons Test Based on Diet Compliance DASHI On Each Measurement Variance

	Blood pressure	Mean	p-value	95%CI	
				Min	Max
	Systolic				
1	2	-3.097	0.106	-6.861	0.667
	3	6.285	0.002	2.408	10.161
2	1	3.097	0.106	-0.667	6.861
	3	9.382	0.000	6.140	12.624
3	1	-6.285	0.002	-10.161	-2.408
	2	-9.382	0.000	-12.624	-6.410
	Diastolic				
1	2	0.992	0.301	-903	2.888
	3	3.607	0.000	1.925	5.288
2	1	-0.992	0.301	-2.888	0.903
	3	2.615	0.003	0.923	4.306
3	1	-3.607	0.000	-5.288	-1.925
	2	-2.615	0.003	-4.306	-0.923

Table 3: Mancova Test SBP

Covariate	Variable	B	P-value	95% CI	
				Min	Max
Smoking Habit	Systolic1	-4.405	0.146	-10.374	1.563
	Systolic 2	-5.872	**0.015**	-10.580	-1.165
	Systolic 3	-1.603	0.494	-6.232	3.027

Table 4: Mancova Test DBP

Covariate	Variable	B	P-value	95% CI	
				Min	Max
Compliance with medication	**Diastolic 1**	4.658	**0.022**	.685	8.631
	Diastolic 2	5.146	**0.017**	.923	9.369
	Diastolic 3	1.406	0.280	-1.161	3.974
Smoking habits	**Diastolic 1**	-7.821	**0.006**	-13.304	-2.337
	Diastolic 2	-4.432	0.134	-10.260	1.396
	Diastolic 3	-2.494	0.166	-6.037	1.050

Discussion

The DASH diet is low in saturated fat and cholesterol. This diet is recommended by the American Heart Association to lower the blood pressure based on the results of a study assessing a clinical approach to investigate the effect of food consumption on blood pressure in subjects 22 years with the systolic blood pressure <160 mmHg and diastolic 80–95 mmHg in America. The results of this study revealed an average systolic and diastolic drop of 6 and 3 mmHg, respectively, in the DASH diet group, whilst in those receiving a diet rich in fruit and vegetables, the systolic and diastolic pressure dropped by 3 and 2 mmHg, respectively.[6]DASHI is a modification of DASH regarding the type and frequency of food and the amount of energy given. Compared with the DASH menu, the DASHI menu differs in the types of food, namely carbohydrate sources, generally derived from rice, vegetables derived from those available in the area and fat derived from oil and coconut milk; it emphasises on vegetables and fruits and consumption of low-fat milk.[7]

In this study, the diet compliance variable was measured using DASHI based on the Harahap study in 2009, which was assessed based on scoring, followed by categorisation into quite obedient and less obedient. According to the WHO, dietary compliance in developed countries is an average of 50%, whilst for developing countries, it is lower. This study indicated that of 96 respondents, 54% sufficiently adhered to the DASHI diet and 45.8% were not compliant, revealing that the number of respondents less obedient and relatively obedient to the diet is not quite different.

This study assessed how dietary adherence affects changes in SBP and DBP differences at three time-points. We found no significant differences between diet-compliant and non-diet-adherent groups with a decrease in the SBP and DBP ($p > 0.05$). Conversely, comparison of first- and second-month measurements and second- and third-month measurements exhibited differences in the SBP and DBP. Some studies indicated a favourable effect of reducing the SBP and DBP in adults on DASH diet. Despite variations in blood pressure reduction rates in different subgroups, the consumption of DASH diet resulted in a reduction of 6.74 mmHg in SBP and 3.54 mmHg in DBP amongst adherents.[8]

The distribution of plots in this study of hypertensive patients quite adherent to the DASHI diet was better in lowering SBP and DBP. Some studies have suggested that a combination of DASH diet with sodium reduction or weight loss exerts a marked effect on the blood pressure reduction. This effect was observed in stage 1 hypertensive patients in African–American populations.[9]

In this study, most respondents had a healthy lifestyle, such as avoiding smoking, monitoring blood pressure and regularly weighing, accounting for considerable blood pressure differences at each measured time-point.

However, the SBP in the first- and second-month had increased, which could be attributed to the high-sodium consumption habits of respondents. In the second-month, the examination was a transition after that the Eid al-Fitr ceremony, increasing the likelihood of dietary changes at that time. Based on studies in Asia, the prevalence of increase in the SBP correlates with an increase in body mass index and waist circumference.[10]

Studies in Chinese and Korean women suggested that abdominal obesity, which is based on the waist circumference, markedly correlates with an increase in the SBP. Additionally, several factors can increase the SBP, one of which is sleep quality.[11] Respondents in this study had overweight BMI, and most respondents who experienced moderate stress had difficulty sleeping (poor sleep quality).

Most respondents (85 patients) in this study were non-smokers because they were well aware of hazards of smoking through media and counselling by public health workers. Covariate factors in this study that affected differences in the SBP and DBP to the DASHI diet compliance in hypertensive patients are smoking habits. Cigarettes contain substantial nicotine, tar, carbon monoxide, which are very dangerous and can enter and damage the lining of the endothelium in the blood vessel wall, ultimately causing hypertension. A study reportedmale and female smokers exhibited high SBP and DBP than non-smokers.[12]

Adherence to medication also affects the blood pressure control in hypertensive patients. In this study, 74% of respondents did not adhere to the medication given by health workers. Most patients do not consume the medication regularly and only take drugs if there are symptoms, accounting for uncontrolled blood pressure in hypertensive patients.

In conclusion, this study establishes differences in the SBP and DBP at three measurements. Overall, dietary compliance (DASHI; quite obedient and disobedience) exerts no effect on differences in the SBP and DBP. However, effects of DASHI diet compliance were noted on differences in the SBP and DBP on blood pressure measurements in the first-and second-month compared with the third.

Conclusion

There are differences in SBP and DBP on 3 measurements. Overall there is no effect of diet compliance (DASHI) (quite obedient and disobedience) on differences in SBP and DBP with p-value> 0.05. There is effect of diet compliance (DASHI) on differences in SBP and DBP measurements the first month compared to the third month with a p-value <0.05, and the second month's blood pressure compared to the third month with p-value <0.05

Multivariate test results showed that there were differences in SBP on DASHI diet compliance after being controlled by smoking covariates, and there were differences in DBP on DASHI diet compliance after control of compliance covariates medication and smoking.

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References

1. Rahajeng E, Kristanti D, Kusumawardani N, Penelitian P, Kesehatan U, Penelitian B. The Incidence Rate Difference Of Hypertension According To Sodium Consumption [A Prospective Cohort Study In Bogor City, West Java, Indonesia. 2016;39(1):45–53.
2. Setiawan Z. Prevalence and Determinants of Hypertension in Java Island, 2004. Natl Public Heal J 2006;1(2).
3. Riyadina W, Kodim N, Bantas K, Trihandini I, Ayu R, Sartika D, et al. Triglycerides As Prognostics Factor Of Uncontrolled Hypertension In Post Menopausal Women In Bogor City 2014. Heal Res Bull 2017; 4:(2–4).
4. Erkoc SB, Isikli B, Metintas S, Kalyoncu C.

Hypertension knowledge-level scale (HK-LS): A study on development, validity and reliability. Int J Environ Res Public Health 2012;9(3):1018–29.

5. Saneei P, Salehi-Abargouei A, Esmaillzadeh A, Azadbakht L. Influence of Dietary Approaches to Stop Hypertension (DASH) diet on blood pressure: A systematic review and meta-analysis on randomized controlled trials. Nutr Metab Cardiovasc Dis 2014; 24(12):1253–61. Available from URL: http://dx.doi.org/10.1016/j.numecd.2014.06.008.
6. Appel LJ, Brands MW, Daniels SR, Karanja N, Elmer PJ, Sacks FM. Dietary approaches to prevent and treat hypertension: A scientific statement from the American Heart Association. Hypertension 2006;47(2):296–308.
7. Harahap H. The Effect of Diet on Reducing Body Weight and Blood Pressure on Prehypertension and Overweight Subjects. Diss Bogor Agric Inst 2009.
8. Laura P. Svetkey, MD, MHS; Denise Simons-Morton, MD, PhD; William M. Vollmer, PhD; Lawrence J. Appel, MD, MPH; Paul R. Conlin, MD; Donna H. Ryan, MD; Jamy Ard MBMK for the DRG, Objective: Effects of Dietary Patterns on Blood Pressure. Arch Intern Med1999;159:285–93.
9. Soenarta AA, Erwinanto, Mumpuni ASS, Barack R, Lukito AA, Hersunarti N, et al. Guidelines For Managing Hypertension in Cardiovascular Diseases. PP PERKI. Jakarta.2015.
10. Xingang Zhang, M.D., Shuang Yao, B.M., Guozhe Sun, M.D., Shasha Yu, M.D., Zhaoqing Sun MD. Total and abdominal obesity among rural Chinese women and the association with hypertension. Nutrition2012; 28:46–52.
11. Bataha YB. Relation of Systolic Blood Pressure to Sleep Quality of Hypertensive Patients in Bahu Manado Health Center. Nurs J (Manila) 2014; 2(2).

[12] Safi SA Al. Does Smoking Affect Blood Pressure and Heart Rate.Eur J Cardiovasc Nurs 2005;4(4).

A Case Study of the Impact of Overweight on Body Image and Self-Esteem in a Population of Moroccan Adolescents and Adults

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Abstract

Context: According to WHO, obesity or overweight are risk factors of psychological disorders and quality of life deterioration.

Objective: Evaluating the impact of overweight on body image and self-esteem in a population of Moroccan adolescents and adults.

Method: The study was carried out on 288 subjects (150 men, and 138 women), aged on average 34,86±0,82 years [15 -76]. Over weight was measure dusing the Body Mass Index (BMI), body image was evaluated using the Physical Appearance Comparison Scale (PACS), and self-esteem was evaluated using the Rosenberg Self-Esteem Scale (RSES).

Results: 43,28 % (n= 103) of subjects had a normal body weight, 25,63% (n=61) were overweight and 16,81% (n=40) were obese. 66,67% (68/102) of over weight subjects reported having compared their physical appearance to others. However, 60,46 % (78/129) of thosewith normal BMI also reported having compared their appearance to others some times or often. Among obese subjects, 73,68% (42/57) tend to compare their physical appearance to others some times or often. In terms of self-esteem, 85,3% (n=209) have a low to verylow self-esteem, 13,1% (n=32) have a moderate self-esteem and 1.6% have a high self-esteem. However, only 15,13% (28/185) of subjects with normal BMI had a moderate to high self-esteem.

A negative correlation was found between PACS and RSES (r= -0,139) and statistically significant correlations were found between BMI and both PACS (r= +0.125) and RSES (r= -0.189).

Conclusion: Consequently, it is recommended to establish multi-disciplinary programs for management of over weight among adolescents and adults, to mainstream the care received and reduce the pressure they experience.

Keywords: *Obesity, BMI, Body Image, Self-esteem, Prevalence, Morocco.*

Introduction

According to WHO (2016), obesity is considered a chronic disease due to its negative impact on general health. In adults, there are reference values to define overweight and obesity, according to the value of the Body Mass Index (BMI). We talk about overweight when BMI is greater than or equal to 25 kg/m2, and about

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obesity if BMI isgreaterthan or equal to 30 kg/m2[1]. Age and sex are alsotakenintoaccountwheninterpreting BMI[2] values. The prevalence of overweight and obesityamong adolescents has doubledworldwidesince the end of the seventies up untilbeginning of the first decade of 2000.

Obesity can cause severalpsychologicalimpairments like low self-esteem and body image[3]

Dissatisfaction: The psychologicaldistressamong obese subjectsisoftenlinked to social stigma, lack of self-esteem and dissatisfaction with body image. Manystudies have demonstratedthatoverweight or obese adolescents are at higherrisk of developinglow self-esteem, body image issues and low performance in social and sport activitiesleading to a lack of socializing[4-7].

Body image islinked to the individual's perception of hisown body, influenced by the socio-cultural contextwherehe grows[8]. It issubject-specific and impacts self-esteem9 significantly. Self-esteem and the physicalelementitislinked to are indicators of individuals' mental health[9]. This health issue may have seriouspsychological and social consequences on adolescents' school performance and the way and frequency of their social interactions, whichmay last till theiradult life [10].

Material and Method

Study Sample: The studywascarried out on 288 participants (n=288), 51,9% (n=150) males, and 47,8% (n=138) females. The averageageamongsubjectsis 34,86 ± 0,82 years [15,76]. It wascarried out in big Moroccancitiesex.:Tangier, Rabat, Casablanca, Fez, Marrakech, Agadir and Oujda, the studysample has been selectedrandomly to ensurehomogeneity and representativity.

Method: The studyused BMI, defined as ratio of weight in kilograms by the body area in square meters (kg/m2). According to WHO body weight classification, for normal body weight, BMI is 18.5-25 kg/m2, for overweight BMI is 5-30 kg/m2, and for obesityitis ≥30 kg/m2.

Furthermore, the studyused the 5-items Physical AppearanceComparisonScale (PACS), whichassesses the tendency of individuals to compare theirphysicalappearance in five social situations. Subjects report how oftenthey compare theirphysicalappearancewithothers on a scale of 1 to 5:where 1 meansnever and 5 meansalways. Total scores range from 5 to 25, wherehigher scores indicate a strongtendency to compare one'sappearancewithothers.

In addition, the impact of obesity on self-perception wasmeasuredusing the Rosenberg scale of self-esteem (Rosenberg 1965), whichmeasuresoverall self-esteem. It comprises tenstatements to whichsubjectsneed to express theirlevel of agreement on a scalesimilar to "Likert" scalefrom 1-4, where 1 means "totallyagree", to 4 meaning "totallydisagree".

Statistical Analysis: To verify the participants' understanding of the test'selements, a preliminary one wascarried out on twelvesubjects, no aberrations noted. The validity of the criterion of simultaneity of the PACS and the self-esteemwasstudied by analyzingtheir association with the BMI.

Data collectedwereanalyzed by SPSS (ver.20). Resultswereexpressed in average± standard deviation (SD) for quantitative variables, and in frequency for qualitative variables. Multiple correlations analyses werecarried out like X^2test with 5 % error and ANOVA (one way).

Results

Socio-demo graphic and anthropometric characteristics: The studywascarried out with 288 subjects, 52,8% (n=150) are males, and 47,9% (n=138) are females. Averageageamong males is 33,5±1,09 years [16,76],andamongwomenis35,79±1,20years[15,71].The test of Fisher hasn'tdemonstrated a significantdifference in agebetweengenders (Fisher=1,98; p<0,16). The distribution per age groups shows that 63,2% (n=182) are adults, and 36,8% (n=121) are adolescents (15-25 y.o). The distribution per schoolattainment shows that 58% (n=167) are universitygraduates vs. 42% (n=121) reachingsecondaryschool. However, across all single subjects, 52,19% are adolescents and 45,05% are adults.

The average BMI of participants is 26,04±6,30, [15,61:75,12]. The difference of average BMI acrossgender groups isstatisticallysignificant, (males; 24,68±4,92 vs. females; 27,53±7,10); t (286) =3,98, p<0,000) (Table 1).

Table 1: Sociodemo graphic and an thropometric characteristics of participants

Variable	Value	Sample size (N=288)	Percentage
Gender	Male	150	52,1
	Female	138	47,9
Level of studies attained	Secondary	121	42
	Graduate	167	58
Age category	Adolescent	106	36,8
	Adult	182	63,2
BMI	Normal	129	44,79
	Overweight	102	35,42
	Obese	57	19,79

Study of the Physical Appearance Comparison Scale: The distribution of scores per percentiles, shows that 34,7% (n=100) of subjects have answeredrarely or never to the statement of "I compare myappearance to the appearance of others", while 43,1% (n=124) have answeredsometimes, and 22,2% (n=64) answeredoften.

The tests of Chi Square show statisticallysignificant associations between the PACS and variables like:sex, highestlevel of studiesachieved, age and BMI, for which the p-values are respectively: (p<0,66) (p<0,047), (p<0,032) and (p<0,013).

From the point of view of the level of studiesachieved, the rate of people havingreachedsecondaryschool, and thosewithuniversitydegreeswho have reportedthattheyoften compare theirappearance to others are respectively 26,45% and 19,16%. Amongstthosestudy participants whoreportedcomparingtheirappearance to othersonlysometimes, 35,54% have reachedsecondaryschool vs. 48,50% who are universitygraduates.

In terms of age group, among adolescents (n=103), 51,46% reportedcomparingtheirphysicalappearance to otherssometimes, while 22.33% reporteddoingitoften. However, amongadults (n=179) 21,23% reportedcomparingtheirphysicalappearance to othersoften vs, 39,11% of thosewhodiditsometimesonly. With regards to the distribution of PACS and BMI, the Chi square test confirmed a significant association betweenbothvariables(Chisquare=8,45;51,46%).Indeed, the rates of overweight and obesityamong participants whoreportedcomparingtheirphysicalappearance to othersoften, are respectively 19,61% and 35,09%. Although 47,6% of overweight participants and 38,6% the obese have reported doing it only some times, the tendency to compare one's physical appearance to others is much more accentuated among obese subjects (73,68%) than among over weigh tones (66,67%). Now, among obese subjects (n=57), 14 females and 7 males reported comparing their physical appearance to others often, while among those who reported doing it some times, 13 were females and 9 were males (Table 2).

Table 2: Association of the PACS score withsex, level of studiesattained, age and BMI

Variable		PACS Score "I compare myphysical appearance to others"			Total	X^2 (p value)
		Rarely	Sometimes	Often		
		(n=100)	(n=124)	(n=60)		
Sex	Male	54	64	32	150	0,12 (p<0,66)
	Female	46	60	32	138	
Level of studies achieved	Secondary	46	43	32	121	5,45 (p<0,047) *
	University	54	81	32	167	
Age	Adolescent	28	53	25	106	4,58 (p<0,032) *
	Adult	72	71	39	182	
BMI	Normal	51	54	24	129	8,46 (p<0,013) *
	Overweight	34	48	20	102	
	Obese	15	22	20	57	

*: Significant difference with 5% margin of error

The study of Rosenberg scale of self-esteem (RSES): The distribution of scores obtained shows that 85,3% (n=209) had a low to verylow self-esteem,13,1% (n=32) had a moderate self-esteem and 1.6% (n=4) had a high self-esteem. The Chi-squared test shows a significant association between self-esteem and variables like:level of studiesachieved and BMI, with p-values (p<0,016) and (p<0,023) respectively. Indeed, 90,78% of subjectshadachieveduniversitystudies vs. 77,88% whohadreachedsecondaryschool, all of whichhad a low to verylow self-esteem. 85,36% of overweightsubjects and 92,85% of the obese had a low to verylow self-esteem (Table 3).

Table 3: Comparison of the RSES based on sex, level of studies, age and BMI

Variables		RSES			Total N	X^2 (p value)
		Low	Moderate	High		
		(n=209)	(n=32)	(n=4)		
Sex	Male	111	19	3	133	1,14 (p<0,58)
	Female	98	13	1	112	
Level of studies achieved	Secondary	81	21	2	104	8,30 (p<0,016) *
	University	128	11	2	141	
Age	Adolescent	81	9	1	91	1,60 (p<0,45)
	Adult	128	23	3	154	
BMI	Normal	157	27	1	185	11,35 (p<0,023) *
	Overweight	35	3	3	41	
	Obese	13	1	0	14	

*: Significant difference with a margin of error of 5%

The correlationanalysis by multiple correlationof variablesinvolved, shows that the PACS isnegativelycorrelatedwith the RSES (r=-0,139; p<0,030), demonstratingthatsubjectswith high PACS score have a low self- esteem and vice-versa. However, itwasdemonstratedthat BMI ispositivelycorrelatedwith PACS (r=0,125; p<0,038) and negativelycorrelatedwith RSES (r=-0,189; p<0,033). Age has not shownanysignificantcorrelationwith PACS and RSES, but remains in a significantcorrelationwith BMI with a correlation coefficient of r=+0,337 (p<0,000) (Table 4).

Table 4: Multiple correlationsbetween PACS, RSES, BMI and age.

Variables		PAC score	RSES Score	BMI	Age
PAC Score	Correlation of Pearson	1	-,139*	,125*	-,097
	Sig. (bilateral)		,030	,038	,106
Score RSES	Correlation of Pearson		1	-,189*	,046
	Sig. (bilateral)			,033	,472
BMI	Correlation of Pearson			1	,337**
	Sig. (bilateral)				,000
Age	Correlation of Pearson				1

* The correlation is significant with a p=value of 0.05 (bilateral).

** The correlation is significant with a p=value of 0.01 (bilateral).

Discussion

This study aimed to explore the relationshipbetweenobesity and self-esteem/body image amongMoroccan adolescents and adults of bothgenders (288 subjects). The rate of obese adolescents in our sample reached 9,71%.

However, in Canada and the US data show that more than the third of adolescents are considered overweight or obese6. The results of this study show a significant association between BMI and PACS (r=0,12; p<0,038), which explains the direct impact of weight on body image, which manifests by comparingone' physical appearance to others.

In addition, men and women differ clearly when it comes to self-assessment of their body, on average women perceive the mselves more as "fat" than men.

In terms of dissatisfaction with the body image, differences between genders are obvious;itincreases more among women than men as BMI increases. The particular focus of women on their weight comesf rom the collective perception of body image among women, linking body image satisfaction to slimness[11].

Female adolescents are more targetedthan males by media, vector of socio-cultural standards and ideals of beauty, where the ideal body is the one whichis slim[12,13]. The most unconfident individuals tend to compare their physical appearance to others most. Furthermore, the resultsconfirm the association between body satisfaction and self-esteem (r=0,139; p<0,03). This supported by previousresearch, demonstratesthat the level of body satisfaction isassociatedwith a high self-esteem[14-16] in bothgenders. In fact, scientific works which studied the correlationbetween body image satisfaction and self-esteem, confirm the strong association betweenboth, regardless of gender or age.

How body isperceivedis at the core of complex processes involving self-expression and self-assessment. More precisely, self-evaluation is imbedded in a common perceptive process, subjacent to self-esteem[17].

Manystudiesdemonstratedthat 50% to 75% of overweight adolescents exhibitlow self-esteem. Significantcorrelationwasfoundbetween PACS and RSES amongoverweight adolescents and adults (r=-0,139). Otherstudiesdemonstrated a disturbed body image and self-esteemamongoverweight and obese young people[18], where adolescents are more susceptible of both low self-esteem and body image issues compared to those with normal body weight[19]

Our results suggest that the need to besocially accepted, over coming shame, and excessive focus on physicalappearance are paramount to improving self-esteem. Theyclarify to what extent the entourage of overweightindividuals can influence their self-esteem, theirpsycheand attitudes. These results are of invaluablei nterest to social and public health decision makers, to improve the mental health of this growing population in Morocco.

Conclusion

This studyopened new avenues for a need to establishmultidisciplinary programs for obesity management, involving the expertise of a variety of healthcareprofessionalsbased on the psychological profile of each patient. Theysuggestthat the psychological dimensions related to body image and self-esteemcould condition the individual'srelationships, his social acceptation and integration. Body satisfaction seems to lead to higher self-esteemamongMoroccanfemales. In summary, the existing relation between body image and self-esteemdenotes the importance of restoring the deficient self-esteem, in body image disorders, by establishing an institutional program with a wholisticapproach to reconstitute the subjective value that obese subjectsassociate to their body.

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References

1. Organisation Mondiale de la Santé. Obésité et surpoids. Aide-mémoire. 2016. no 31.
2. Oppert JM, Rolland-Cachera MF. Prévalence, évolution dans le temps et conséquences économiques de l'obésité. Médecine/sciences. 1998;9(11):939-943.
3. Tyler C, Fullerton G. The definition and assessment of childhoodoverweight: A developmental

perspective. In Handbook of childhood and adolescent obesity. Springer US. 2008.

4. Buttitta M, Rousseau A, Gronnier P, Guerrien A. Anxiété sociale et satisfaction des besoins d'autonomie, de compétence et d'appartenance sociale chez les adolescents obèses. Neuropsychiatrie de l'Enfance et de l'Adolescence. 2014;62(5) :271-277.
5. Griffiths LJ, Parsons TJ, Hill AJ. Self-esteem and quality of life in obese children and adolescents: A systematicreview. PaediatricObesity. 2010;5(4),282-304.
6. Lefèvre H. Obésité chez l'adolescent : un diagnostic simple, une prise en charge complexe. Soins. Pédiatrie, puériculture. 2015;36(286):14-16.
7. O'dea JA. Self-concept, Self-esteem and Body Weight in Adolescent Females A Three-year Longitudinal Study. Journal of Health Psychology. 2006;11(4) :599-611.
8. Letonturier P. L'image corporelle et son vécu psychique. Presse Med. 2006;(35):630-1.
9. Ninot G, Fortes M, Delignieres D. A psychometrictool for the assessment of the dynamics of the psychical self. Eur J Applied Psychology. 2001;(51) : 205-16.
10. Lachal J, Orri M, Sibeoni J, Moro MR, Revah-Levy A. Méta-synthèse qualitative de l'obésité de l'enfant et de l'adolescent. Neuropsychiatrie de l'Enfance et de l'Adolescence. 2015;63 (3) :183-191.
11. Hubert A, De Labarre M. La dictature de la minceur, Cahiers de nutrition et de diététique. 2005; 40:300-306.
12. Taylor B, Sharpe T, Shisslak C, Bryson S, Estes L, Gray N, Mcknight K, Crago M, Kraemer H, Killen J. Factorsassociatedwithweightconcerns in adolescent girls, International journal of eatingdisorders. 1998; 24: 31-42.
13. Schwartz D, Phares V, Tantleef DS, Thompson K. Body image, psychologicalfunctioning, and parental feedback regardingphysicalappearance, International journal of eatingdisorders. 1999; 25 :339-343.
14. Bruchon SM. Une psychologie du corps, Paris, Presses universitaires de France. 1990.
15. Furnham A, Badmin N, Sneade I. Body image di ssatisfaction:genderdifferences in eating attitudes, self-esteem, and reasons for exercise, Journal of psychology, 2002;136:581-596.
16. Kostansku M, Gullone E. Adolescent body image dissatisfaction:relationshipswith self-esteem, anxiety, and depressioncontrolling for body mass, Journal of childpsychology and psychiatry. 1998;(39):255-262.
17. Bruchon SM. Dimensionality of the body image: The Body-image questionnaire, Perceptual and motorskills. 1987;65 :887-892.
18. Sudres JL, Dupuy M, Ghrib F, Desjardins H, Hubert I, Glattard M, Adolescents obèses : évaluation de l'image du corps, de l'estime de soi, de l'anxiété et de la dépression. Neuropsychiatrie de l'enfance et de l'adolescence. 2013;61(1) :17-22.
19. Dion J, Hains J, Vachon P, Plouffe J, Laberge L, Perron M, McDuff P, Leone M. Be thinner or larger ? Correlates of body dissatisfaction in a large sample of French-Canadian children. The Journal of Paediatrics. 2016.

Analysis Factors of Nursing Performance at the Mother and Child Hospital in East Java

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Abstract

Introduction: Hospital services are inseparable from the role of a nurse who is demanded to be able to provide the best performance. Factors that can improve nurse performance are motivation and self-esteem.

Objective: This study aimed to analyse the factors that can improve the performance of nurses in Mother and Child Hospital.

Method: This study used a cross-sectional design and a simple random sampling technique. The calculation result involved 295 samples. The independent variables were intrinsic and extrinsic motivation and self-esteem. The dependent variable was nursing performance. The data was collected using a questionnaire that was tested for validity and reliability. The analysis used a multiple linear regression test with a significance level of $\alpha \leq 0.05$.

Results: The results showed that the educational level related to the age aspect was associated with job performance ($p=0.035$) and that the intrinsic motivation was associated with job performance ($p=0.016$). Extrinsic motivation correlated with job performance ($p=0.000$).

Conclusion: Intrinsic and extrinsic motivation factors with education level have a good effect on improving the performance of nurses. However, the role of the hospital is needed to maintain and improve job performance to be even better. It is recommended that nurses increase their educational level by continuing school to a higher level.

Keyword: *Intrinsic motivation, extrinsic motivation, educational level, nurse performance.*

Introduction

Nurse performance is vital to quality patient care outcomes[1,2]. Job satisfaction is a global concern because of the potential impact on the quality and safety of patient care in addition to low job satisfaction is a contributing factor associated with nurses leaving their current jobs and the profession[2,3]. The nursing workforce in the healthcare sector has a specific structure that cannot be ignored and motivation can play an integral role in many of the compelling challenges facing the nursing profession today. Although nurses' motivation is a significant element of work performance, it is largely understudied and a better understanding of motivation sources among nurses in Saudi Arabia can give us a deeper understanding of motivators that can be utilised to preserve and increase the number of national nurses in the Saudi Arabia's nursing workforce.Moreover,

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motivation can significantly improve the steadiness of organisational performance[5].

Motivation is important in management. Performance levels for motivated employees are higher than that for unmotivated ones and vice versa. Intrinsic and extrinsic motivations are positively related to nurses' job performance[6]. Therefore, applying a well designed motivating strategy plays a significant role in enabling employees to use their skills, expertise, and knowledge effectively. Additionally, enhancing employee motivation can help maximise employee skills, sincerity, punctuality, flexibility, andabrupt response to different tasks; as a result of an employee's high performance level, the organisation's overall productivity level is affected positively[7].

According to the United States National Center for Health Workforce Analysis report in 2012, there are approximately 2.9 million nurses currently active in the United States. The demand on the nursing profession is expected to reach approximately three million in 2025. The shortage of nurses in Indonesia is increasing across the board and is expected to reach approximately 17.402 nurses[8].

On the positive side, to the extent nurses focus more on patients' accomplishment as a source of self worth, they adopted a more autonomy supportive stance, however, only when their failure based orientation was minimised[7]. When nurses increase their team-based self-esteem that a predictor perceives more team trust, which improves their motivation or confidence to engage in voice behaviour that could be risky in their group[6]. The purpose of this study was to analyse the factors that can improve the performance of nurses in Mother and Child Hospital.

Method

This study was a descriptive research study that used a cross-sectional design. The sample in this research consisted of 295nurses of maternal and child hospital utilising simple random sampling. The independent variables of the research included nurses of maternal and child hospital. The dependent variable was nursing performance. The instruments used in the collecting data were a questionnaire for measuring the involved intrinsic motivation was adopted from Winkel (2009); Fauzan (2006), for the extrinsic motivation variable, was adopted from Amabile (1997); Fauzan (2006), nurse performance was adopted from Mathis and Jackson (2002), the nurse's self-esteem was adopted from Wells and Marwell (1976); Soegianto (2010). All items of the statement were then developed by researchers to suit the conditions of the Mother and Child Hospital. The data analysis used in this research utilised a multiple linear regression test with a significant level of $\alpha<0.05$.

Results

Table 1: Respondent Demographic Characteristics (n=295)

Variable	n	%
Age		
≤ 30 years	34	11.5
31 – 40 years	166	56.3
41 – 50 years	92	31.1
≥ 51 years	3	01.0
Sex		
Male	41	13.9
Female	254	86.1
Education Level		
Diploma Degree 3	93	31.4
Diploma Degree 4	45	15.3
Bachelor Nursing	112	38.0
Registered Nurse (Ners)	45	15.3
Length of Work		
< 1 years	4	01.4
1 – 2 years	49	15.6
3 – 5 years	124	42.0
> 5 years	118	40.0

Multiple Linear Regression Test of the Nursing Performance at the Mother and Child Hospital in East Java.

Table 2: The Correlation between Motivation and Self Esteem with Nursing Performance at the Mother and Child Hospital in East Java

Sub Variables	Category	F	%	p
Age	≤ 30 years	34	11.5	
	31 – 40 years	166	56.3	0.506
	41 – 50 years	92	31.1	
Sex	Male	41	13.9	0.275
	Female	254	86.1	
Education Level	Diploma Degree 3	93	31.4	0.035
	Diploma Degree 4	45	15.3	
	Bachelor Nursing	112	38.0	
	Registered Nurse (Ners)	45	15.3	
Length of Work	< 1 years	4	01.4	0.945
	1 – 2 years	49	15.6	
	3 – 5 years	124	42.0	
	> 5 years	118	40.0	
Sub Variables		F	%	p
Intrinsic Motivation (X1)				
Responsible Achievement Interest to be a Health Care Worker Appreciation Opportunity to Developed		295	100	0.016
Extrinsic Motivation (X2)				
Salary as a Health Care Worker Physical Conditions Supervision/ Schedules Hospital policy		295	100	0.000
Sub Variables		F	%	p
Self Esteem (X.3)				
self-acceptance self-respect self-confidence		295	100	0.404

This study found that the level of education and motivation had a significant correlation in association with job performance. Personal factor within the aspects of educational level had a significant relationship with job performance. The results of this study indicate that 38% of nurses with educational background bachelor degree with good performance, bigger compared to the educated diploma (31.4%). As seen in Table 2, the value of educational level was 0.035, which means that p <0.05. Intrinsic motivation with responsible achievement, interest to be health care worker, appreciation, the opportunity to developed aspect had a significant relationship with performance of nurse. It also had a *p*-value of 0.016, which equals $p<0.05$. Extrinsic motivation within the salary as a health care worker, physical conditions, supervision/ schedules, hospital policy aspect had a significant correlation with job performance with value was 0.000.

Discussion

Educational Level of Job Performance: In this study nurse with a Bachelor of Nursing educational background had the opportunity to perform better than the educational background of SPK / SPR. This is consistent with [10] nurses with higher education have higher workability. Gibson[11]also suggested that high levels of education generally lead to someone more capable and willing to accept responsibility. Furthermore,researcher[12] explained that education is a picture of individual abilities and skills, is the main

factor that can affect performance. Through Education, a person can increase intellectual maturity so that he can make decisions in action. Besides, it is assumed that someone who has a higher education background has goals, expectations, and insights to improve work performance through optimal performance. The higher the nurse's education,possible analytical power to handle nursing and medical problems the higher so that the application of care nursing to patients is getting better. This result is also strengthened from research[13]which states that education has a significant influenceon employee performance.

Intrinsic Motivation of Job Performance: Hospital management needs to pay attention to aspects of work motivation of its employees, including nurses. High work motivation can improve the performance of services provided. Efforts are needed to improve work motivation for nurses so that they can have a positive impact on hospital development. Intrinsic motivation sub-variables were consisting of responsibility, recognition, work performance, career development, work and promotion results obtained in general, all intrinsic motivation sub-variables influence employee performance. Intrinsic motivational factors in the form of opportunities for education/career development, the extent of work received is an important factor for doctors to improve their performance which results in job satisfaction levels. Intrinsic motivation can influence opportunities for promotion that can improve one's performance because one's performance is measured in terms of their opportunities for promotion

Intrinsic motivation has a significant relationship with the job performance of nurses, indicating that intrinsic motivation has been able to increase the job performance of nurses in Maternal and Child Hospitals. Intrinsic motivation is characterised by a focus on satisfaction in performing a particular behaviour for its own[14]. The concept[15] that intrinsic motivation is the motivation that the direction of stimulation comes from within a person without interference from outside factors. Where intrinsic motivation as a whole associates motivation with the work that is being done so that someone will feel that his work is fun, binding and satisfying to him. In other words, someone who is intrinsically motivated will find out for himself that the process gives satisfaction to himself.Factors Influencing to Employee's performance such as job stress, physical stress, psychological stress, organisational stress and also motivation and communication[16]. The other research showed that nurses supposed job satisfaction, logistic provisions, and an enabling work environment as key intrinsic motivation factors that encourage their work performance at the hospital[17].

Extrinsic Motivation of Job Performance: Extrinsic motivation has a significant effect on nurse job performance. The higher effective extrinsic motivation will be effected on the higher the nurse's job performance. External motivation showing a reason to participate in their job to achieve its own goals. Extrinsic motivation mostly influenced by situational aspects, such as the benefits factors[21]. The results of this study contradict[22]which states that extrinsic will question a person getting a response to something outside of his work, especially from others.

On the other hand, this study also proves the items of the theory[23] by providing facts about factors of acceptance, physical working conditions, supervision, and significant organisational policies with motivation nurse job satisfaction. Extrinsic motivation is created from external stimuli and can be stimulated by incentives, awards and other praise. In the health care aspect, extrinsic motivation as a force to interchange nurses to perform excellent behaviour that will bring benefits to their workplace or organisation[24].

Extrinsic motivation has a significant effect on nurses' performance in Maternal and Child hospitals in East Java. Work performance is linked to efficiency or perception-oriented terms such as supervisory ratings and goal accomplishments[25]. The results of this study reinforce and explain about extrinsic motivation which gives rise to motivation that can help improve the situation. The existence of extrinsic motivation that triggers to increase in nurse performance. Extrinsic motivation in this study was arranged through four indicators, such as grants or salary as paramedics, physical conditions, scheduling official services, and hospital policies. Analysis of four indicators in the structural research model shows the important indicators in designing extrinsic motivation. Increased work performance, job satisfaction and great team are identified effects of nurses' motivation[26]. That situation also creates an environment where people ready to work with initiative, interest and enthusiasm, with a high personal and group satisfaction, and confidence to achieve their personal as well as organisational goals.

Job satisfaction in this study formulates by four indicators such as satisfaction with the salary, their

work, their chief and satisfaction with public works. Other research states that a good leader will have an impact such as trust and opportunities to learn and develop their abilities, in addition to the leader's policy support their on-the-job choices and actions[27]. From the descriptive analysis that has been presented that the job satisfaction variable was significant. These results show that the nurse's job satisfaction has well done, but not yet maximised. This information shows that there is still an opportunity to increase the need for nurses by making effective the job satisfaction of nurses at the mother and child hospital in East Java. The biggest factor that shapes job satisfaction is the satisfaction of coworkers to be able to help while carrying out their duties in the hospital. Employee performance is one of the key factors for reducing the quality of health services[28].

Conclusion

Motivation must be more considered to increase work motivation. Providing opportunity broader for employees to continue to grow and get the opportunities more open for education.Then the employee's performance will remain at the highest level that can be a positive impact on the development of the hospital in the future.

Ethical Clearance: This study has passed the institutional review board from NyaiAgengPinasih Mother and Child Hospital, East Java Province, Indonesia. The number of ethical consideration: 133/134/RSIA-NAP/C.10/V/2019.

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Conflict of Interest: None.

References

1. Lu H, Barriball KL, Zhang X, et al. Job satisfaction among hospital nurses revisited: a systematic review. Int J Nurs Stud 2012; 49: 1017–1038.
2. Masum AKM, Azad MAK, Hoque KE, et al. Job satisfaction and intention to quit: an empirical analysis of nurses in Turkey. PeerJ 2016; 4: e1896.
3. Van Bogaert P, Clarke S, Roelant E, et al. Impacts of unit-level nurse practice environment and burnout on nurse-reported outcomes: a multilevel modelling approach. J Clin Nurs 2010; 19: 1664–1674.
4. Amiresmaili M, Moosazadeh M. Determining job satisfaction of nurses working in hospitals of Iran: A systematic review and meta-analysis. Iran J Nurs Midwifery Res 2013; 18: 343.
5. Abu Yahya O, Ismaile S, Allari RS, et al. Correlates of nurses' motivation and their demographic characteristics. In: Nursing forum. Wiley Online Library, 2019, pp. 7–15.
6. Chang WY, Hsu C-T, Yu PY. Confidence is the plant of slow growth: a moderated mediation model for predicting voice behavior among power distance orientation and team-based self-esteem in Taiwanese nurses. Psychol Res Behav Manag 2019; 12: 609.
7. Duprez V, Vansteenkiste M, Beeckman D, et al. Is nurses' self esteem interwoven with patients' achievements? The concept of patient invested contingent self esteem. J Clin Nurs 2019; 28: 3858–3865.
8. Indonesia KR. Profil Kesehatan Indonesia Tahun 2017.
9. Lu H, Zhao Y, While A. Job satisfaction among hospital nurses: a literature review. Int J Nurs Stud.
10. Gillies A. Using research in Nursing: a workbook for practitioners. Radcliffe Publishing, 2002.
11. Barsade SG, Gibson DE. Why does affect matter in organizations? Acad Manag Perspect 2007; 21: 36–59.
12. Pulkkinen K, Aarrevaara T, Berg LN, et al. Does It Really Matter? Assessing the Performance Effects of Changes in Leadership and Management Structures in Nordic Higher Education. In: Reforms, Organizational Change and Performance in Higher Education. Springer, 2019, pp. 3–36.
13. Hartinah S, Suharso P, Umam R, et al. Teacher's performance management: The role of principal's leadership, work environment and motivation in Tegal City, Indonesia. Manag Sci Lett 2020; 10: 235–246.
14. DePasque S, Tricomi E. Effects of intrinsic motivation on feedback processing during learning. Neuroimage 2016; 119: 175–186.
15. Winkel. Psikologi Pengajaran. Jakarta: Grasindo, 2009.
16. Shaikh MR, Tunio RA, Shah IA. Factors Affecting to Employee's Performance. Int J Acad Res Accounting, Financ Manag Sci 2017; 7: 312–321.
17. Aduo-Adjei K, Emmanuel O, Forster OM. The

Impact of Motivation on the Work Performance of Health Workers (Korle Bu Teaching Hospital): Evidence from Ghana. Hosp Pract Res 2016; 1: 45–50.

18. Ridwan LF. Pengaruh Motivasi Intrinsik Dan Motivasi Ekstrinsikterhadap Kinerja Perawat suatu Kajian Literatur. Pascasarj Ilmu Kesehat Masy Fak Kedokt Univ Padjadjaran, Bandung.
19. Raza Y, Akhtar MW, Husnain M, et al. The Impact of Intrinsic Motivation on Employee's Job Satisfaction. Manag Organ Stud; 2. Epub ahead of print 2015. DOI: 10.5430/mos.v2n3p80.
20. Siswati S, Arifin A, . S. Intrinsic Motivation on The Nurses Performance In General Hospital of Labuang Baji Makassar. Int J ChemTech Res 2018; 11: 300–307.
21. Makki A, Abid M. Influence of intrinsic and extrinsic motivation on employee's task performance. Stud Asian Soc Sci 2017; 4: 38–43.
22. Amabile TM. Motivating creativity in organizations: On doing what you love and loving what you do. Calif Manage Rev 1997; 40: 39–58.
23. Prihartanta W. Teori-teori motivasi. J Adab 2015; 1: 1–14.
24. Hee OC, Kamaludin NH, Ping LL. Motivation and Job performance among nurses in the health tourism hospital in Malaysia. Int Rev Manag Mark 2016; 6: 668–672.
25. Kuranchie-Mensah EB, Amponsah-Tawiah K. Employee motivation and work performance: A comparative study of mining companies in Ghana. J Ind Eng Manag 2016; 9: 255–309.
26. Deressa AT, Zeru G. Work motivation and its effects on organizational performance: the case of nurses in Hawassa public and private hospitals: Mixed method study approach. BMC Res Notes 2019; 12: 213.
27. Diamantidis AD, Chatzoglou P. Factors affecting employee performance: an empirical approach. Int J Product Perform Manag.
28. Zafar M, Karim E, Abbas O. "Factors of Workplace Environment that Affects Employee Performance in an Organization": A study on Greenwich University of Karachi.

Effectivity of Teacher Motivation on Dental and Oral Hygiene of Elementary School Students

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Abstract

Background: Dental and oral diseases can be prevented by keeping them clean through toothbrushing in a proper way. The behavior of the brushing of the students can be influenced by an external motivation by their teacher. The purpose of this study is to identify the influence of teacher motivation on the improvement of dental and oral hygiene of Elementary School students in Bangli regency, Indonesia.

Method: This research is an experimental study with a pre-test and post-test control group design. The sample was 248 students, from ten elementary schools randomly chosen in each district, then grouped into an intervention group and control group. The data which was collected are dental and oral hygiene in before and after the intervention. The data was analyzed using Wilcoxon Signed Rank Test and Mann Whitney Test.

Results: The result of OHI-S on intervention group obtain p-value in 0.000 which is less than 0.05. Meaning that there is a significant difference of dental and oral hygiene of the respondent before and after the intervention. Meanwhile on the control group, the p-value is 0.284, more than 0.05. Meaning that there is no significant difference in dental and oral hygiene before and after the intervention. Mann Whitney Test OHI-S intervention group and control group has sig=0.000, less than 0.05 which means there is a significant difference in the dental and oral hygiene of the intervention group and control group before and after the intervention.

Conclusion: In conclusion, the teacher motivation on dental and oral hygiene for the student is effective to increase the dental and oral hygiene of the 3rd grade elementary school students.

K***eywords:*** *Motivation, OHI-S, student, teacher.*

Introduction

Children are vulnerable to dental and oral disease because of their teeth changes from deciduous to permanent. Therefore, there are some oral health problems can be found such as persistence in which deciduous teeth have not yet fell off, while the permanent teeth have already arisen. Dental decay is the infectious disease which is resulted by the problem of disruption of normal oral bacteria and overgrowth cariogenic organism [(1)(2)(3)]. In addition, gingivitis can also attack as it is also common disease among population in which may result as tooth loss [(4)]. All the problems of dental including to dental caries mostly caused by the health behavior [(5).] The ability to keep the dental and oral health are influenced by some factors such as knowledge and willingness. The willingness of someone to do something is strongly influenced by a motivation, internally or influenced by others[(6)]. Especially for elementary student, the motivation may come from their teacher to do some act such as how to keep their dental and oral health properly. Teacher

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being an important and role model for their students. Through motivation which is given by the teacher every morning when student start the learning process maybe can give some impact on altering their student behavior especially on keeping the dental and oral health. Toothbrushing must be adopted from a young age[7][8][9][10].

Bangli district is located in Bali province, Indonesia with 141 public elementary schools spread in 4 sub-districts. There are 48 in Kintamani, 30 in Susut, 29 in Tembuku and 33 in Bangli. There is no recent study conducted on dental and oral hygiene by involving teachers as the motivator to their student. That fact encourages the study about teacher motivation effectivity on the improvement of dental and oral hygiene to be conducted. The purpose of this study is to identify the effectivity of teacher motivation on the improvement of dental and oral hygiene in 3rd grade elementary school in Bangli Regency in 2018. We analyze the improvement of dental and oral hygiene before and after the motivation is given.

Methodology

This research is an experimental community study with pre-test and post-test control group design as mentioned in [11]. The population is all of the 3rd-grade of Elementary School in Bangli Regency. The minimum sample taken was 124 in each group and the total was 248 students taken from 10 elementary schools and determined by proportional sampling. Elementary school was chosen randomly in each sub district. There were three school in Kintamani, three school in Bangli, three schools in Susut and one school in Tembuku. The type of data collected are primary and secondary data. Primary data of dental and oral hygiene was collected by measuring Oral Hygiene Index Simplified (OHI-S) in both intervention and control group. Health promotion and toothbrushing altogether were carried out to the intervention and control group. A calibration with the principal and teachers was conducted, five 3rd-grade teachers were told about the subject that would be delivered to their students and five principals were told about how to observe the process of motivation given by the teachers. At least three weeks in a row, teachers remind and motivate the intervention group to keep their dental and oral hygiene. At the 21st day, the evaluation was done by remeasuring the dental and oral health by using OHIS-S index, then health promotion about dental and oral health and brushing teeth together were done both in intervention and control group. The collected data was analyzed by screening, editing, coding, tabulating, quantitatively by univariate while the effectivity of the teacher motivation on dental and oral hygiene of the students was analyzed by the difference of OHI-S score before and after the treatment in control and intervention group. The test used Wilcoxon and Mann Whitney test[12].

Results

A. Characteristics of Study Subject:

- **Distribution and frequency of teacher motivation:** Table 1 shows all teachers carried out motivational activities for maintaining dental and oral hygiene to the respondents resulted in good criteria with five students (100%).

Table 1: Distribution and frequency of teacher motivation

Motivation Criteria	Teacher	
	f	%
Good	5	100
Moderate	0	0
Poor	0	0
Fail	0	0
Total	5	100

- **Distribution and frequency of OHI-S criteria of student (intervention group) before and after treatment:** Table 2 shows the dental and oral hygiene of respondents (intervention group) prior to the treatment mostly resulted in moderate criteria, namely as many as 90 students (72.6%) and the least is in poor criteria, namely as many as one person (0.8%). After the treatment on dental and mouth hygiene of the respondents namely the intervention group was mostly in good criteria, which is 76 people (60.8%), and none of the respondents has dental and oral hygiene with poor criteria.

Table 2: Distribution and frequency of OHI-S Criteria of The Students (Intervention Group) Before and After Intervention

OHI-S Criteria	Intervention Group			
	Before		After	
	f	%	f	%
Good (0.0-1,2)	33	26.6	76	60.8
Moderate (1,3-3,0)	90	72.6	48	39.2
Poor (3,1-6,0)	1	0.8	0	0
Total	124	100	124	100

Table 3: Distribution and Frequency of The Students (Control Group) at The Beginning of Examination and Evaluation Result

OHI-S Criteria	Intervention Group			
	Before		After	
	f	%	f	%
Good (0.0-1,2)	18	14.5	17	13.7
Moderate (1,3-3,0)	96	77.4	98	79.0
Poor (3,1-6,0)	10	8.1	9	7.3
Total	124	100	124	100

- **Distribution and frequency of the students (control group) at the beginning of examination and evaluation result:** Table 3 shows the dental and oral hygiene of respondents (control group) the results of the examination before the intervention were mostly in moderate criteria, namely 96 people (77.4%) and the least is in poor criteria, which were 10 people (8.1%). Dental and oral hygiene after the treatment is mostly in moderate criteria, as many as 98 people (79%).

- **Distribution frequency criteria of dental and oral hygiene of the students (intervention group and control group) before intervention:** Table 4 shows the criteria for dental and oral hygiene of the treatment group prior to the intervention being mostly in moderate criteria, namely as many as 90 people (72.6%) and the least is in poor criteria as much as one person (0.8%). While the OHI-S criteria of control group is mostly in moderate criteria as many as 96 people (77.4%) and the least is in poor criteria as many as 10 people (8.1%).

Table 4: Distribution Frequency Criteria of Dental and Oral Hygiene of The Student (Intervention and Control Group) Before Intervention.

No.	OHI-S Criteria	OHI-S					
		Intervention Group		Control Group		Total	
		f	%	f	%	f	%
1.	Good	33	26.6	18	14.5	51	21
2.	Moderate	90	72.6	96	77.4	186	75
3.	Poor	1	0.8	10	8.1	11	4
Total		124	100	124	100	248	100

- **Distribution and frequency of the students' dental and oral hygiene (intervention and control group) after intervention:** Table 5 shows that the level of dental and oral hygiene of the intervention group after the intervention is in good criteria, as many as 76 people (60.8%), and no one got dental and oral hygiene with poor criteria. The level of dental and oral hygiene in the control group is mostly in moderate criteria, namely 98 people (79%), and the least is in poor criteria, which is as many as nine persons (7.3%).

Table 5: Distribution and Frequency of Dental and Oral Hygiene of The Student (Intervention Group and Control Group) After Intervention

No.	OHI-S Criteria	OHI-S					
		Intervention Group		Control Group		Total	
		f	%	f	%	f	%
1.	Good	76	60.8	17	13.7	93	37.5
2.	Moderate	48	39.2	98	79.0	146	58.87
3.	Bad	0	0	9	7.3	9	3.63
Total		124	100	124	100	248	100

Analysis Result:

1. **Normality Test:** Table 6 shows the results of the normality test of both intervention and control group before and after the treatment. The value of sig = 0.000 which is less than 0.05. These results indicate that all data are distributed abnormally. So, the different test analysis used is the Wilcoxon Signed Rank Test to test the sample related data and the Ancova Test for the two unrelated sample data [12].

Table 6: Normality Test

No.	Variable	N	Mean	Std. Dev	Sig.	Conclusion
1.	OHI-S Intervention-Pre	124	1.8845	0.73235	0,000	Not Normal
2.	OHI-S Intervention-Post	124	1.2669	0.49041	0,000	Not Normal
3.	OHI-S Control-Pre	124	2.0455	0.73088	0,000	Not Normal
4.	OHI-S Control-Post	124	2.0755	0.71730	0,000	Not Normal

2. **OHI-S Analysis of the Intervention Group Before and After Treatment:** The OHI-S was analyzed using Wilcoxon Signed Rank test statistic. The Wilcoxon Signed Rank Test statistic results before and after the treatment obtain p-value (Asymp.sig 2 tailed) of 0.000, less than 0.05 which means there is a significant difference in the dental and oral hygiene of respondents before and after the intervention.

3. **Ohi-S Analysis of the Control Group Before and After Treatment:** OHI-S analysis of the control group before and after intervention was done by statistic Wilcoxon Signed Rank test. The results obtain the Wilcoxon Signed Rank test with *p value (Asymp.sig 2 tailed)* = 0.284 more than 0.05 which means there is no significant difference of the dental and oral health of the student before and after treatment.

4. **OHI-S Analysis of Intervention Group and Control Group Before Treatment**: The OHI-S analysis result of intervention group and control group before the treatment was analyzed by Ancova. The Mann-Whitney results show the sig value of 1.75 greater than 0.05 which means there is no significant difference of dental and oral hygiene (OHI-S score) between the intervention group and control group before the treatment.

5. **OHI-S Analysis of Intervention Group and Control Group After Treatment:** The analysis of dental and oral hygiene (OHI-S score) of the student in intervention group and control group after the treatment was analyzed using Mann-Whitney test. The results of Mann-Whitney test show that the *sig* value is 0.000, less than 0.05 which means there is a significant difference of the dental and oral hygiene between the intervention group and control group after the treatment.

Discussion

The control group has a moderate score on the average of dental and oral hygiene before and after treatment. There is no significant difference of dental and oral hygiene before and after the treatment, proven by the result of statistical test Wilcoxon Signed Rank test which resulted p-value (Asymp.sig 2 tailed) 0.284, greater than the critical value of the study 0.05. Meanwhile in the intervention group, there is a significant difference, there is an improvement from moderate criteria to good criteria. Statistically, there is a significant difference on dental and oral hygiene before and after intervention, shown by the result of statistics Wilcoxon Signed Rank Test which resulted p-value (Asymp.sig 2 tailed) 0.000 lesser than 0.05. The result of Mann Whitney test sig is 1.75 which means more than 0.05 showing that there is no significant difference between dental and oral hygiene of control group and intervention group before the treatment was given. Meanwhile the Mann Whitney test after treatment has value sig = 0.000, lesser than 0.05 which means there is a significant difference of dental and oral hygiene after the treatment was given. This is caused by before the motivation was given by the teacher, the students brush their teeth irregularly and improperly. This is supported by [13], which says that if we don't brushed our teeth soon after eating regularly and properly, there will be the cumulation of food or called as debris. The motivation that given by the teacher in the beginning of class will encourage the habit of the student to brush their teeth in the morning

after breakfast and at night before sleep routinely. Power and strength in human itself is caused by the motivation which given by others to encourage to achieve a goal [14]. The changes on behavior after the student has given a health promotion and given the movie about the impact of careless to the dental and oral health, it can encourage the students from toothbrushing lazily to diligently and can reach the oral and dental health better than it was[15]. Thus, the success of effectivity also influenced by the teachers as the school dental service to play a key role in the dental and oral health of the students [16] [17] [18].

Conclusion

Based on our findings in this research, the following conclusions can be drawn. There is a significant difference of dental and oral hygiene level either before and after treatment at the intervention group and there is no any significant difference at the control group before given the treatment. Significant difference is found at the intervention group and control group after the treatment was given. So, it can be concluded that the motivation given by the teacher about how to keep the dental and oral hygiene is effective to improve the dental and oral hygiene.

Conflict of Interest: The author has no conflict of interests related to the conduct and reporting of this research.

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Ethical Clearance: Before conduct of the study written permission was obtained from Poltekkes Kemenkes Bali, Indonesia. The consent and willingness were established from all the subjects who meet the criteria for this research.

References

1. Çolak H, Dülgergil ÇT, Dalli M, Hamidi MM. Early childhood caries update: A review of causes, diagnoses, and treatments. J Nat Sci Biol Med. 2013;4(1):29–38.
2. Fuccilo R, Sharpe B, Laura Smith M. Oral Health : An Essential Component of Primary Care. 2015.
3. Adair PM, Burnside G, Pine C. Analysis of Health Behaviour Change Interventions for Preventing Dental Caries Delivered in Primary Schools. Caries Res. 2013;47(s1):2–12.
4. Al-zarea BK. Oral Health Knowledge of Periodontal Disease among University Students. Int J Dent. 2013; 2013(Article ID 647397):1–7.
5. Jerkovic K, Binnekade JM, Kruk JJ Van Der, Most JA Van Der, Talsma AC, Schans CP Van Der. Differences in oral health behavior between children from high and children from low SES schools in the Netherlands . Community Dent Heal. 2009; 20(May 2007):1–6.
6. Sarwono SW. Pengantar Umum Psikologi. Jakarta: PT Bulan Bintang; 2000.
7. Tashiro Y, Nakamura K, Seino K, Ochi S, Ishii H, Hasegawa M. The impact of a school-based tooth- brushing program on dental caries : a cross- sectional study. Environ Health Prev Med. 2019;6:1–9.
8. Pervez A, Kinney JS, Gwozdek A, Farrell CM, Inglehart MR. Education About Dental Hygienists' Roles in Public Dental Prevention Programs: Dental and Dental Hygiene Students' and Faculty Members' and Dental Hygienists' Perspectives. J Dent Educ. 2016;80(September):1071–81.
9. Adair PM, Pine CM, Burnside G, Nicoll AD, Gillett A, Anwar S, et al. Familial and cultural perceptions and beliefs of oral hygiene and dietary practices among ethnically and socio-economically diverse groups. 2004; 21:102–11.
10. Marangoni F, Martini D, Scaglioni S, Sculati M, Donini LM. Oral health behaviours of parents and young children in a practice based caries prevention trial in Northern Ireland. Int J Food Sci Nutr. 2019;1–15.
11. Arikunto S. Research Procedure A General Approach to Practice. Jakarta: Rineka Cipta; 2010.
12. Santoso S. Mengatasi Berbagai Masalah Statistik dengan SPSS. Jakarta: PT Alex Media Komputindo Kelompok Gramedia; 2005.
13. Herijulianti MH, Putri E, Nurjanah N. Science of Prevention of Dental Hard Tissue Diseases and Dental Support Networks. Jakarta: EGC; 2010.
14. Hidayat DR. Ilmu Perilaku Manusia Pengantar Psikologi untuk Tenaga Kesehatang. Jakarta: CV Trans Info Media; 2013. 8 p.
15. Kencana IGS, Gejir IN, Artawa IMB. Hubungan Gingivitis dengan Perilaku Merokok pada Seniman Patung Kayu Di Desa Mas Kecamatan Ubud Kabupaten Gianyar. 2Jurnal Kesehat Gigi. 2015;3(2).

16. Keller H.Comprehensive Oral Health Services for Improving Children' s and Adolescents' Oral Health Through School-Based Health Centers
17. National Advisory Committee on Health and Disability. Improving Child Oral Health and Reducing Child Oral Health Inequalities. 2003.
18. Phanthavong S, Id DN, Phonaphone T, Kanda K, Sombouaphan P, Wake N, et al. Oral health behavior of children and guardians' beliefs about children' s dental caries in Vientiane, Lao People's Democratic Republic (Lao PDR). PLoS One. 2019;14(1):1–10.

Study Some of the Factors Affecting the Incidence of Diabetes in the Employed Segment in Basra City

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Abstract

Context: Diabetes mellitus (DM) is a lifelong metabolic disease, considered often as an epidemic problem that leads to a reduction in quality and expectancy of life. There is an increasing prevalence of DM throughout the world as a result of changing dietary patterns and decreased physical activity. The aim of this study is to identify some of the factors that affect the incidence of diabetes at the employees ' segment in Basra city. A cross-sectional study was conducted among 120 patients with type 2 diabetes that included 85 male and 35 females. The results have reflected the apparent effect of age, obesity, Genetic history on diabetes, thus Confirmed by the statistical side of the medical opinion and No effect of smoking on diabetes .The results showed the apparent effect factor for age, genetic history and obesity on diabetes while the results confirmed the lack of influence of sex and smoking on diabetes**.**

Keywords: *Diabetes - factors affecting - metabolic disease.*

Introduction

Diabetes is a chronic disease that occurs when the pancreas is unable to produce insulin in sufficient quantity, or when the body is unable to use effectively the insulin it produces. Insulin is a hormone that regulates the level of sugar by Hyperglycemia or hyperglycemia is a common effect in the body not controlling diabetes, and with time leads to severe damage in many organs of the body, especially nerves and blood vessels[1],Diabetes and its complications are an effective health problemand it gets more prevalent day by day and is stuck in civilized progress.the scientific progress has been able to reduce or eliminate Some are final. So it has become a problem that deserves to be studied and to stress the need to confront it At different levels of health, global and economic[2].The aim of this study is to identify some of the factors influencing the disease of diabetes In the city of Basra.

Literature Review:

The medical concept of diabetes mellitus (Mellitus Diabetes): In his daily diet, he eats glucose, which is the source of his bodyenergy, the cells relies in many of its functions on glucose sugar (blood sugar) to keep the human in good health, and presence of the pancreas and what it produces from the insulin and glucose sugar is transported to Inside the cells, the insulin helps to convert this sugar and food types to the Jalikogen, If the body is not excreted enough insulin or does not use it adequately and properly, the glucose values It will rise in the blood that leads to the person's diabetes. Diabetes Mellitus (Mellitus Diabetes) is defined as a defect in the process of carrying glucose inside the body The cause is a lack of secretion of the pancreas, lack of secretion or lack of efficacy of the insulin and the consequent increase in blood sugar, thus a disturbance in the metabolism for carbohydrates, protein and fats, due to different causes may be organic or psychic or because In the intake of sugars or due to hereditary factors, diabetes can cause significant complications and dangerous, as two of the third people die of the disease in the face of stroke or diseases . The heart, as the risk of death doubles among people with the disease if compared to non-infected Chronic diabetes causes the body's organs to fail to function,12 especially the eyes and heart Kidneys, blood vessels and hematological[3].

Types of Diabetes Mellitus: Diabetes mellitus is classified into four types according to the organization classification[4].

Type 1: this type is called the old (IDDM) which diabetics depend on the insulin in treating them,most patients of this type are young and infect the persons Between the ages (13-11) This type of diabetes requires a lifetime of insulin injections. Constantly, the disease appears as an emergency and its symptoms are severe nausea, vomiting and drought .

Type 2 : most people with this type of sugar are adults, their bodies are resistant to insulin, i.e. they are unable to take advantage of insulin properly. They must pay attention to the quality of their food and exercise in order to control Diabetes this type represents 90% of diabetics, which distinguishes it that patients have a high percentage of insulin in their blood and that the body cells have lost the sensation of this hormone) and a Many people in this type are over the age of 55, and those with a first-class relative are either parents or siblings with diabetes, and also have a history of high blood pressure or high cholesterol and there is no difference in the incidence of diabetes between the sexes during the age of 25 The first 5 years of the life of the injured, but the balance tends to the tendency of the gender of females after this age, that is, females are more likely to be infected with this type of male and obesity plays a big role in the incidence of this type of diabetes, obesity forms more than 70% of patients and obesity is concentrated (trunk or ventral) [5].

Type 3: this type of diabetes is similar to type 2 diabetes, and it gets 2-5% among pregnant women and the ratio increases with age and can continue or disappear after birth. Medical supervision is required during pregnancy [6].

Method and Material

Design of the Study: Descriptive, cross sectional study.

Setting of the Study: Basra University colleges and various schools in the city of Basra, different circles in the city of Basra,Basra city hospitals.

The Sample of the Study: The study was descriptive. A sample of 120 patients with diabetes mellitus type 2 was taken from Basra University colleges and various schools in Basra city, Basra government departments and Basra city hospitals. The information was collected through a direct interview with the injured, a query about the duration of the disease, the method used in the treatment, and the question of other diseases as well as habits and practices about diabetes. Information has been collected since December 2018 until February 2019. In this sample, some factors have been relied on to measure the extent of they affect in the incidence of diabetes and these factors are (the patient's age, the patient's sex, the duration of the disease, the genetic predisposition to disease, the way the patient uses the treatment, the patient's awareness to take care of himself to minimize complications Diabetes).

Statistical Analysis: Study sample data was analyzed using some descriptive statistic method and using the statistical SPSS program.

Results

The results in table 1 showed Socio- demographic characteristics of the participants, the sex 35% of the samples were females while the 85%of the samples were male and the 94% of the samples were Greater than 25 years, the 80% were employed on the hospital, the 19% employed on higher education, the 21% employed on education the 98% of them had positive family history of diabetes.

Table 1: Socio- demographic characteristics of the participants

Variable		No.	%
Sex	Male	85	83.70
	Female	35	16.29
Age	<25	0	0
	49-25	94	33.78
	65-50	26	66.21
Work place	The hospital	80	6666.
	Higher Education	19	83.15
	Education	21	5.17
Family history of diabetes	Positive	98	81.66
	Negative	22	18.33
Sex		120	99.99

The results in table 2 appeared that the duration of the disease(5%) for < 1 years, (74%)for < 10 years and (18%) for < 15 years,(13%) use diet (61%) use pills, (26%) use Insulin. (79%)smoke 20> cigarette and (5%) have other diseases HY pretension.

Table 2: participants attitudes toward their illness

Question	Answer	No.	%
The duration of the disease	< 1 years	6	5
	< 10 years	89	74
	< 15 years	25	18
The Way you use it	diet	34	13
	pills	80	61
	Insulin	6	26
Do you have other diseases accompany	obesity	66	55
	Hy pertension	7	5
	Highgrease	47	39

Data entered in the program as follows:

1. X1) = The first factor is the patient's age) Age

   K=Age groups

   K= 1,2.3…..5

   Ages are divided into different categories

   <15= 0 years

   15-50=1 Years

   >= 2 years 50

2. Gender (X2) The second factor is the patient's gender) male = 0

   Female = 1

3. Obesity (x3) The third factor is the patient's obesity

   Non obesity = 0

   Obesity =1

4. Smoking (x4) The fourth factor is the patient's smoking

   Non smoking = 0

   Smoking = 1

5. Genetic factor (x5) The fifth factor is the patient's genetic factor

   Non genetic factor = 0

   Genetic factor = 1

No luck in table (3) that the level of the function of the independent variable(X1) age equals (0.00) which is less than (0.05) so we reject the imposition of the absence that provides the existence of effect concerning the age of the person in the incidence of diabetes That is, the age of the injured has an effect on the disease,it was note that the level of the function of the independent variable (X2) sex equals(0.470) which is greater than(0.05), so we accept the imposition of the absence of effect on the sex of the person in the incidence of diabetes, it was note that the of the function of the independent variable X3 has reached zero and that value is much smaller than (0.05) so we reject the Hypothesis of non that the presence of effect of the body obesity in the incidence of diabetes, which means that this factor has a significant effect in the incidence of the disease and that the result of medical opinion the more the level person is overweight the better the chance of getting, it was also note that the function level of the independent of smoking(X4) equals 0.167, which is greater than(0.05) i.e., there is no effect for smoking on diabetes and we not the function level of Genetic history(X5) equals(0 .000),which is smaller than (0.05) there is effect for Genetic history on diabetes.

Table 3 :Variance Analysis Table using a program

Correlations							
		Infected	**Age**	**Gender**	**Smoke**	**Obesity**	**Family History**
Infected	Pearson Correlation	1	.543**	-.007	-.089	.175*	.413**
	Sig. (1-tailed)		.000	.470	.167	.028	.000
	N	120	120	120	120	120	120
Age	Pearson Correlation	.543**	1	-.034	-.226**	-.092	.159*
	Sig. (1-tailed)	.000		.355	.007	.160	.041
	N	120	120	120	120	120	120
Gender	Pearson Correlation	-.007	-.034	1	-.386**	.033	-.075
	Sig. (1-tailed)	.470	.355		.000	.361	.208
	N	120	120	120	120	120	120

Correlations							
		Infected	**Age**	**Gender**	**Smoke**	**Obesity**	**Family History**
Smoke	Pearson Correlation	-.089	-.226**	-.386**	1	.184*	.027
	Sig. (1-tailed)	.167	.007	.000		.022	.384
	N	120	120	120	120	120	120
Obesity	Pearson Correlation	.175*	-.092	.033	.184*	1	.248**
	Sig. (1-tailed)	.028	.160	.361	.022		.003
	N	120	120	120	120	120	120
Family History	Pearson Correlation	.413**	.159*	-.075	.027	.248**	1
	Sig. (1-tailed)	.000	.041	.208	.384	.003	
	N	120	120	120	120	120	120

**. Correlation is significant at the 0.01 level (1-tailed)., *. Correlation is significant at the 0.05 level (1-tailed).

Discussion

These results were consistent with[7], waynegao[8] found the Excess weight affects two thirds of the U.S. adult population and increases risk for cardiovascular disease and diabetes. All patients should be screened for obesity and most should be screened for pre-diabetes and diabetes. The best treatment for diabetes is prevention. Prevention of diabetes can be accomplished through a 7% weight loss through intensive lifestyle interventions that include caloric reduction and approximately 30 min of daily moderate physical activity[9]. Practitioners will have access to these evidence-based programs soon[10]. The Centers for Disease Control and Prevention are promoting community-based diabetes prevention programs throughout the country[11].

So the results recommend that you continue to conduct statistical and non-statistical research on diabetes due to the abundance and severity of the disease in order to be more informed about solutions to reduce and cure it and the other recommendation was conducted statistical research on the impact of other causative factors, such as sudden shocks, psychological condition, and other factors that have not been examined.

Ethical Clearance: It was part of scientific plan in Nursing College, University of Basra.

Source of Funding: It was by ourselves.

Conflict of Interest: It was nil.

References

1. Global Action Plan for the Prevention and Control of Noncommunicable diseases 2013-2020 (World Health Organization, Geneva, 2016)
2. International Diabetes Federation,'About World Diabetes Day', accessed 2 November 2018 .
3. Amed S, Oram R. Maturity-Onset Diabetes of the Young (MODY): Making the right diagnosis to optimize treatment. Can J Diabetes 2016;40:449–54.
4. Fatima A, Khawaja KI, Burney S, et al. Type 1 and type 2 diabetes mellitus: Are they mutually exclusive? Singapore Med J 2013;54:396–400.
5. Shields BM, Peters JL, Cooper C, et al. Can clinical features be used to differentiate type 1 from type 2 diabetes? A systematic review of the literature. BMJ Open 2015;5:e009088.
6. Naylor R, Philipson LH. Who should have genetic testing for maturity-onset diabetes of the young? Clin Endocrinol (Oxf) 2011;75:422–6.
7. American Diabetes Association Diagnosis and classification of diabetes mellitus. Diabetes Care 2012;35: S64–71.
8. Wayne Gao, Enkhzayachuluunbaatan chi pang wen- smokers with diabetes:Twice as deadly and shortened life by 15 years. Tob. Indue. Dis.2018.
9. Jones AG, Hattersley AT. The clinical utility of C-peptide measurement in the care of patients with diabetes. Diabet Med 2013;30:803–17. 11. R
10. De Franco E, Flanagan SE, Houghton JA, et al. The effect of early, comprehensive genomic testing on clinical care in neonatal diabetes: An international cohort study. Lancet 2015;386:957–63.
11. Patel P, Macerollo A. Diabetes mellitus: Diagnosis and screening. Am Fam Physician 2010;81:863-70.

Polyunsaturated Fatty Acid Intake and Symptom Severity of Patients with Schizophrenia in Ernaldi Bahar Hospital, South Sumatra, Indonesia

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Abstract

Background/Aims: The treatment of schizophrenia is commonly viewed from a pharmacological and social perspective, but issues of nutrient intake are seldom examined. However, the various study reported that polyunsaturated fatty acids (PUFAs) concentration is reduced in the plasma of schizophrenic. Therefore PUFAs intake may have a correlation with symptom severity of schizophrenic. This study aimed to assess the PUFAs intake of schizophrenic and its correlation with symptom severity of of schizophrenic.

Method: This cross-sectional study was conducted on 63 schizophrenia hospitalized patients in Ernaldi Bahar Hospital, South Sumatra, Indonesia. The symptom severity of of schizophrenic were determined using the validated Indonesian version of PANSS. Dietary intake was assessed using a 3-day food weighing. Correlation between variables was determined using the Spearman Correlation Coefficient.

Results: The result showed a significant negative correlation between omega-3 fatty acids and Positive scale, Negative Scale, General psychopathology and risk of aggression with r=-0.345, r= -0.408, r= -0.483, and r= -0.406 respectively ($p<0.01$). The omega-6 fatty acids intake were negatively correlated with Positive scale, Negative Scale, General psychopathology and risk of aggression with r= -0.390, r= -0.496, r=-0.525, and r=-0.389 respectively ($p<0.01$). A statistically significant correlation was seen between ratio of omega-6/ omega-3 and Positive scale, Negative Scale, General psychopathology and risk of aggression with r=0.249, r= 0.256, r= 0.356, r=0.343 respectively ($p<0.01$).

Conclusion: These findings suggest that increasing PUFAs intake might have a positive health outcome in of schizophrenic.

Keywords: *Omega-3, omega-6, ratio of omega-6/omega-3, schizophrenia.*

Introduction

Schizophrenia represent an important public health problem due to their prevalence and associated incapacity. Schizophrenia is a neurodevelopmental and neurodegenerative disorder displaying disturbance in multiple neurotransmission that presents as psychosis, often with paranoia and delusion[(1)]. Symptoms of schizophrenia are classified into positive symptoms, negative symptoms and cognitive symptoms. Positive symptoms include auditory hallucinations, which often criticize or abuse them. These auditory hallucinations can lead to the development of strange beliefs or delusions[(2)]. Negative symptoms are reduced motivation, impoverished speech, blunted affect and social withdrawal[(3)]. Cognitive symptoms have shown as poor executive functioning and working memory. This condition could lead to a suicide attempt in schizophrenic. Suicide mortality rate in schizophrenic is

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higher in this group than in the general population. The lifetime suicide rate among schizophrenic is estimated to be 4% to 10% [4]

Due to the limitations of antipsychotic drugs to achieve adequate rates of clinical remission and functional recovery in schizophrenic have promoted the search for complementary approaches. Recently, the potential of diet and nutrients to improve the mental health of the population and for the treatment of psychiatric disorders being discussed. Previous research suggests that abnormalities myelination and dopamine system have been implicated in schizophrenia, yet the mechanism underlying these abnormalities are not fully [5,6]. Hence PUFAs are essential for neurodevelopment, disturbances of PUFAs metabolism may be involved in the etiology and pathology of neurodevelopmental disorders like schizophrenia. PUFAs are The major constituents of all cell membrane phospholipids and have important role in numerous biological processes including receptor binding, neurotransmission, signal transduction and the synthesis of active metabolites (i.e. eicosanoids) [5,7,8]. Furthermore, previous evidence suggests that PUFA also play a role in myelination[5,9].

The PUFAs have the most functional and are divided into two main types: omega-6 and the omega-3. Arachidonic acid (AA) and docosahexaenoic acid (DHA) are the most abundant fatty acids in the central nervous system. AA, dihomogamma-linolenic acid and eicosapentaenoic acid (EPA) are also important as cell-signaling and enzyme-regulating molecules and as precursors of eicosanoids (prostaglandins, thromboxanes, and leukotrienes). Meanwhile, EPA and DHA showed potential beneficial effects on neuropsychiatric diseases[10,11]. Moreover, The AA/DHA (omega-6/ omega-3) ratio is important in the maintenance of an appropriate level of biological membrane fluidity, which is in turn, essential for ion channel function, membrane receptor activity and the release of neurohormones. Dysfunctional of numerous neurotransmission pathways have been found to be in schizophrenia, which raises the probability that membrane phospholipids that modulate the activity of both receptors and are involved in signal transduction may be implicated of schizophrenia[7]. Since the late 1980s, it has been revealed that PUFA metabolism disturbances in schizophrenic. It has been revealed that deficiencies of PUFA described in red blood cell (RBC) membrane [6,8].

Although, it has been proposed the potential of diet and nutrients to improve the mental health of the population and for the treatment of psychiatric disorders, issues of the nutrient intake of schizophrenic and its correlation psychiatric symptoms in schizophrenia are seldom examined (especially in Indonesia). Therefore, we conducted a study aimed to assess the PUFAs intake of schizophrenic and its correlation with symptom severity of schizophrenic.

Methodology

Study Design and Participants: This cross-sectional study was conducted on 63 schizophrenia hospitalized patients in Ernaldi Bahar Hospital, South Sumatra, Indonesia. Participants with a nasogastric tube and not following all data collection sequences were excluded from the study.

Weighed Food Records: Total daily dietary intake data were collected using a combination of a 3-day record and weighing-back method. Food consumption was then registered by keeping records of amounts served and weighing waste after the meal.

Dietary data were converted into PUFAs intake using the Indonesia fatty acid composition table, Singapore Food Nutrition Composition (Singapore Health Promotion Agency) and Nutrisurvey software.

Symptom Severity of Schizophrenic: Symptomseverity of patients were assessed using Indonesian version of Positive and Negative Syndrome Scale. The assesment was conducted by certified nurse. PANSS consists of 33 items including 7 positive scale items, 7 negative scale items, 16 general psychopathology items, and contains 3 additional points to meet the risk of aggression. PANS is approved by clinicians who are approved and approved on a scale of 1-7 with 1 (none), 2 (minimum), 3 (mild), 4 (moderate), 5 (mild), 6 (severe), 7 (very heavy) with a range of positive and negative scales from 7-49 and range the scale of general psychopathology from 16 to 112.

Statistic Analysis: Only data from subjects completing the study were analyzed. Before analysis, the normality test beforehand on all variables used the Kolmogorov-Smirnov test. Correlation between PUFAs intake (Omega-3; Omega-6; Ratio of Omega-6/ Omega-3) and Psychiatric symptoms (Positive scale; Negative Scale; General psychopathology; Risk of aggression) were tested using the Spearman Correlation Coefficient.

Result

Respondent Characteristics: Characteristics data showed in this study showed that 43 respondents (68.3%) are male and 20 respondents (31.7%) are female. Mean age of the respondent was 36.5 years old with 20 years old for the youngest and 59 years old for the oldest.

PUFAs Intake: This study found that the majority of respondents had an average intake of omega-3 fatty acids that were sufficient and exceeded the recommended adequacy of omega-3 fatty acids with minimum intake 0.5 g and maximum 3.5, meanwhile mostly respondent have omega-6 intake was below the recommended adequacy rate with minimum intake 3.5 g and maximum 16.4 g.

Table 1: PUFAs Intake

PUFA	Median (min-max)
Omega-3 (g/day)	1.20 (0.5-3.5)
Omega-6 (g/day)	6.20 (3.5-16.4)
Ratio of Omega-6/Omega-3	5.00:1 (1.4:1 - 7.6: 1)

The ratio of omega-6 / omega-3 ratio data were obtained from the comparison of omega-6 and omega-3 fatty acid intake of respondents. The distribution of ratio of omega-6 / omega-3 respondents can be seen in the Table 1. A lower n-6 to n-3 PUFAs ratio (ideal ratio around 2:1) consumption has been recommended in order to reduce the formation of pro-inflammatory eicosanoids from omega-6 and to increase the production of anti-inflammatory mediators from omega-3[13].

Psychiatric Symptoms: Several previous studies suggest that the negative symptoms of schizophrenia, including social withdrawal, lack of motivation; decreased affective responsiveness, impoverished speech, and movement, contribute more to poor quality of life and functional outcomes for individuals with schizophrenia than do positive symptoms [15,17]. The result of psychiatric symptoms assessment using PANSS showed in table 2.

Table 2: Psychiatric symptoms

Symptom Severity of schizophrenic	Median (min-max)
Positive scale	14 (7-48)
Negative Scale	13 (7-31)
General psychopathology	33 (18-59)
Risk of aggression	6 (3-15)

Correlation between PUFAs intake with PANSS score: EPA and DHA, play important roles in the development and maintenance of normal central nervous system (CNS) structure and function. Evidence has emerged over the last three decades which suggests that the fatty acid composition of the habitual diet may be relevant to the pathophysiology and potentially etiology of neuropsychiatric disorders including schizophrenia[12,19,20].

Table 3: Correlation between PUFAs intake andsymptom severity of schizophrenic

PUFA	Positive scale	Negative Scale	Generalpsychopathology	Risk of aggresion
Omega-3 (g/day)	-0.345*	-0.408*	-0.483*	-0.406*
Omega-6 (g/day)	-0.390*	-0.496*	-0.525*	-0.389*
Ratio of Omega-6/Omega-3	0.249*	0.256*	0.356*	0.343*

* Significant with *p value*<0 .01

Therefore, we conducted a correlation test between PUFAs intake and symptom severity of schizophrenic (presented in PANSS score). The result showed a significant negative correlation between omega-3 fatty acids and Positive scale, Negative Scale, General psychopathology and risk of aggression. The omega-6 fatty acids intake were negatively correlated with Positive scale, Negative Scale, General psychopathology and risk of aggression. A statistically significant correlation was seen between ratio of omega-6/omega-3 and Positive scale, Negative Scale, General psychopathology and risk of(Table 3).

Discussion

PUFA's dietary deficiency and its metabolism abnormalities have beenlong implicated in the pathophysiology and etiology of recurrent mood disorders including schizophrenia. Previously researchs have provided converging evidence implicating PUFAs insufficiency, and increases omega-6/omega-3 ratio, in

the pathophysiology of mood disorders[19]. Low level of membrane and erythrocite PUFAs have been observed in schizophrenic[1,21]. Meanwhile, Omega-3 fatty acids EPA and DHA are derived from ALA and are dietary essential fatty acids[22]. Hence improve omega-3 intake may reduce psychiatric symptoms in schizophrenicby speeding up the response to treatment and the tolerability of commonly used antipsychotic drugs due to changes in neurotransmission[23,24].

Previous studies also showed that omega-3 and omega-6 fatty acids in the erythrocyte membranes correlated significantly with improvement in PANSS sub-scale scores [25]. Recent studies discussed the possibility that omega-3 fatty acid and dopamine system represent different aspects of the same etiology and pathology of schizophrenia[6,12].

The dopamine system consists of 4 dopaminergic pathways. The nigrostriatal dopamine pathway projects from dopaminergic cell bodies and ends in the caudate nucleus. Low dopamine levels within this pathway are thought to affect the motor organs. The mesolimbic pathway, extending from the ventral tegmental area of the brainstem to axon terminals in limbic areas, plays an important role in the positive symptoms of schizophrenia in the presence of excess dopamine. The mesocortical pathway extends from the ventral tegmental area of the brain stem to the frontal cortex. Low mesocortical dopamine levels cause negative symptoms and cognitive deficits in schizophrenia. The tuberoinfundibular pathway extends from the hypothalamus to the pituitary gland. Normally, the prefrontal dopamine system suppressively controls the limbic dopamine system[6,12,15,26]. Previous research predicts that decrease dietary omega-3 fatty acids cause changes in the double layer of cell membrane phospholip. This changes may decrease dopamine concentration in the frontal lobe[6,12]. This mechanism might explain the relevance of omega-3 fatty acids intake and psychiatric symptoms schizophrenia.

Another PUFAs beside omega-3 also have a critical role in brain development and maintenance of brain structure and function such as omega-6. Previous studies showed that sufficient levels of omega-6 (especially AA) are required to improve neurological health[9]. Meanwhile, AA concentration is found reduced in peripheral blood measures of schizophrenic[5,21]. This condition suggests that increase AA intake may have a positive impact on psychiatric symptoms in schizophrenic. The beneficial effects of omega-3 fatty acids in psychiatric disorders are well publicized, but the omega-6 fatty acids role are seldom discussed. However, these fatty acids (omega-3 and omega-6) are proven involved in the production of eicosanoids and affect the membrane fluidity, by their incorporation into membrane phospholipids[13].

Hence the same enzymes are involved in the generation of long chain n3-PUFAs and long chain n6-PUFAs, ALA and LA and their respective metabolites compete for the same enzymatic machinery. In consequence, high levels of LA may inhibit the conversion of ALA to long chain n3-PUFAs and vice-versa. Consequently, there are strong indications that an increased ratio of omega-6 to omega-3 may reduce the availability of omega-3, which triggers oxidative stress that involved in the pathogenesis of depression[9,20].

Previous study showed that increase omega-6 to omega-3 ratio may be induce of a pro-inflammatory response. Therefore a stronger inflammatory response may increase the production of free radicals and reduce PUFA levels. Reduced anti-inflammatory activity may be involved in negative symptoms and cognitive impairment observed during the acute stages of schizophrenia episodes[27]. Consistent with previous research, the result of our study also showed that the ratio of omega-6 to omega-3 intake has a significant positive correlation and PANSS score.

Conclusion

Nutritional intervention through adequate and balanced intake ofPUFAs might decrease thesymptom severity of schizophrenic which can be seen based on PANSS score, but the improvement inPANSS score is also inseparable from pharmacological and psychological intervention.

Competing Interest: There is no competing interest in conducting this research.

Ethical Clearance: Ethical Approval from Ethics committee of Universitas Esa Unggul was taken (No. 0337-18.327/PKE-KEP/FINAL-EA/UEU/VIII/2018).

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References

1. Mahan LK, Raymond JL, editors. Krause's food & the nutrition care process. Fourteenth edition. St. Louis, Missouri: Elsevier; 2017. 1134 p.

2. Reininghaus U, Dutta R, Dazzan P, Doody GA, Fearon P, Lappin J, et al. Mortality in Schizophrenia and Other Psychoses: A 10-Year Follow-up of the ÆSOP First-Episode Cohort. Schizophrenia Bulletin. 2015 May;41(3):664–73.
3. Arroll MA, Wilder L, Neil J. Nutritional interventions for the adjunctive treatment of schizophrenia: a brief review. Nutrition Journal [Internet]. 2014 Dec [cited 2019 Jul 1];13(1). Available from: http://nutritionj.biomedcentral.com/articles/10.1186/1475-2891-13-91
4. Teraishi T, Hori H, Sasayama D, Matsuo J, Ogawa S, Ishida I, et al. Relationship between Lifetime Suicide Attempts and Schizotypal Traits in Patients with Schizophrenia. Hashimoto K, editor. PLoS ONE. 2014 Sep 16;9(9):e107739.
5. Peters BD, Machielsen MWJ, Hoen WP, Caan MWA, Malhotra AK, Szeszko PR, et al. Polyunsaturated Fatty Acid Concentration Predicts Myelin Integrity in Early-Phase Psychosis. Schizophrenia Bulletin. 2013 Jul 1;39(4):830–8.
6. Ohara K. The n-3 polyunsaturated fatty acid/ dopamine hypothesis of schizophrenia. Progress in Neuro-Psychopharmacology and Biological Psychiatry. 2007 Mar;31(2):469–74.
7. Pawełczyk T, Grancow M, Kotlicka-Antczak M, Trafalska E, Gębski P, Szemraj J, et al. Omega-3 fatty acids in first-episode schizophrenia - a randomized controlled study of efficacy and relapse prevention (OFFER): rationale, design, and method. BMC Psychiatry [Internet]. 2015 Dec [cited 2019 Jun 29];15(1). Available from: http://bmcpsychiatry.biomedcentral.com/articles/10.1186/s12888-015-0473-2
8. Schlögelhofer M, Amminger GP, Schaefer MR, Fusar-Poli P, Smesny S, McGorry P, et al. Polyunsaturated fatty acids in emerging psychosis: a safer alternative?: Polyunsaturated fatty acids in emerging psychosis. Early Intervention in Psychiatry. 2014 Aug;8(3):199–208.
9. Liu JJ, Green P, John Mann J, Rapoport SI, Sublette ME. Pathways of polyunsaturated fatty acid utilization: Implications for brain function in neuropsychiatric health and disease. Brain Research. 2015 Feb;1597:220–46.
10. Balasubramanian N. Omega-3 Fatty Acids: An Adjunct for Schizophrenia. International Journal of Health Sciences. 2013;(2):7.
11. Ristic-Medic D, Vucic V, Takic M, Karadzic I, Glibetic M. Polyunsaturated fatty acids in health and disease. Journal of the Serbian Chemical Society. 2013;78(9):1269–89.
12. Healy-Stoffel M, Levant B. N-3 (Omega-3) Fatty Acids: Effects on Brain Dopamine Systems and Potential Role in the Etiology and Treatment of Neuropsychiatric Disorders. CNS & Neurological Disorders - Drug Targets. 2018 Jun 19;17(3):216–32.
13. Husted KS, Bouzinova EV. The importance of n-6/n-3 fatty acids ratio in the major depressive disorder. Medicina. 2016;52(3):139–47.
14. Sembiring RM, M Amin M, Effendy E. THE DIFFERENCES SCORE OF POSITIVE AND NEGATIVE SYNDROME SCALE NEGATIVE SCALE BETWEEN SCHIZOPHRENIC PATIENTS THAT RECEIVED RISPERIDONE AND RISPERIDONE WITH FLUOXETINE. Asian Journal of Pharmaceutical and Clinical Research. 2018 Apr 26;11(13):39.
15. Patel KR, Cherian J, Gohil K, Atkinson D. Schizophrenia: Overview and Treatment Options. :8.
16. Peralta V, Cuesta MJ, de Leon J. Positive and negative symptoms/syndromes in schizophrenia: reliability and validity of different diagnostic systems. Psychol Med. 1995 Jan; 25(1):43–50.
17. Picchioni MM, Murray RM. Schizophrenia. BMJ. 2007 Jul 14;335(7610):91–5.
18. Amminger GP, McGorry PD. Update on Omega-3 Polyunsaturated Fatty Acids in Early-Stage Psychotic Disorders. Neuropsychopharmacology. 2012 Jan;37(1):309–10.
19. Messamore E, Almeida DM, Jandacek RJ, McNamara RK. Polyunsaturated fatty acids and recurrent mood disorders: Phenomenology, mechanisms, and clinical application. Progress in Lipid Research. 2017 Apr;66:1–13.
20. Knochel C, Voss M, Gruter F, S. Alves G, Matura S, Sepanski B, et al. Omega-3 Fatty Acids: Novel Neurotherapeutic Targets for Cognitive Dysfunction in Mood Disorders and Schizophrenia? Current Neuropharmacology. 2015 Oct 13;13(5):663–80.
21. Reddy RD, Keshavan MS, Yao JK. Reduced Red Blood Cell Membrane Essential Polyunsaturated Fatty Acids in First Episode Schizophrenia at Neuroleptic-Naive Baseline. Schizophrenia

Bulletin. 2004 Jan 1;30(4):901–11.

22. Bozzatello P, Brignolo E, De Grandi E, Bellino S. Supplementation with Omega-3 Fatty Acids in Psychiatric Disorders: A Review of Literature Data. Journal of Clinical Medicine. 2016 Jul 27;5(8):67.
23. Berger ME, Smesny S, Kim S-W, Davey CG, Rice S, Sarnyai Z, et al. Omega-6 to omega-3 polyunsaturated fatty acid ratio and subsequent mood disorders in young people with at-risk mental states: a 7-year longitudinal study. Translational Psychiatry. 2017 Aug;7(8):e1220–e1220.
24. Jamilian H, Solhi H, Jamilian M. Randomized, Placebo-Controlled Clinical Trial of Omega-3 as Supplemental Treatment in Schizophrenia. Global Journal of Health Science [Internet]. 2014 Sep 18 [cited 2019 Jul 3];6(7). Available from: http://www.ccsenet.org/journal/index.php/gjhs/article/view/38466
25. van Rensburg SJ, Smuts CM, Hon D, Kidd M, van der Merwe S, Myburgh C, et al. Changes in erythrocyte membrane fatty acids during a clinical trial of eicosapentaenoic acid (EPA) supplementation in schizophrenia. Metabolic Brain Disease. 2009 Dec; 24(4):659–72.
26. Stahl SM. Stahl's essential psychopharmacology: prescriber's guide. Fifth edition. New York, NY: Cambridge University Press; 2014. 802 p. (Cambridge medicine).
27. Kim S-W, Jhon M, Kim J-M, Smesny S, Rice S, Berk M, et al. Relationship between Erythrocyte Fatty Acid Composition and Psychopathology in the Vienna Omega-3 Study. Carpenter DO, editor. PLOS ONE. 2016 Mar 10;11(3):e0151417.

A Study of Cyber Bullying Behavior in Middle-Schools in Rabat- Morocco: Prevalence and Risk Factors

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Abstract

Background: Cyber bullying is considered a public health issue in many developed countries while in Morocco there is a lack of data about this phenomenon.

Objective: The aim of this study is to investigate the prevalence of cyberbullying among students in middle schools in Rabat and to determine risk factors among students' cyberbullying profiles.

Method: It's a cross-sectional study based on an anonymous self-report questionnaire about inflicted cyberbullying during the last twelve months. Data were collected in 16 middle-schools in the urban area of Rabat. A total of 1914 students aged from 12 to 16 years participated in the study.

We used a Multinomial Logistic Regression to examine the relationship between the cyber bullying categories and our independent variables.

Results: Cyber bullying has been reported by 54,5%(n=1043) of the sample, of which 18,8%(n=360), being victims only, 11,7% (n=224) being perpetrators only, and 24,0% (n=459) being perpetrators/victims. There wasn't a significant difference in profile between genders. Most popular types of cyberbullying behavior were text messages and exclusion from internet groups. Regarding traditional bullying, the prevalences were 35% (n=669) of whom 16,4% (n=313) victims only, 7,6% (n=145) perpetrators only and 11%(n=211) perpetrators/victims. Our study showed that traditional bullying was the main risk factor of cyberbullying.

Conclusion: Cyber bullying is a major issue among students in middle schools in Rabat. The main risk factor is the involvement in traditional bullying. Hence,preventive actions should be taken to help reduce and overcome violence in schools.

Keywords: *Cyberbullying, Middle-schools, Adolescents, Prevalence, risk factors, Morocco.*

Introduction

Cyber bullying has emerged since the advent of information and communication technology (ICTs).

It has grown to become a serious public health concern in many developed countries[1]. This phenomenon is still a major issue among researchers and educators given the severe effects and the strong negative influence among students[2,3]. There are several definitions of cyberbullying, but to date no consensus has been reached. Hinduja defines it as a willful and repeated harm inflictedthrough the use of computers, cell phones, and other electronic devices[4]. Other authors define it as an aggressive, intentional act or behavior carried out by an individual or group of individuals repeatedly, using electronic devices against a victim

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who can not easily defend himself or herself[5]. This phenomenon is characterized by the anonymity of the perpetrator, the rapid diffusion of harmful messages and its persistence over time, the large size of the audience, and the disinhibiting character of the exchanges[6].

As for the traditional Bullying, it's characterized by physical, verbal or relational and social aggressive behavior between peers. According to Olweus (2013), bullying is characterized by an aggressive and repeated behavior and an imbalance of power[7].

The current study aims to investigate the prevalence of cyberbullying among middle-school students in Rabat and to identify risk factors among students' cyberbullying profiles.

Material and Method

Study Population: This survey was conducted from November 1st, 2017 to January 30th, 2018. Data were collected from a sample of students attending middle-school in the urban areas of Rabat. The study was carried out on 1914 participants aged from 12 to 16 years old.

Stages of the Research:

1st Step: The study protocol was approved by the Ethics Committee for Biomedical Research of Mohammed V University in Rabat (IORG0006594). The students were informed of the anonymous and confidential nature of the study. Besides, no investigation was done before getting students' verbal consent.

2nd Step: The study used a cyberbullying self-report questionnaire developed by Hinduja to which we added the item on using the cell phones. It also used the traditional bullying Olweus questionnaire[7,8]. Over all, the questionnaire consisted in 30 questions including socio-demographics traits, ICTs use and the length of connection time, eight items about cyberbullying and twelve items about traditional bullying (Alpha coefficients for this scale were respectively 0,78 for cyberbullying and 0,88 for traditional bullying). The participants were divided into two groups: those involved in cyberbullying and those who were not. The first group was classified into three profiles: victims only, perpetrators only and perpetrator/victim.

Statistical Analysis: The data were analyzed using SPSS software version 23.0. Quantitative variables distribution were reported in average and standard deviation and compared by "student t" test. The qualitative variables were described in percentage and compared by khi-deux test. The confidence interval of 95% was considered statistically significant at 5%. The multinomial logistic regression has been chosen to determine the risk factors.

Results

Socio-demographic characteristics and use of ICTs: The study was carried out on 1914 participants of whom 51.8% were girls. The average age of the students was 13.6 ± 1.1 years, of which 74.9% were between 12 and 14 and 25% were between 15 and 16. This study showed that 67.7% of the participants had a mobile phone and 77.8 among them had been using internet from smartphones. In addition, data showed that 30,4% of the participants have had access to internet several times a day. Moreover,almost the third of participants spent more than 32 hours per week online while half of participants spent more than 4 hours per week online. More than half of the participants were found out to be communicating with their friends (68.9%), searching for information (63.9%), online enjoyment (66%), and 64,1% using Facebook.

Prevalence of cyberbullying and traditional bullying: Prevalence of cyberbullying were 54,5% (n=1043). The participants were categorized into three profiles: victims only 18.8% (n=360), perpetrators only 11,7% (n=224), and perpetrator/victims 24,0% (n=459). There wasn't a significant difference in profile between genders. Considering cyberbullying acts,our study found that boys were more likely to send unpleasant messages, show embarrassing videos and photos of someone without his permission, and make unpleasant phone calls than girls (table 1). Also, participants between 12-14 years old (18,3%) were more likely to be victims only and those between 15-16 years old (35,4%) were more likely to be perpetrators/victims. Regarding traditional bullying the prevalence's were 35% (n=669) with 16,4% (n=313) were victims only, 7,6% (n=145) were perpetrators only and 11% (n=211) were perpetrators/victims.

Table 1: Distribution of different acts of cyberbullying by gender.

Behavior	Perpetration			Victimization		
	Boys n=384	Girls n=353	X^2 p[a]-value	Boys n=398	Girls n=421	X^2 p[a]-value
Send unpleasant text messages	42,2%	25,2%	24,97***	59,3%	54,6%	1,81
Show embarrassing videos and photos of someone without his permission	19,0%	10,5%	10,53**	15,2%	16,8%	0,40
Log in to someone's IM account without his permission and pretend to be him	---	---	---	22,9%	29,5%	4,58*
Take someone's personal mail without permission and publish it	14,6%	10,5%	2,80	20,9%	19,5%	0,24
Hack someone's personal data	31,5%	28,6%	0,73	29,6%	34,4%	2,15
Insult someone online	33,6%	28,9%	1,88	32,2%	40,6%	6,31*
Block and exclude someone from the online group	54,7%	57,5%	10,37**	33,2%	39,2%	3,21
Connect to the IM account of a friend without his consent and claim to be him	31,3%	31,2%	0,59	---	---	---
Make unpleasant phone calls	25,5%	15,9%	0,001	24,6%	24,5%	0,003

Note: [a]*P*-value by X^2 test, ****p*<0.001; ***p*<0.01; **p*<0.05.

Risk Factors of Cyberbullying: Multinomial logistic regression showed that 12 of the fifteen predictors effectively predicted perpetrator/victim profile. The latter was correctly identified in 62 % of instances while victims only were identified in 8,9 % of instances only. The pseudo-r^2 (Nagelkerke) was 0, 32 indicating a moderate fit between the model and the data.

The main cyberperpetrators/cybervictims risk factors were being traditional bully/victim OR 9,85 *p*< à 0,001, duration spent online a week more than 32 hour OR= 9,63 *p*< 0,05, talking about cyber bullying OR 3,41 *p*< 0,001, parental conflict OR 2,59, *p*<0,001. Regarding victims only the main risk factors were: talking about cyber bullying OR 3,03 *p*<0,001, being a traditional bully/victim OR 2,91 *p*< 0,001 and parental conflict OR 2,16 *p*<0,001. Duration spent online a week was also a main risk factor OR 8,06, but it was statistically insignificant (table 2).

Table 2: Multinomial regression analysis of risks of cyberbullying

Variables	Adjusted OR CI 95% (n=1914, Nagelkerke R^2= 0,32, p< 0.001)		
	Victim only	Perpetrator only	Perpetrator/victim
Sociodemographic charactaristics			
Age 12-14 (yes)	0,77(0,55-1,06)	0,73(0,50-1,06)	0,52***(0,38-0,72)
Private school (yes)	0,56**(0,37-0,85)	0,39***(0,23-0,64)	0,41***(0,26-0,63)
Traditional bullying			
victim	1,85**(1,26-2,72)	1,44(0,89-2,32)	3,88***(2,68-5,64)
bully	1,62(0,94-2,80)	1,97*(1,08-3,58)	3,03***(1,81-5,06)
Bully/victms	2,91***(1,68-5,03)	3,31***(1,81-6,07)	9,85***(6;01-16,15)
Technology use			
Have a computer (yes)	0,98(0,71-1,34)	1,31(0,92-1,98)	1,57**(1,15-2,14)
Duration spent online per week			
>32 hour	8,06(0,99-65,65)	4,44(0,53-36,66)	9,63*(1,08-85,90)
17-32 hour	6,02(0,73-49,29)	3,53(0,42-29,36)	7,46(0,83-66,94)

Variables	Adjusted OR CI 95% (n=1914, Nagelkerke R^2= 0,32, p< 0.001)		
	Victim only	Perpetrator only	Perpetrator/victim
4-16 hour	3,66(0,45-29,37)	2,31(0,28-18,70)	3,18(0,36-28,07)
searching for information(yes)	0,59**(0,44-0,79)	0,59**(0,42-0,84)	0,41***(0,30-0,55)
Publish blogs (yes)	1,30(0,94-1,79)	1,04(0,71-1,52)	1,75**(1,27-2,40)
Snapshat use (yes)	0,86(0,59-1,26)	1,61*(1,07-2,42)	0,99(0,68-1,45)
Facebook use (yes)	1,10(0,81-1,49)	1,29(0,89-1,87)	1,67**(1,20-2,33)
Family			
Parental Conflict (yes)	2,16***(1,59-2,94)	1,35(0,92-1,98)	2,59***(1,90-3,54)
Students' reaction to cyberbullying			
Talking about cyberbullying (yes)	3,03***(2,22-4,14)	1,88**(1,28-2,74)	3,41***(2,49-4,68)
Communicating with their friends (yes)	1,51*(1,08-2,11)	1,61*(1,08-2,40)	1,45*(1,03-2,05)

The reference group was the group of participants who were not involved of cyberbullying. ote: ***p<0.001; **p<0.01; *p<0.05.

Discussion

This study showed that the prevalence of cyberbullying was considerably important; more than half of the participants were involved in cyberbullying. There is a lack of data about cyberbullying in middle school in our country. However, worldwide the prevalence of cyberbullying varies from one author to the other. Some reported high prevalence as chu (74.6%) and Ghiomisi (62.2 %)[9,10]. Whereas others less prevalence as lee (34,5%) and Kowalski (11%)[11,15]. This variability may be influenced by the difference in measurement tools, definitions used, the duration of the study, age, cultural context or internet access in each country[12,13].

Our results indicated also that gender was not significantly associated with different profiles of cyberbullying. These data were in line with the previous studies. For some studies there were no gender differences[14]. For others, cyberbullying has a gender and profile dimension. Some authors suggested that girls were more often victims[15], while others suggested they were more often perpetrator/victims[16]. Furthermore Boys were more likely than girls to be perpetrators[17,18]. By sharp contrast,this survey documented that the predominant cyberperpetration behavior experienced by boys was sending unpleasant text messages and excluding the other from the group online. The most frequent act of cybervictimization received by both boys and girls was receiving unpleasant text messages online. These results were consistent with the previous studies[19]. These text messages that are privileged by the adolescents could be seen as a means of liberation allows them to let out their aggressive behavior.

Considering risk factors of cyberbullying, this study showed that the main one was being involved in traditional bullying as bully/victim. This finding mirrors the results of previous studies[19,20]. The perpetration of aggressive acting online seems to be a more acquired behavior. In fact,it may be an extension of traditional school bullying.

Our results showed that prevalence of cyberperpetrators/victims was higher than traditional bully/victim. This finding was different from those of the previous studies[21]. This conflicting result should take into account the Moroccan context. Perhaps the adolescents in our country use cyberbullying more than the traditional bullying to take revenge hiding behind the screen.

Our results revealed that spending more time online and talking frequently about cyberbullying increase the odds of being perpetrators/victims. This finding was in line with previous researches[19,20]. This result showed that the adolescents must have knowledge of the risk of using ICTs. High internet use increases probability of becoming involved in cyberbullying. Moreover, the more talking about it the more usual it becomes. Perhaps those involved in cyberbullying are encouraged by wrong crowd. Consequently, adolescents should be sensitized of the risks of using ICTs.

In addition, parents' conflict was associated with the risk of cyberbullying. This is consistent with previous studies. The family conflict has a major impact on adolescents' behavior. Indeed, in Morocco, Boughima

et al in 2017 showed that 74.8% of women experienced violence at home. Adolescent witnessed violence on their mothers in 93% of cases and were beaten with their mothers in 66.5% of cases. Such violence may be transmitted to youths and expressed through cyberbullying. The adolescents prioritize parental tyranny and become tyrant themselfs. That's why parents should care more about the stability of the couple and its consequences on the future behavior of their child[22,23].

Although the sample was larger, this study has a limitation: The prevalence was limited only to the region of Rabat. Therefore, we cannot generalize the results to all Morocco. More extensive researches across the country are needed to access other risk factors and to identify students at risk early and determine the impact of Cyberbullying

Conclusion

To sum up, cyber bullying is a real social phenomenon in middle-schools. More than half of the participants were involved. The most important risk factors were: traditional bullying,time spent on internet, family conflicts, or talking about cyberbullying. Hence, parents, educators and health professionals should be aware of these risk factors. Information and prevention programs should be taken to help reduce and overcome violence in schools.

Conflict of Interest: No

Source of Funding: No

Ethical Approval: The procedures were carried out in accordance with the recommendations of the Internal Ethics Committee of the Center for Doctoral Studies, Faculty of Medicine and Pharmacy, Mohammed V University, Rabat, Morocco. This procedure was examined and approved by the Committee.

References

1. Savage MW, Tokunaga RS. Moving toward a theory: Testing an integrated model of cyberbullying perpetration, aggression, social skills, and Internet self-efficacy. Computers in Human Behavior. 2017;71:353–361.
2. Brown CF, Demaray MK, Secord, SM. Cyber victimization in middle school and relations to social emotional outcomes. Computers in Human Behavior. 2017;35:12–21.
3. Palermiti AL, Servidio R, BartoloMG, Costabile A. Cyberbullying and self-esteem: An Italian study. Computers in Human Behavior. 2017;69:136–141.
4. Hinduja S, & Patchin JW. Bullying beyond the schoolyard: Preventing and responding to cyberbullying. 2nd ed. Thousand Oaks, CA; 2015a. Sage Publications
5. Smith PK, Mahdavi J, Carvalho M, Fisher S, Russell S, Tippett N. Cyberbullying: Its nature and impact in secondary school pupils. Journal of Child Psychology and Psychiatry. 2008;49:376–385.
6. Mason KL. Cyberbullying: A preliminary assessment for school personnel. Psychology in the Schools. 2008;45(4):323–348.
7. Olweus D. School Bullying: Development and Some Important Challenges. Annual Review of Clinical Psychology. 2013;9(1):751–780.
8. Hinduja S, Patchin JW. Bullying, Cyberbullying and Suicide. Archives of Suicide Research. 2010;14(3):206-221.
9. Chu XW, Fan CY, Liu QQ, Zhou ZK, Cyberbullyingvictimization and symptoms of depression and anxiety among Chinese adolescents: Examininghopelessness as a mediator and self-compassion as a moderator, Computers in Human Behavior. 2018;86:377-386.
10. Gkiomisi A, Gkrizioti M, Gkiomisi A, Anastasilakis DA, Kardaras P. Cyberbullying Among Greek High School Adolescents. The Indian Journal of Pediatrics. 2017May;84(5): 364–368.
11. Lee C, Shin N. Prevalence of cyberbullying and predictors of cyberbullying perpetration among Korean adolescents Computers in Human Behavior. 2017;68:352- 358.
12. Selkie EM, Fales JL, Moreno MA. Cyberbullying Prevalence Among US Middle and High Schoole Aged Adolescents: A Systematic Review and Quality Assessment. Journal of Adolescent Health. 2015;58(2):125-33.
13. Li Q. A cross-cultural comparison of adolescents' experience related to cyberbullying, Educational Research. 2008;50(3):223-234.
14. Williams KR, Guerra NG. Prevalence and predictors of Internet bullying. Journal of Adolescent Health. 2007;41:14–21.
15. Kowalski RM, Limber SP. Electronic bullying among middle school students. Journal of

Adolescent Health. 2007;41: S22-S30.

16. Pettalia JL, Levin E, Dickinson J. Cyberbullying: eliciting harm without consequence. Computers in Human Behavior. 2013; 29:2758–2765.
17. Aricak T, Siyahhan S, Uzunhasanoglu A, Saribeyoglu S, Ciplak S, Yilmaz N, et al. Cyberbullying among Turkish adolescents. CyberPsychology & Behavior. 2008;11(3):253-26l.
18. Barlett C, Coyne SM. A meta-analysis of sex differences in cyber-bullying Behavior, The moderating role of age. Aggressive Behavior. 2014;40(5):474–488.
19. Zhou Z, Tang H, Tian Y, Wei H, Zhang F, Morrison CM. Cyberbullying and its risk factors among Chinese high school students. School Psychology International.2013;34(6): 630–647
20. Mishna F, Khoury-Kassabri M, Gadalla T, DaciukJ. Risk factorsfor involvement in cyberbullying: Victims, bullies and bully-victims. Children & Youth Services Review. 2012; 34(1): 63–70.
21. Modecki KL, Minchin J, Harbaugh AG, et al. Bullying prevalence across contexts: A meta-analysis measuring cyber and traditional bullying. Journal of Adolescent Health. 2014; 55:602–611.
22. Boughima FA, Razine R, Benyaich H, Mrabet M. The profile of women victims of domestic violence in Morocco. La revue de médecinelégale. 2018sept;9(3):96-102.
23. Chen Q, Lo CKM, Zhu Y, Cheung A, Chan K L, Ip P.Family poly-victimization and cyberbullying among adolescents in a Chinese school sample. Child Abuse & Neglect. 2018;77:180–187.

The Correlation of Dental Caries with Parents Education Science Level at Ar-Rahmah Islamic Elementary School Tamalanrea Makassar, South Sulawesi

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Abstract

Introduction: Common dental diseases or disorders are dental caries. The initial cause of dental caries is plaque. Plaque is a soft layer composed by a group of microorganisms that multiply in a matrix that is formed and attached to the surface of the uncleaned tooth. The problem of dental caries in Indonesia is still a problem that needs attention. The results of research that have been done, obtained almost 80% of the population in Indonesia suffer dental caries and children who suffer caries is about 90%.Childhood is the beginning of behavior formation. Not surprisingly, they are quite susceptible to experience in health status changes, including dental health. Therefore, dental health maintenance in children should involve the interaction of various parties, in which case the child itself, parents, and doctors. The knowledge, attitudes, and behavior of all these components affect the dental health status of the child. In children, the influence of parents is very strong. Attitudes and behavior of parents, especially mothers, in dental care gives a significant effect on the attitudes and behavior of children.

Objectives: To see the relationship between prevalence of dental caries at SDIT Ar-Rahmah Tamalanrea with parents education level.

Research Method: A total of 301 students of SDIT Ar-Rahmah were involved in this study with sampling method, by total sampling.

Result:The percentage of dental caries cases by children's age are at 11 years old is 2.71%, the largest percentage of children's dental caries cases by gender are female of 0.73%, the largest percentage of dental caries cases based on the parents occupation are in children whose their parents work as imam mosque and others of 100%, the largest percentage of dental caries cases based on the parents education level is in children whose their parents had non-bachelor education level of 1.92%.

Conclusion: The magnitude of correlation between prevalence of children dental caries with parent education level at SDIT Ar-Rahmah Tamalanrea is 0,046 with significance about 0,358. This shows that there is no correlation between prevalence of children dental caries with parental education level.

Keywords: *Prevalence, dental caries, parents education level*

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Introduction

Common dental diseases or disorders are dental caries. The initial cause of dental caries is plaque. Plaque is a soft layer composed by a group of microorganisms that multiply in a matrix that is formed and attached to the surface of the uncleaned tooth. The results of

research that have been done, obtained almost 80% of the population in Indonesia suffer dental caries and children who suffer caries is about 90%. Generally, school-age children like to consume sweet foods and beverages that generally contain sucrose sugar type, which is one of the factors that cause dental caries.[1]

Dental caries is an infectious disease that damages tooth structure. These diseases cause tooth cavities Dental caries is spread around the world, where the disease can not be healed by itself. Dental caries can be inhibited only by good filling. The structure of tooth elements and the factors that affect the occurrence of caries teeth should be known, if we want to know how the process of dental caries.Dental caries can be experienced by everyone and can occur on one or more teeth surfaces and may extend to the deeper parts of the tooth, for example from enamel to dentin or to the pulp.[2,3,4]

In addition to the four factors associated with caries above, there are also external risk factors such as age, gender, education level, economic level, environment, attitudes and behaviors related to dental health. In the field of dental health many theories prove that behavioral science is often ignored and that is a mistake.[5.6]

Childhood is the beginning of behavior formation. Not surprisingly, they are quite susceptible to experience in health status changes, including dental health. Therefore, dental health maintenance in children should involve the interaction of various parties, in which case the child itself, parents, and doctors. The knowledge, attitudes, and behavior of all these components affect the dental health status of the child.[7,8]

In modern humans that living in industrialized societies, caries is common but caries frequency differs in each country and among individu within the country itself. The prevalence of caries in children in developing countries is increasing rapidly.[9, 10]

Dental caries of Indonesian children, especially toddlers, is very apprehensive.Nearly nine out of ten children suffered caries with seven of the 20 damaged teeth. The result of SKRT which states dental caries in children is a serious problem in oral health in Indonesia with prevalence up to 90,05%, especially at school age. This is also a proof of the lack of public behavior awareness to maintain oral health.[11,12, 13]

At least 90% of children have experienced dental caries problems since the age of five due to bottle-feeding behavior in late childhood, food consumed, and the wrong brushing technique. As many as 90% of Indonesian children (ages 0-16 years) suffer from dental caries. Children who experience dental caries easily experience abnormal tooth growth, for example, protruded teeth. Not only that, dental caries can also make teeth easy to fall out prematurely.[15,14]

The tooth cavity is the place where millions of bacteria enter the blood vessels can cause the spread of bacteria and toxins that cause infections in other body parts such as the respiratory tract, heart, sepsis and brain.[16]

Based on caries stage (Depth of Dental Caries)[11]

a. Superficialis Caries

b. Media Caries

c. Profunda Caries

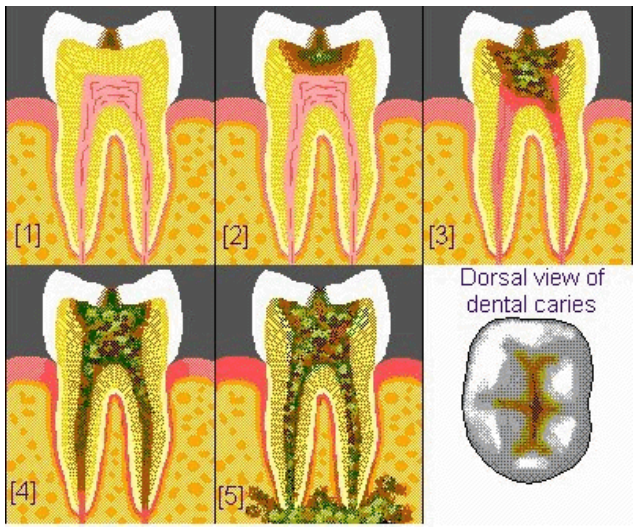
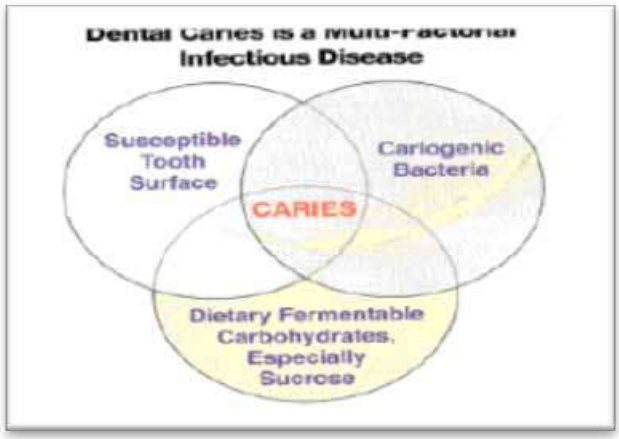


Figure 1: Caries Stadium: (1) superficial caries, (2) media caries, (3) Profunda caries stage I, (4) Profunda caries stage II, (5) caries profunda stage III. Source: Available from: halim87dentist. wordpress.com/.../. Accessed on: 30/10/2009.

Etiology of Caries: The theory of caries etiology develops with the development of medical science.[10]



Source: Available from: www.dentalgentlecare.com/images/cariesdentalcirc.gif Accessed on: 30/10/2009.

Figure 2: Scheme of dental caries

Individual awareness, attitudes and behavior to wards dental health: Dental and oral health issues are closely related to social, psychological, cultural and economic factors. The character of the social structure and individual status in social status has a role to play as a symptom is shown and overcome . Since dental and oral problems are not a life-threatening problem, they are often ignored so it is important to provide a better understanding to the individual about how dental and oral health should be perceived.[17,18]

The prevention and control of caries: Prevention of dental caries from an early age is an absolute thing, which means must be aware of the initial symptoms, such the emergence of invisible small holes like the chalk on the surface of the tooth. Every time we eat, food remnants and bacteria form an acidic substance that can dissolve minerals in tooth enamel and form a small, invisible hole.[19]

Parent Role: Parents role in the supervision of brushing teeth and bringing the child for tooth examination in dentist is still low. There are no relationship between the role of health officer and sport teacher with students' toothbrushing behavior. Parents role has a correlation with the dental caries experience status, periodontal status and students oral hygiene.[21]

Objectives; Based on explanation above, the authors are interested to conduct research about "The Relationship Between Prevalence of Children Dental Caries in SDIT Ar-Rahmah Tamalanrea with Parents Occupation and Education Level".

Research Method

This research type is observational analytic. The sample of this research is all students of SDIT Ar-Rahmah Tamalanrea Makassar about 300 students. First, socialization to the school concerned, principals and teachers about the intent and purpose of research conducted in the school. Take the names of all the students at SDIT Ar-Rahmah Tamalanrea. Calling the students one by one then record the full name, age, gender, parent's occupation, and fill the table containing the child's teeth status by performing dental examinations that have caries on all teeth of the child. After all data has been recorded, then process the data by calculating the total data from each type of data based on age, gender, type of parent's occupation, and parent education level.

Results

Based on the data of the research conducted on all the students of class I to VI in SDIT Ar-Rahmah Tamalanrea Makassar about 300 children, while n in the table is the number of children x the total number of teeth examined in each child, to know prevalence of dental caries in children, then the presentation of the data can be seen in the table and the following graph.

Table 1: Prevalence of Children Dental Caries Based on Student's Age

Age	N	D		M		F		DMF-T		Normal	
		Total	%	Total	%	Total	%	Total	%	Total	%
6	14476	282	1.95	47	0.33	0	0	329	2.27	14147	97.73
7	20822	266	1.28	82	0.39	11	0.05	359	1.72	20463	98.28
8	11872	153	1.29	64	0.54	7	0.06	224	1.89	11648	98.11
9	12087	189	1.56	30	0.25	18	0.15	237	1.96	11850	98.04
10	10203	132	1.29	38	0.37	9	0.09	179	1.75	10024	98.25
11	3108	54	1.74	27	0.87	3	0.09	84	2.71	3024	97.29
Total	**72568**	**1076**	**1.48**	**288**	**0.39**	**48**	**0.07**	**1412**	**1.95**	**71156**	**98.05**

Based on the table above can be seen that DMF-T in children examined about 300 children by age then there were 44 children aged 6 years (2.27%), 58 children aged 7 years (1.72%), 53 children aged 8 years (1.89%), 51 children aged 9 years (1.96%), 57 children aged 10 years (1.75%), 37 children aged 11 years (2.71%).While normal aged 6 year (97.73%), aged 7 years (98.28%), aged 8 years old (98.11%), aged 9 years (98.04%), aged 10 years (98.25%), aged 11 years (97.29%).

Table 2: Prevalence of Dental Caries by Gender

Gender	N	D		M		F		DMF-T		Normal	
		Total	%	Total	%	Total	%	Total	%	Total	%
Male	125999	604	0.48	149	0.12	20	0.02	773	0.61	125226	99.39
Female	87680	472	0.54	139	0.16	29	0.03	640	0.73	87040	99.27
Total	213679	1076	0.51	288	0.14	49	0.02	1413	0.66	212266	99.34

Based on the table above can be seen that DMF-T in children examined about 300 children by gender then there were 163 children with male gender (0.61%) and 137 children with female gender (0.73%).While in normal, boys were (99,39%) and girls were (99.27%).

Table 3: Prevalence of Dental Caries by Occupation Type of Parents

Code	N	D		M		F		DMF-T		Normal	
		Total	%	Total	%	Total	%	Total	%	Total	%
1	219438	752	0.34	208	0.09	42	0.02	1002	0.46	218436	99.54
2	3875	100	2.58	16	0.41	9	0.23	125	3.23	3750	96.77
3	9600	192	2	46	0.48	2	0.02	240	2.5	9360	97.5
4	150	20	13.33	10	6.67	0	0	30	20	120	80
5	100	12	12	8	8	0	0	20	20	80	80
Total	233163	1076	0.46	288	0.13	53	0.02	1417	0.61	231746	99.39

Information:

1. **Civil Servants:** Lecturers, teachers, government officials, doctors.
2. **Private:** Private employees.
3. **Self-Employed:** Merchants, entrepreneurs, bricklayers, construction workers.
4. **Police:** Police
5. **TNI:** Army/TNI

Based on the table above can be seen that DMF-T in children examined about 300 children based on the occupation type of parents then there were 219 children (0.46%), private were 31 children (3.23%), self-employed were 40 children (2.5 %), police were 5 children (20%), soldiers were 5 children (20%).While in normal children who work as civil servants were 99.54%, private were 96.77%, self-employed were 97.50%, police were 80%, soldiers were 80%. It can be seen in the following graph.

Table 4: Prevalence of Dental Caries Based on Parents Education Level

Parents Education Level	n	D		M		F		DMF-T		Normal	
		Total	%	Total	%	Total	%	Total	%	Total	%
Bachelor	287928	871	0.31	242	0.08	48	0.02	1161	0.41	286767	99.59
Non-Bachelor	13312	205	1.54	46	0.35	5	0.04	256	1.92	13056	98.08
Total	**301240**	**1076**	**0.36**	**288**	**0.09**	**53**	**0.02**	**1417**	**0.47**	**299823**	**99.53**

In the prevalence of children's dental caries by parents education level, then the lowest percentage in 248 children with bachelor education level was 0.41%, which decay 0.31%, missing 0.08%, and filling 0.02%. The largest percentage of the 52 children with non-bachelor education level was 1.92%, where the decay is 1.54%, missing 0.35% and filling 0.04%.This indicates that the higher the educational level like bachelor the lower percentage of dental caries in the school. It can be seen in the following graph.

Table 5: Relationship between Prevalence of Dental Caries Based on Parents Education Level

Correlations			
		Prevalence of Dental caries	**Level of Parent Education**
Prevalence of Dental caries	Pearson Correlation	1,000	.048
	Sig. (2-tailed)		.410
	N	300,000	300
Level of Parent Education	Pearson Correlation	.048	1,000
	Sig. (2-tailed)	.410	
	N	300	300,000

From the correlation test conducted between the prevalence of dental caries with parents' education level at SDIT Ar-Rahmah Tamalanrea we obtained value of 0.048 with significance of 0.410. These values indicate that there is no correlation between the prevalence of dental caries and parents' education level.

Conclusion

From the results of conducted research on all students of SDIT Ar-Rahmah Tamalanrea Makassar from class I to VI as many as 300 students can be concluded hat:

1. The largest percentage of children's dental caries cases based on age are at age 11 years of 2,71% or 37 children.
2. The largest percentage of children's dental caries based on gender is in girls of 0.73% or 137 children, whereas in boys of 0.61% or 163 children.
3. The largest percentage of children's dental caries based on parents occupation are in children whose parents work as private employees is 3.23% or 31 children whereas in children whose employment as a civil servant is 0.46% or 219 children.
4. The largest percentage of dental caries cases based on the parent's education level is in children whose parents education level of non-bachelor is 1.92% or 52 children whereas in children with bachelor education level is 0.41% or 248 children.
5. Correlation magnitude between the prevalence of dental caries in children with parent's education level on SDIT Ar-Rahmah Tamalanrea is 0,048 with significance of 0.410. This shows that there is no correlation between prevalence of children's dental caries with parental education level.

Conflict of Interest: The authors declare that they have no conflict of interest.

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Ethical Clearance: Author was taken ethical clearance from Education Science Committee.

References

1. Asri Ruth and Lestari Sri. Dental caries and Oral Hygiene Pupils SDN Panusupan I Radudongkal District Pemalang Regency Central Java. Journal of the Indonesian Dental Association-May 2005; 1; 28-32.
2. Dental Caries [Internet]. Wikipedia [cited 31 September 2009]. Available from: http://en.wikipedia.org/wiki/dental_caries
3. Riani Dewi, Sarasati. The Role of Food Patterns to Dental Caries on Children (The Role of Food Patterns to Dental Caries on Children). Journal of the Indonesian Dental Association-May 2005; 1; 14.
4. Heriandi S. Prevention in Child Dentistry. Dentistry University of Indonesia. Jakarta, 2000
5. Octiara Essie and Roesnawi Yati. Dental caries, oral

hygiene and dental hygiene in children's orphanage Pungai in Binjai. Journal Dental Dentika-Vol 6; 1; 18-23.

6. R.Soebroto. Dental Health Education Method. Journal of Scientific and Technological Dentistry-November 2007 Vol: 2; 65-68.
7. Tanti Ardiyanti Train the Child Maintain Cleanliness and Dental Health Since Early Age [Internet]. [cited 31 September 2009]. Available from: http://www.pdgionline.com/v2/index.php?option=com_content & task=view & id=672 & Itemid=1.
8. Mother's Behavior Determine Child's Dental Health. [cited 24 September 2009].Available from: http://rumahkusorgaku.wordpress.com/2008/07/25/perilaku-ibu-tentukan-kesehatan-gigi-anak/
9. Kidd Edwina and Joyston Sally. Interpreting: Sumawinata Narlan and Faruk Safrida. Basics of Cervical Disease and its Prevention. Medical Book Publishers EGC: Jakarta; 2002.
10. Suwelo Ismu Suharsono. Dental caries in children with various etiological factors. Medical Book Publishers EGC: Jakarta;992.
11. Tarigan Rasinta. Dental caries. Printed IV. Hippocrates:Jakarta, 1990.
12. Flour Tablet Prevent Dental Caries [Internet]. Solusi Kesehatan [Cited 20 September 2009]. Available from: http://solusikesehatan.net/index2.php
13. Asmawati. Analysis of Dental caries relationships and nutritional status of children aged 10-11 years in SD Athirah, SDN 1 Bawakaraeng and SDN 3 Bangkala. Dentofasial Journal of Dentistry-October 2007 Vol.6: 2; 78-79.
14. Caries Attack 90 Percent Of Children Since Age 5 Years [Internet].[cited 31 September 2009]. Available from: http://www.pikiran-rakyat.com/index/php
15. Avoid tooth cavities [Internet]. Deplujunior [Cited 31 September 2009]. Available from: http://deplujunior.org/koran-berani.html.
16. Highest Perforated Tooth Disease in Indonesia [Internet]. [cited 31 September 2009]. Available from: www.kabarbisnis.com/umum.html.
17. Tooth [Internet]. [Cited 31 September 2009]. Available from: http://en.wikipedia.org/wiki/tooth.
18. Kartika W. Dental and Oral Health Services Needs At Low Income Communities. Scientific Scientific Dentistry (Scietific Journal in Dentistry) -September 2007 Wol.22: 3; 91-97.
19. Foods as Causes of Caries Occurrence [Internet]. [Cited 31 September 2009]. Available from:www.uniklinikum-giessen.de/erhaltung/Karies.
20. DentalCarePerforated [Internet]. [Cited 31 September 2009]. Available from: www.kabarbisnis.com/umum/285737_penyakit_gigi_berlubang_tertinggi_di_indonesia.html
21. Magdarina. Systemic Fluorine and Dental Health [Internet]. [Cited 31 September 2009]. Available from: www.kalbe.co.id/files/cdk/files/52_15_Flour.

Prevalence of Diabetes Mellitus among Stroke patients in King Fahad Specialist Hospital, Buraidah, 2018

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Abstract

Background: Globally there is a paradigm shift is started from increasing non communicable diseases trend,of which diabetes mellitus is increasing and it acts as a background for shoot up of stroke cases in the society. Stroke is having significant impact on mortality, morbidity, also leads to physically and economically making the person as handicapped.

Objectives: To estimate the prevalence, glycaemic control and risk factors of the diabetes mellitus among the stroke patients.

Methodology: This was a institutional based cross sectional study carried out in the King Fahad Specialist Hospital (KFSH), Buraidah. Sample size of 134 among the stroke patients during the period of June 2018 to June 2019. Data was entered in SPSS version 21.0 and necessary statistical tests like simple proportions, chi square test and logistic regression analysis were applied.

Results: prevalence of Diabetes mellitus among the stroke patients was 33.6%. Of all the stroke patients, about 85.1% were having any limb (upper limb or lower limb) weakness or paralysis. Approximately 68.2% were having Hb A1 C level > 7% among the diabetes with stroke patients and near to 80.6% patients were from ischaemic stroke. Hypertension was significantly associated with diabetes among the stroke patients (P<0.01).

Conclusions: Based on the study results,prevalence of diabetes among stroke patient was relatively little high, two thirds of diabetic patients were having poor glycaemic control. In addition to diabetes, we found high prevalence of hypertension, dyslipidaemia among the stroke patients.

Keywords: *Age, sex, Diabetes, hypertension, lipid status, Stroke, BMI.*

Introduction

Stroke is an abrupt onset of neurological deficit that is attributed to a vascular cause. [1] It is diagnosed clinically and any laboratory diagnosis only helps in supporting the initial diagnosis.[2]. In 2017, WHO classified stroke as the second leading cause of death worldwide after cardiovascular disease .[3] Locally, a study that published from King Khalid university,Abha shown the prevalence of stroke in Buraidah 64/100000 per year.[4]

In general, cardiovascular diseases (CVD), including stroke, are major healthcare issues in both developing and developed countries with deleterious effects at individual, family and societal levels. Between 2010 and 2030, the estimated total direct medical costs would escalate from $273–$818 billion in the United States alone.[5]Diabetes mellitus is known as a major risk factor for stroke, apart from hypertension, ischemic

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heart disease, alcoholism, smoking, family history and hyperlipidemia.[6] Saudi Arabia has high prevalence of diabetes mellitus according to the statistics mentioned in the Saudi Health Information Survey Handbook 2013 diabetes mellitus prevalence was estimated to be 13.4% among adults .[7]

As you all know Diabetes Mellitus prevalence is increasing all over the world due to environmental and life style modifications acting combine to increase the disease. As a result of Diabetes incidence and prevalence, indirectly stroke patients are increasing. Need self care, adoption of preventive strategies and strict adherence of medication helpful for minimizing the disease associated complications. In view of huge morbidity and mortality patterns associated with Diabetes mellitus and economic burden on the families, there were many studies conducted to know the prevalence of Diabetes among community and hospitals in our kingdom and other countries. But, there is less available information about prevalence of diabetes mellitus among stroke patients.

In view of the above situations, and due to the importance of the prevalence of diabetes mellitus among stroke patients and lack of much published information in our region. We planned to conduct this study in Buraydah in tertiary care center - King Fahad Specialist Hospital (KFSH) to find the clinical profile of the stroke patients.

Objectives:

1. To estimate the prevalence of diabetes mellitus among stroke patients in King Fahad Specialist Hospital.
2. To find the socio demographic characteristics, glycaemic control and other risk factors of Diabetes among the stroke patients.

Patients and Method

Description of the Study Area and Location: King Fahad Specialist Hospital: Big tertiary health care centre for the Al qassim province having 385 bedding capacity and catering specialist services and sub speciality.

Target Population: All stroke patients in the represented areas of King Fahad Specialist Hospital.

Study Design and Setting: This was a institutional based cross sectional study carried out in the Stroke unit area of King Fahad Specialist Hospital (KFSH), Buraidah. New Stroke patients that admitted in medical department in King Fahad Specialist Hospital, Buraidah. An interview based questionnaire was designed and information collected from the patients who were conscious. Those who were seriously ill, comatose patients, information taken from the close relatives of the patients.

Study Period: This study was conducted from June 2018 to June 2019.

Sample Size:135 Participants. Sample size was calculated using WHO software for sample size determination . At 95% confidence level, 7% precision and an expected prevalence of 22% of diabetes among stroke patients.

Sampling method: It will be sample of all the stroke cases in KFSH will be taken for the research.

Inclusion Criteria: All stroke patients admitted in King Fahad Specialist hospital whose age above 20 years of age.

Exclusion Criteria: Transient ischaemic patients, brain tumour patients

Method of Data Collection: An interview questionnaire was prepared in consultation with the experts in the Family medicine department, Internal Medicine and neurologist working in the King Fahad specialist hospital and supervisor of the research project. All the study subjects were explained in detail about the purpose, importance and confidentiality about the disease.

Random blood glucose and HbA1C: In case of newly detected diabetes individuals, random Blood sugar more than 200mg/dl and HbA1C more than 6.5% considered by the hospital clinicians and also in my study as a criteria and lab values were taken from the records. For the glycaemic control among the diabetic patients as therapy, cut of point of less than 7% taken as good control and more than 7% taken as uncontrolled glycaemic status [8,9].

Ethical Clearance: Institutional ethical committee certificate was received from Regional Ethics committee, Buraidah, Qassim province, registered at National Bio & medical ethics committee, registration No: H-04-Q-001.

Data Analysis: Statistical analysis was done by using the statistical software spss -21 version. To find out the association of diabetes mellitus among stroke

patients with the above factors, simple proportions, Chi-square test and binary logistic regression analysis was done. The statistical significance was evaluated at 95% confidence level and P value is <0.05.

Results

In the study population, total of 134 patients were participated in the present survey, we identified 45 patients were diabetes mellitus patients among all stroke patients admitted during the study period in King Fahad Specialist Hospital, Buraidah. The prevalence of the Diabetes mellitus among the study stroke patients was 33.6%. Among the stroke patients, about 59.7% were in > 60 years of age group, males were 67.2%.

In the study population, approximately 73.1 % were having slurred speech, 40.3% were having facial palsy and 85.1% were having any limb (upper limb or lower limb) weakness or paralysis. Among the stroke patients, about 20.9% (28/134) were having dyslipidaemia. Among the dyslipidaemic patients, approximately 41.7% were having more than 10 years duration.

Table 1: Shows Demographic characteristics among Stroke patients of study population

Demographic parameters	Number	Percentage
Age (n-134) 20-30	2	1.5
31-40	8	6.0
41-50	16	11.9
51-60	28	20.9
>60	80	59.7
Sex (n-134)		
Male	90	67.2
Female	44	32.8
Occupation (n-134)		
Employee	30	22.4
non employee	104	77.6
Marital status (n-134)		
Yes	128	95.5
No	6	4.5
Number of children (n-122)		
< or = 2	8	6.0
3-5 members	42	31.3
>5 members	72	53.7
Income (n-134)		
< 3000 SR	84	62.7
>3000 SR	50	37.3

Out of 134 stroke patients, 48 patients were hypertension with stroke. About 47 (35%) patients were given response about duration of hypertension. Of which, approximately 51.1% were having more than 10 years of hypertension duration. About 34.3% (46) were given hypertension compliance history, of which 52.2% (24/46) were having hypertension compliance.

Among all the stroke patients, about 4.5% (6/134) were given quitting of smoking history given. Of which, 50% (2/4) were smoked more than 20 cigars /day and also all the ex smokers given more than 20 years of smoking duration history. In the study stroke patients, about 67.1% (90/134) patients were having BMI more than 25 and only 32.9% (44/134) were having BMI < 25.

Table 2: Report of type of stroke and past stroke history among the stroke patients:

Type of stroke (n-134)	Number	Percentage
Ischaemic	108	80.6
Haemorrhagic	26	19.4
Total	134	100.0
Past stroke history (n-134)		
Yes	26	19.4
No	108	80.6
Total	134	100.0

Table: 2 stated that near to 80.6% were from ischaemic stroke and only 19.4% of the patients from haemorrhagic stroke origin.

Table 3: Diabetes duration, compliance and Hb A1 C status among the study stroke patients:

Diabetes Duration (n-44)	Number	Percentage
< or = 5 yrs	2	4.5
>5 yrs - 10 yrs	12	27.3
> 10 yrs	30	68.2
Total	44	100
Diabetes compliance (n-43)		
Yes	21	48.8
No	22	51.2
Total	43	100
Hb A1 C (n-44)	Number of Diabetics with stroke	Percentage
< or = 7	14	31.8
> 7	30	68.2
Total	44	100.0

Table 3 revealed that 45 patients were diabetes with

stroke. About 44 (32.8%) patients were given response about duration of Diabetes. Of which, approximately 68.2% were having more than 10 years of Diabetes duration.

Table 4: Hypertension in relation to Diabetes status among the stroke patients:

Hypertension	Stroke with Diabetes	Stroke without Diabetes	Odd's Ratio	Confidence interval
Present	24 (53.3%)	24 (26.9%)	3.095	1.462 to 6.551
Absent	21 (46.7%)	65 (73.1%)		
Total	45 (33.6%)	89 (66.4%)		

X^2 - 9.03, 1 df, P- 0.003, Statistically significant association was found between hypertension and stroke with Diabetes.

Table: 5 - Smoking status, frequency and its duration among the stroke patients:

Smoking (n-134)	Number	Percentage
Yes	24	17.9
No	108	80.6
Not available	2	1.5
Total	134	100
Frequency (n-24)		
<20 cigars/day	12	50%
= or >20 cigars/day	12	50%
Total	24	100
Duration (n-22)		
<15 yrs	4	18.2
> 15 yrs	18	81.8
Total	22	100

Table 6: Logistic regression analysis of factors associated with Diabetes Mellitus among the stroke patients:

Variables	Odd's ratio	95% confidence interval		P value
Occupation	.985	.233	4.154	.983
Age	1.503	.501	4.505	.467
Body mass index	.800	.325	1.969	.627
Exercise	.876	.273	2.804	.823
Smoking	1.716	.524	5.616	.372
Hypertension	.267	.119	.599	.001
Dyslipidaemia	.584	.231	1.477	.256

Table 6 stated that hypertension was significantly associated with diabetes mellitus among the stroke patients (P< 0.001).

Discussion

In the Kingdom of Saudi Arabia, stroke is a rapidly growing problem and a major cause of illness and death. This increasing incidence is due to the changing life style in the country and high prevalence of diabetes mellitus, obesity, dyslipidaemia, and hypertension, all considered as important risk factors [10].

In the present study, the mean age was observed as 65.73 ± 16.69. The study conducted in Saudi Arabia, Arar internal medicine department showed that, the age of elderly ranges from 50-92 years with a mean age 60 years, male to female ratio was 47.8 to 52.2 [12]. In southwest Saudi Arabia by Al-Modeer et al [12], the age of elderly ranges from 60-104 years with a mean of 77.2 years. In Al Rajeh et al., in a hospital that exclusively treated the Saudi Arabian National Guard hospital, the mean age of the patients was 63 years **[13].** In the present study, 67.2% were males and 32.8% were females. Another study conducted in Dubai, cerebrovascular accident affected 38.8% of the studied elderly, more prevalent in males than females **[14].**

In the current study denoted that the mean body mass index observed as 27.19 ± 3.97 and about 67.1% (90/134) patients were having BMI more than 25. Almost similar observation of body mass index of more than 25 among the stroke patients was 66.7% in their study [11].

In the present study, the prevalence of the Diabetes mellitus among the study stroke patients was 33.6%. Singh et al [15] conducted study in India, revealed the prevalence of 24% and another study conducted in Hyderabad, India showed the Prevalence of Diabetes among the stroke patients was 55% and he stated that diabetes is the one of the important risk factor for getting the stroke [8]. Estimates suggest that patients with diabetes have twice the risk of stroke compared to non-diabetics. Few mechanisms that have described the effects of high blood sugar level leads to impaired auto regulation of cerebral blood flow and hyperglycaemia tends to develop cerebral oedema.

In the present study population, about the type of the stroke, near to 80.6% were identified from the Computerized Tomography (CT) scan and clinical expert opinion as ischaemic stroke and 19.4% patients were from haemorrhagic stroke. The incidence of ischaemic stroke was 2.5-and 3.6-times greater higher among diabetic men and women, respectively, in the Framingham study [16].

Among the Diabetes with stroke patients, about 68.2% were having Hb A1 C level > 7%, that reflects majority of the diabetics among the stroke patients were not having good glycaemic control and it tends to act as a risk factor for getting stroke. The Hjalmarsson et al study done in Indonesia and discovered that pre stroke glycemic control disorder or baseline HbA1c is an independent risk factor for poor survival and an unwelcome functional outcome after suffering from an ischemic stroke [17].

Among the total diabetes with stroke patients, about 53.3% were having hypertension. Hypertension was significantly associated with Diabetes among the stroke patients (P<0.01). Study conducted in Qatar by Khan FY et al revealed that prevalence of hypertension range among the diabetes with stroke patients was 32-40% and denoted that hypertension is recognized as a one of the risk factor for the stroke [18].

In the study patients, about 20.9% were having dyslipidaemia. Study conducted by Turkey AM et al done at Tikrit teaching hospital and another study done by Yesilot N, Koyuncu BA et al at Istanbul medical school in the year 2011 revealed that dyslipidaemia was from 18% to 46% [19,20].

Out of 134 stroke patients in the present study, about 17.9% patients were having smoking habit. study done by McLachlan RS et al in United Arab Emirates shown that range of smoking habit from 13% to 44.4% among stroke patients [20]. One of the limitation of the study, those patients were in coma, data collection from the relatives bit difficulty faced. As a result, we missed some information from the patients.

Conclusion

Overall prevalence of Diabetes mellitus among the stroke patients was 33.6%. Majority of the diabetes patients were un controlled status and half of the Diabetes individuals were not having good compliance of diabetes. Almost one third of the patients were having hypertension in the study population. Approximately one fifth of the patients were having dyslipidaemia and smoking habit.

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References

1. Lindsberg PJ, Roine RO. Hyperglycemia in acute stroke. Stroke. 2004 Feb 1;35(2):363-4.
2. Smith WS, Joey D, English S. Cerebrovascular disease. In: Harrison's principles of internal medicine 18th Edition, McGraw Hill, New York; 2011:3270-3294.
3. World Health Organization, The top 10 causes of death. 2014. Reference Source. 2017.
4. Alahmari K, Paul SS. Prevalence of Stroke in Kingdom of Saudi Arabia-Through a Physiotherapist Diary. Mediterranean Journal of Social Sciences. 2016 Jan 7;7(1 S1):228.
5. Heidenreich PA, Trogdon JG, Khavjou OA, et al. Forecasting the future of cardiovascular disease in the United States: a policy statement from the American Heart Association. Circulation. 2011;123:933–944.
6. Walton J. Brains Disease of the nervous system. In: Disorders of cerebral circulation. US: Springer; 2000:204.
7. Source ministry of health portal kingdom of Saudi Arabia https://www.moh.gov.sa/en/healthawareness/healthday/2015/pages/healthday-2015-11-14.aspx
8. Mallikarjuna KV, Reddy GP. Prevalence of diabetes among stroke patients: a study in a tertiary care centre. International Journal of Advances in Medicine. 2016:189-93.
9. John WG. Use of HbA1c in the diagnosis of diabetes. Diabetic Med. 2012;29:1350-7.
10. Hassan S (2015):A Study of Morbidity Pattern among Geriatric Population in Fayoum Governorate, Egypt. Journal of American Science,11(4):90-95.
11. Ahmed AJ, Ali Abdalla SA, Alshammari SS, Abdullah AM, Abdullah AM, Alanazi MH, Alruwaili AN, Alanazi SM, Alenezi FN, Alruwaili

MN. Cerebrovascular Stroke among Senior Adult Population in Arar, KSA. Egyptian Journal of Hospital Medicine. 2018 May 1;71(6).

12. Al-Modeer M, Hassanien S, Jabloun C (2013):Profile of morbidity among elderly at home health care service in Southern Saudi Arabia. J Family Community Med., 20(1):53-57.
13. Al Rajeh S, Bademosi O, Ismail H, Awada A, Dawodu A, Al-Freihi H, Assuhaimi S, Borollosi M, Al-Shammasi S. A community survey of neurological disorders in Saudi Arabia: the Thugbah study. Neuroepidemiology. 1993;12(3):164-78.
14. Becker S, Al Zaid K, Al Faris E. Screening for somatization and depression in Saudi Arabia: a validation study of the PHQ in primary care. The International Journal of Psychiatry in Medicine. 2002 Sep;32(3):271-83.
15. Singh KG, Singh SD, Bijoychandra K, Kamei P, Chingkhei BM. A study on the clinical profile of stroke in relation to glycaemic status of patients. J Indian Academy Clin Med. 2014;15(3):177-81.
16. Lakka HM, Laaksonen DE, Lakka TA, Niskanen LK, Kumpusalo E, Tuomilehto J, Salonen JT. The metabolic syndrome and total and cardiovascular disease mortality in middle-aged men. Jama. 2002 Dec 4;288(21):2709-16.
17. Hjalmarsson C, Manhem K, Bokemark L, Andersson B. The role of prestroke glycemic control on severity and outcome of acute ischemic stroke. Stroke research and treatment. 2014;2014.
18. Khan FY. Risk factors of young ischemic stroke in Qatar. Clinical neurology and neurosurgery. 2007 Nov 1;109(9):770-3.
19. Turkey AM. Case fatality rate in one month duration for first ever stroke in Tikrit teaching hospital. Medical Journal of Tikrit. 2012;18(182):29-37.
20. McLachlan RS. Cerebrovascular disease in the United Arab Emirates nationals. Emirates Medical Journal. 2002;20:153-6.

Risk Factors and the Pattern of Injuries of Road Traffic Accidents in Holy City of Karbala/Iraq

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Abstract

Background: Road traffic injuries (RTIs) are an important cause of morbidity and mortality. Iraq, is one of the countries with higher rates of RTIs

Objectives: To identify Risk factors and pattern of injuries of Road Traffic injuries in Holy city of Karbala/ Iraq.

Method: A Hospital-based cross sectional study conducted at Imam Hussein medical city in Karbala during the period March, 1st to May 30th 2019 included 400 patients with different Road traffic injuries who were present at the emergency department or admitted to the surgical wards after initial management in the emergency department

Results: The mean age of the subjects was (26.35 ± 15.42). Almost (27.5%) of victims aged 11-20 years and (85.5%) of cases were males and almost (48%) had low level of education. Head injuries were more frequent, accounted for (35.1%), lower and upper limbs were injuries in (32.3%% and 10.5% respectively). Fractures accounted for about 30% of cases. Almost (31%) the cases needed admission to the wards. The case fatality rate was 2.5%.

Conclusion: Road traffic injuries are the most common among young people, especially motorbike drivers, and Teenager are the most vulnerable. The Head is the most exposed part to injuries and the fractures are the most frequent type. A large proportion of cases require medical attention within the hospital and head injuries are the most common cause of death.

Keywords: *Road traffic Injuries, RTIs, Risk factors; injury pattern; road traffic accidents*

Introduction

Globally, one crucial reason to morbidity and mortality is Road Traffic Injuries (RTIs) and this usually happens in poor and middle-income countries. According to Disability Adjusted Life Years (DALY) lost, RTIs is one of the leading disease burdens and it is ranked as number 9 worldwide among other harmful causes.[1] RTAs can be transpired due to a collision between vehicles, vehicles and pedestrian, vehicles and animals or between vehicles and fixed objects. Almost, about 20 - 50 million people remain in serious injuries because of road traffic collisions [2]. The available data on RTIs and death cases in some Arab and regional countries show some differences. For instance, moderate to high fatality rates were reported in the UAE, Saudi Arabia and Kuwait[2–4]. Generally, in Middle East the harmful circumstances of road traffic accidents are alarming and require an immediate response to control its disastrous outcomes. In Iraq, most of the Iraqis live in urban places (almost

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70%). Since many years the RTAs occurrence and its extensive negative impact has endangered the lives of many people and there is a rise in Iraqi fatalities[2,5,6] Base on WHO data, age adjusted death rate in Iraq ranked as number 4 in the world regarding the RTIs fatalities [2,5].In Iraq, during 2011, RTIs is about four times bigger than the loss as a result from terrorism. Consequently, the decade of action for road safety 2011-2010 was pledged to control and reduce the level of traffic road loss by year 2020. This attention was considered due to the need to design appropriate interventions which aim to prevent or minimize RTAs in Iraq [2,5,7]. Locally, in spite of the increase in traffic accidents in holy city of Karbala, but there are not enough studies on this subject, which led us to conduct this study to shed light on risk factors and pattern of injuries resulting from road traffic accidents in Karbala.

Patients and Method

This was a descriptive cross-sectional study conducted in Imam Hussein medical city in holy Karbala, during the period from 1 March to 30 May 2019. A total of 400 patients with different RTIs of both genders who were admitted to the emergency department or the surgical wards of the hospital were included regardless their age. Patient was excluded if he / she refused to participate, or uncooperative patient, victim of accidents from other provinces or Unconscious patients without accompanying person or the accompanying person have no information about the accident or injury. Data collected using a pre-constructed data collection sheet included personal data, Accident related data, risk factors, clinical data, type and site of injury, and primary and progressive management and intervention. All questionnaires were reviewed and checked for errors or inconsistency . Data analysis, performed using the statistical package for social sciences version 25, appropriate statistical tests were applied accordingly. hit pedestrian, rollover and sideway were the most frequent mechanism of accident, contributed for 23.5%, 22.3% and 21.5%, respectively. Regarding the cause of accident, negligent cycling, road crossing or driving was the main cause of accidents, represented 44.3% of all causes, followed by high speed (14%), bad road (12.5%) and overcrowded road (11.5%), other causes are less frequent summarized in the same (Table 2)

Finding: Demographic characteristics of the 400 RTIs victims and road users categories are shown in(Table 1), Table 2 demonstrated the accident's related characteristics including the type of vehicle, mechanism and cause of accident; 2-wheel motorcycle and car were the most involved vehicle in the accidents, contributed for 55% and 51.8%, respectively.

Regarding the use of safety measures, only 4 out of 207 motorcycle and bicycle users were wearing a helmet during the accident. Among the 77 car drivers and passengers, only 6 were setting the seat belt during the accident. Regarding the time of accident, the least frequent accidents, (7.8%), occurred during the 12:01 to 6:00 am, and the more frequent accidents, (39%), at 6:01 pm to 12:00 am. Among the 400 victims, 40.5% reached the hospital by an ambulance, 38.0% by private car while the remaining victims transported by taxi, other vehicle, carried by peoples, or police car and in 5 victims the mean of transport was unknown., (Table 3).

Table 4, summarizes the site and types of RTIs of the 400 victims, where 41.8% had head injuries, 51.3% lower limb, 21.3% upper limb while back or chest and other sites were less frequent, 6.8% and 2% respectively. Fractures reported in 30%, contusion and/ or ecchymosis, abrasion and laceration in 20.5%, 19% and 13.8%, respectively, while vascular injuries and multiple superficial wound, vascular and soft tissue injury reported in 7%, 6.3% and 3.5%, respectively.

The outcome of the victims revealed 10 mortalities giving a case fatality of 2.5% while 97.5% survived, (Figure 1).

Table 1: Age, gender and road user categories of 400 RTIs victims

Variable		No.	%
Age (year)	1 - 10	58	14.5
	11 - 20	110	27.5
	21 - 30	96	24.0
	31 - 40	73	18.3
	41 - 60	29	7.3
	> 60	34	8.5
Gender	Male	342	85.5
	Female	58	14.5
Road users	Motorcyclist	205	51.3
	Pedestrian	116	29
	Passenger	51	12.8
	Driver	26	6.5
	Pedal cyclist	2	0.5

Table 2: Accidents related characteristics (N=400)

Variable	No.	%
Type of Vehicle		
2-WheelMotorcycle	220	55.0
3-WheelMotorcycle	53	13.3
Car	207	51.8
Light motor vehicles	34	8.5
Bicycle	2	0.5
Mechanism of accident		
Rollover	94	23.5
Hit pedestrian	89	22.3
Sideway	86	21.5
Head on	47	11.8
Hit and run	29	7.3
Rear end	25	6.3
Hit object on the road	25	6.3
Not established	5	1.3
Cause of accident		
Negligent (cycling, road crossing, driving)	177	44.3
High speed	56	14.0
Bad road	50	12.5
Overcrowded road	46	11.5
Mobile use	23	5.7
Playing on road	21	5.3
Poor vision	15	3.7
Mechanical fault of vehicle and other	12	3.0

Table 3: Accident and victims related factors of 400 RTIs victims

Variable	No.	%
Using safety measures		
Wearing a helmet*	4	1.9
Set a seatbelt **	6	7.8
Time of accident		
12.01am-06.00am	31	7.8
06.01am-12.00pm	94	23.5
12.01pm-06.00pm	119	29.8
06.01pm-12.00am	156	39.0
Mean of transported to hospital		
Ambulance	162	40.5
Private car	152	38.0
Taxi/other vehicle	38	9.5
Carried by people	25	4.5
Police vehicle	3	0.8
Not established	20	5
*motorcycle and bicycle users, n = 207, **passengers and drivers, n=77		

Table 4: Sit and types of RTIs

Variable	No.	%
Site of injuries*		
Head and face	167	41.8
Lower limb	205	51.3
Upper limb	85	21.3
Back /chest	27	6.8
Other sites*	8	2.0
Type of injury		
Fracture	120	30.0
Contusion and/or ecchymosis	82	20.5
Abrasion	76	19.0
Laceration	55	13.8
Multiple superficial wound	28	7.0
Vascular injury	25	6.3
Soft tissue injury	14	3.5
*Other sites: abdomen, neck, cervical spine, pelvis		

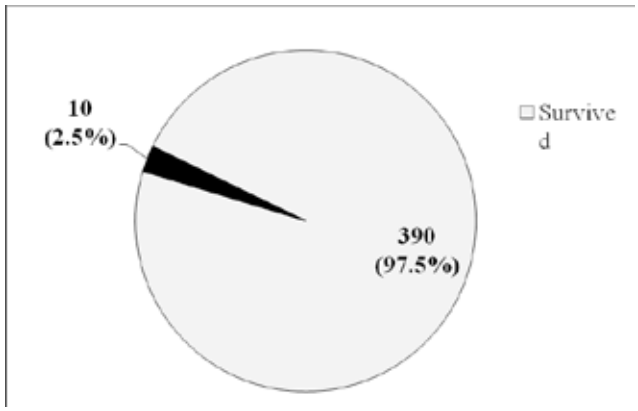

Figure 1: Case fatality and survival rates of 400 RTIs cases

Discussion

The present study found higher proportion of victims aged 11–40 years, this finding agreed a previous Iraqi study from Babylon[8]. And disagreed that reported in Korea and Pakistan[9,10]. Males were the dominant victims which might be due to the higher exposure to traffic in males compared to females this finding supported that reported in Yemen[11]. Motorcyclist were the more frequent, (51.3%), road users among the victims. The higher proportion of motorcycles reported in the current study was expected due to the increasing number of the imported motorcycles in Iraq which were widely used by Iraqi population particularly among the young adults. In Iraq, since 2003, there have been an increasing number of motorcycles in the streets[12]. These findings in line the Yemeni study[11], while inconsistent with that

conducted in Kenya[13] and Pakistan[14] and the differences could be due to the variation in natures of different populations . Negligence was the major cause of RTIs which agreed with previous studies from Nigeria[15] and UAE[16]. Vast majority of motorcycle riders in our study did not wear the helmets and vast majority of drivers did not set a seatbelt on at the time of accidents. Using safety measures is very important protective factor can reduce the risk of RTIs[17,18]. In the current study, more frequent accidents, (39%), occurred at 06.01pm-12.00am, however, it had been documented that the more frequent accidents happen at day time [7]. In the present study the more frequent mean of transport was ambulance, contributed for 40.5%, and this indicates an improvement in the emergency health system in Karbala province, however, in the remaining 59.5% of cases the patients transported by private car, taxi, or other vehicle. In the present study, head and face injuries reported in 41.8%, lower limbs and upper limbs injuries in 51.3% and 21.3%, respectively, back and chest in 6.8% and other sites contributed for only 2%, This finding coincided with the finding of other previous Iraqi study conducted by Waleed et al. [12]. Previous reports referred that head and lower limb are the most common sites of injury and head injury carry the higher risk for morbidity and mortality in road traffic accidents[19,20].

Fracture was the more frequent lesion among the cases of the present study, (30%), followed by contusion and/or ecchymosis (20.5%), abrasion s (19%), laceration (13.8%) multiple superficial wound (7%), vascular injury (6.3%) and soft tissue injury reported in (3.5%) of the cases . However, different injuries could occur during an accident and different organs of the body could be affected. Ganveer et al. mentioned that fractures were the commonest injuries in RTAs[21]. Fortunately, majority of the cases survivesd and only 2.5% died, this rate was close to that previously reported in Karbala [12], Tikrit [22] and in Najaf provinces of Iraq [23] . While the fatality rate in was lower than that reported in Saudi Arabia [24].

Conclusion

Majority of the road traffic injuries victims in Karbala were young adult male, unemployed or students. Most RTAs occurred inside the city or on a secondary roads. Motorcycles were the main vehicle involved and negligence was the most frequent cause of RTIs. Head and lower limbs were the commonest sites of injuries and the main cause of fatality. Fractures are the commonest type of lesions among the studied group. Case Fatality rates due to RTA was close to that reported in previous Iraqi studies and lower than that reported in other countries.

Ethical Clearance: All ethical issues were approved by the authors and the data were collected according to the World medical Association Declaration of Helsinki.

Conflict of Interest: Authors declared: None.

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References

1. Murray CJL, Vos T, Lozano R, Naghavi M, Flaxman AD, Michaud C, et al. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet. 2012;380(9859):2197–223.
2. Diah B, Baiee HA. Epidemiological Features of Road Traffic Accident Deaths in Babylon Province during the Period 2010-2014. J Babylon Univ. 2017;25(3):1129–38.
3. Hammoudi A, Karani G, Littlewood J. Road traffic accidents among drivers in Abu Dhabi, United Arab Emirates. J Traffic Logist Eng Vol. 2014;2(1):7–12.
4. Ziyab AH, Akhtar S. Incidence and trend of road traffic injuries and related deaths in Kuwait: 2000–2009. Injury. 2012;43(12):2018–22.
5. Hasan F, Asad A. Road Traffic Accidents in Iraq: a Review of Evidence-Based Literature. Int J Traffic Transp Eng. 2017;7(2):256–75.
6. Neham SS, Ewadh HA. A Study of Traffic Safety at Four-Leg Signalized Intersections Using Traffic Conflict Technique. AL-TAQANI. 2008;21(4):30–49.
7. Mohammed HD, Ahmed AM, Ahmed HA. Statistical Analysis of Traffic Accidents Locations Using Geographic Information System in Darbandikhan Town-Kurdistan Region of Iraq. Int J Sci Eng Res. 2015;6(5):1831–43.
8. Aljoborae SFFM, ALHumairi AK Al. A Study of Road Traffic Accidents in Babylon Province Sijal. 2014;11(4):912–22.
9. Park K, Hwang SS, Lee JS, Kim Y, Kwon S. Individual and areal risk factors for road traffic injury deaths: nationwide study in South Korea. Asia Pac J Public Health. 2010;22(3):320–31.

10. Zia Y, Sabir M, Saeed IU. Pedestrian injuries and fatalities by patterns in reported road traffic crashes—Islamabad. JPMA. 2014;64(3):1162–5.
11. Nagi A Abdulla. Medico-Legal Study of Non-Fatal Road Traffic Injuries. Iraqi JMS. 2013;11(2):135–43.
12. Waleed M, Abdul-Sahib M, Al-Ghabban SI. Risk factors and pattern of injuries in motorcycle accidents in Holy Karbala. Karbala Jorunal Med. 2013;6(1):1552–60.
13. Osoro ME, Ng Z, Oundo J, Omolo J, Luman E. Factors associated with severity of road traffic injuries, Thika, Kenya. Pan Afr Med J. 2011;8(1):42–9.
14. Saleem S, Haider A, Khan J, Saleem T. Study of fatal road traffic accidents: based on medico-legal autopsies. Gomal J Med Sci. 2015;13(1):124–31.
15. Bekibele C, Fawole O, Bamgboye A, Adekunle L, Ajav R, Baiyeroju A. Risk factors for road traffic accidents among drivers of public institutions in Ibadan, Nigeria. Afr J Health Sci. 2008;14(3):137–42.
16. Hassan MN, Hawas YE, Maraqa MA. A holistic approach for assessing traffic safety in the United Arab Emirates. Accid Anal Prev. 2012;45:554–64.
17. Cunill M, Gras ME, Planes M, Oliveras C, Sullman MJM. An investigation of factors reducing seat belt use amongst Spanish drivers and passengers on urban roads. Accid Anal Prev. 2004;36(3):439–45.
18. Liu BC, Ivers R, Norton R, Boufous S, Blows S, Lo SK. Helmets for preventing injury in motorcycle riders. Cochrane database Syst Rev. 2008;13(1):1-3.
19. Tandle, R, Keoliya N. Patterns of head injuries in fatal road traffic accidents in a rural district of Maharashtra-Autopsy based study. J Indian Acad Forensic Med 2011; 33 (3): 228-31.
20. Seid M, Azazh A, Enquselassie F, Yisma E. Injury characteristics and outcome of road traffic accident among victims at Adult Emergency Department of Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia: a prospective hospital based study. BMC Emerg Med. 2015;15(1):10–17.
21. Ganveer GB, Tiwari RR. Injury pattern among non-fatal road traffic accident cases: A cross-sectional study in central India. Indian J Med Sci. 2005;59(1):9–12.
22. Ali AM. Road traffic accident fatalities in Tikrit general Hospital. Med J Tikrit. 2005;2(112):24–7.
23. Mohammed SJ. Epidemiological study on road traffic accidents in Al-Najaf city during 2011. kufa J Nurs Sci. 2012;2(3):138–42.
24. Mansuri FA, Al-Zalabani AH, Zalat MM, Qabshawi RI. Road safety and road traffic accidents in Saudi Arabia: a systematic review of existing evidence. Saudi Med J. 2015;36(4):418–26

Alpha-Fetoprotein for Prediction of Placenta Accreta in Women with Complete Placenta Previa Centeralis: A Prospective Study

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Abstract

Background: Placenta accreta (PA) is a major life-threating obstetrical burden associated with high morbidity and mortality. This study aims to evaluate the ability of alpha-fetoprotein for prediction of placenta accreta in women with complete placenta previa centeralis.

Method: This is a prospective study carried out at Minia Maternity University Hospital, Egypt during the period from October 2017 to March 2019. This study included a total of 100 pregnant women who are admitted to the hospital for CS between 28:38 weeks of gestation. They were classified into 2 groups (50 women per each), group (I) Diffuse PA: include women with diffuse placenta accreta and group (II) Control group: include women with normally implanted placenta.

Results: Both groups were comparable regarding age, residence and parity however, diffuse PA group had significantly higher number of cases with ≥ 4 previous CSs and positive history of placenta previa. Group (I) had lower postoperative heamoglobin and platelet count ($p<0.01$). Serum alpha-fetoprotein concentration was significantly higher in PA group compared to control (1.33 ± 0.38 vs. 0.66 ± 0.22 MoM, $p<0.01$). Also, group (I) had higher amount of blood transfused units and longer duration of hospital stay compared to control group (all $p<0.01$). Incidence of complications was obviously higher in PA group (41 cases, 82%, $p<0.01$). The results of the predictive value of serum alpha-fetoprotein for placenta accrete revealed that the area under curve (AUC) was 0.958 and the best cutoff was > 0.84 MoM with a sensitivity of 92%, specificity = 82% PPV = 83%, NPV = 87.2% and accuracy of 85% ($p<0.01$).

Conclusion: In conclusion, the results indicate a significant association between elevated serum alpha-fetoprotein level and placenta accreta. Also, serum alpha-fetoprotein has a high predictive value for placenta accreta in women with complete placenta previa centeralis.

Keywords: *Alpha-fetoprotein, Prediction, Placenta accreta, Placenta previa, Prospective Study*

Introduction

Abnormal placental adherence is associated with major pregnancy complications, it could be presented in three conditions; placenta accreta, increta and percreta [1]. Placenta accreta is the complete or partial attachment or penetration of the placenta to the myometrium or related organs that obstruct normal separation at delivery, this case results in significant hemorrhage that threats both mother and neonate life [2]. Additionally,

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placenta accreta is associated with high morbidity that includes hysterectomy, blood transfusion, infection and ICU admission, etc.. [3]. Numerous risk factors have been associated with placenta accreta, placenta previa is one of them [4]. Placenta accreta was reported to occur in approximately 15% of cases with placenta previa and in about 67% of cases where placenta previa occurs in cases with previous cesarean delivery for placenta previa [5]. The antenatal diagnosis of placenta accreta is pivotal, because it allows both the medical team and the patient to be prepared for the suspected complications during delivery [6].

Alpha-fetoprotein (AFP) is a serum glycoprotein that was discovered early in human fetal serum by Bergstrand and Czar in 1956 [7-8]. It is the chief mammalian tumor-associated fetal protein found in adult's blood (by a small amount of 10-20 ng/ml) [9]. Maternal serum alpha-fetoprotein is elevated in some pregnancy complications such as spontaneous abortion, pre-elampsia, gestational hypertension, preterm delivery and premature rupture of membranes (PROM) [10, 11]. Also, poor maternal and fetal outcome is strongly related to the elevation of maternal AFP (probably as a result of placental injury) [12]. In addition, a significant association was found between increasing maternal AFP and the greater likelihood of persistent placenta previa [13]. Furthermore, the risk for abnormal placental adherence was increased in women with an elevated maternal serum AFP level, especially in the presence of a placenta previa [14]. The objective of this study is to evaluate alpha-fetoprotein as a predictor of placenta accreta in women with complete placenta previa centeralis.

Patients and Method

This is a prospective study that was carried out at Minia Maternity University Hospital, Egypt during the period from October 2017 to March 2019 (18 months). The study was approved by the research ethics committee of the Department of Obstetrics and Gynaecology, Faculty of Medicine, Minia University. All patients had signed a written informed consent after they have been made aware of the purpose of the study, interventions, outcome and possible complications. The study included a total of 100 pregnant women with previous CS who are admitted to the hospital for CS between 28:38 weeks of gestation. They were classified to 2 groups (50 women per each) as follow:

Group (I) Diffuse PA: include women with diffuse placenta accreta.

Group (II) Control group: include women with normally implanted placenta.

Women with placenta previa centeralis who were delivered by CS had history of prior CS and gestational age of 28:38 weeks were included. Exclusion criteria were; recurrent pregnancy loss, IUFD, IUGR, multiple pregnancy, fetal chromosomal anomaly, prior cervical or uterine surgery other than CS and curettage, any known systemic disease eg. diabetes mellitus, hypertension, etc., pregnancy achieved by ART, placental abnormality other than placenta previa and congenital fetal malformation such as neural tube defect, abdominal wall defect gastrointestinal and skeletal abnormality.

Full history was taken. General and abdominal examinations, basic laboratory investigations and detailed US examination were done for all included cases. The diagnosis of placenta previa was based on the presence of placental tissue covering the internal cervical os. Placenta accreta was diagnosed by ultrasound. Maternal serum alpha-fetoprotein was measured by automated equipment (IMMULITE 2000, Siemens Healthcare Diagnostics, Los Angeles, CA, USA) solid-phase competitive hemiluminescent enzyme immunoassay system as per the manufacturer's instructions. Multiple of the median (MoM) values were calculated for serum alpha-fetoprotein. Pre and post-operative complete blood count (CBC) were determined by Automated cell counter Sysmex, NE (TAO, Medical Incorporation, Ono, Japan). Given blood units for each case was recorded. Postoperatively, patients who were admitted to ICU were subjected to close daily follow-up. Postoperative complications and hospital stay duration were recorded.

Statistical Analysis: SPSS program (Statistical Package for Social Sciences, version 20, IBM, NY, USA) was used for statistical analysis. Numerical data were presented as mean ±standard deviation (SD), while categorical data were presented as number and percentage. For comparisons of quantitative data, independent and paired sample T-test were used, however, for qualitative data, Chi-square test or Fisher exact were used. Probability values (P. V.) were considered significant if less than 0.05 and highly significant if less than 0.01.

Results

Incidence of complications was obviously higher in PA group (41 cases, 82%, p<0.01) of these, 19 cases with post-partum hemorrhage and 14 cases with bladder injury. Regarding surgical interference in group (I), 35 cases (70%) had hysterectomy, 11 cases (22%) had leaving placenta in situ and 4 cases were managed conservatively. However, 4 cases (8%) only in control group were managed conservatively (3 cases by bilateral uterine artery ligation and 1 case by ballon tamponade) (Table 1). The results of the predictive value of serum alpha-fetoprotein for placenta accrete revealed that the area under curve (AUC) was 0.958 and the best cutoff was > 0.84 MoM with a sensitivity of 92%, specificity = 82% PPV = 83%, NPV = 87.2% and accuracy of 85% (p<0.01) (Table, 2 and Figure 1).

Table 1: Laboratory investigations, clinical finding and surgical interference between groups.

Variable		Groups		P. value (Sig.)
		Group (I) Diffuse PA (n=50)	Group (II) Control (n=50)	
Heamoglobin (g/dl)	Preoperative	11.2 ± 1.7	11.3 ± 1.3	0.74^{NS}
	Postoperative	8.6 ± 1.3	9.8 ± 1.3	<0.01**
Platelet count (10^3)	Preoperative	245.3 ± 29.2	252.9 ± 31.5	0.21^{NS}
	Postoperative	155.2 ± 23.7	195.4 ± 26.8	<0.01**
Serum alpha-fetoprotein	ng/ml	124.7 ± 35.8	61.7 ± 20.9	<0.01**
	MOM	1.33 ± 0.38	0.66 ± 0.22	<0.01**
Blood transfusion (units)		4.74 ± 1.95	0.2 ± 0.4	<0.01**
Duration of hospital stay (days)		7.1 ± 3.9	1.3 ± 0.7	<0.01**
Complications	No	9 (18.0%)	46 (92.0%)	<0.01**
	Bladder injury	14 (28.0%)	2 (4.0%)	
	ICU admission	8 (16.0%)	1 (2.0%)	
	Post-partum hemorrhage	19 (38.0%)	1 (2.0%)	
	Delayed hysterectomy	0	0	
Surgical interference				
Hysterectomy		35 (70.0%)	0	<0.01**
Leaving placenta in situ	Partial	1 (2.0%)	0	0.31^{NS}
	Complete	10 (20.0%)	0	<0.01**
Conservative management	Bilateral uterine artery ligation	0	3 (6.0%)	0.08^{NS}
	Cervical tamponade	2 (4.0%)	0	0.15^{NS}
	Ballon tamponade	2 (4.0%)	1 (2.0%)	0.56^{NS}

Chi-square and T tests were used to compare between groups. NS Not significant. ** Significant (P≤ 0.01)

Table 2: Alpha-fetoprotein for prediction of placenta accreta.

Parameter	AUC	Cutoff	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Diagn. Accuracy
AFP (MoM)	0.958	> 0.84	92.0	82.0	83.0	87.2	85.0

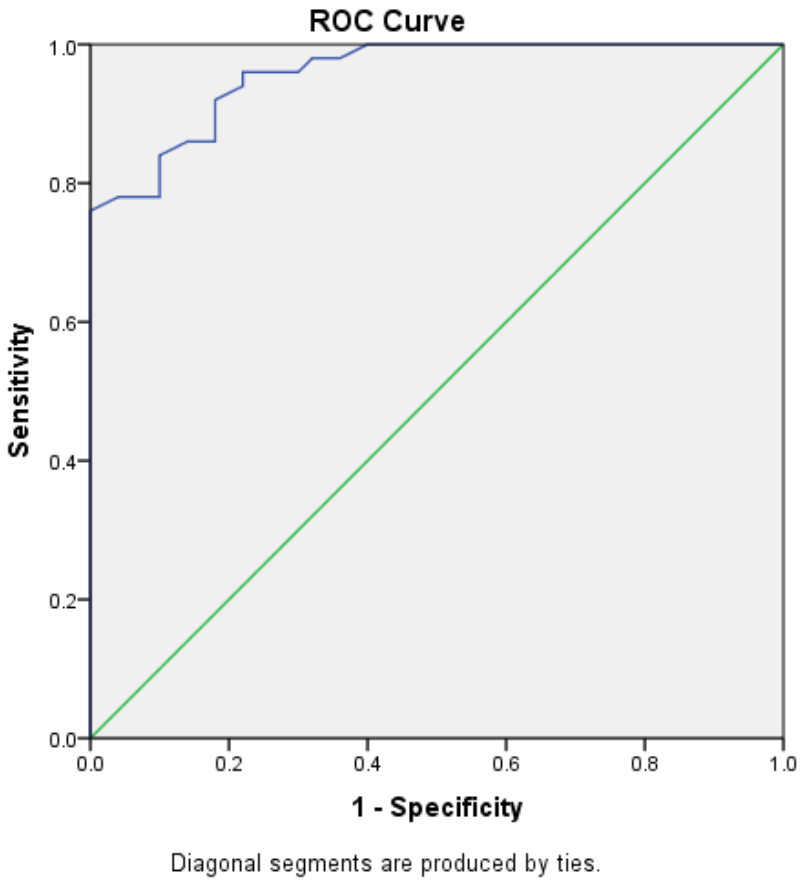

Figure (1): ROC curve analysis of serum AFP for prediction of placenta accreta.

Discussion

Currently, alpha-fetoprotein is used for the prediction of the fetus's quality, its elevation in amniotic fluid may indicate the likelihood of neural tube defects [15]. Furthermore, the sudden upregulation of maternal serum AFP (up to 380-500 ng/mL) was associated with the presence of incipient abortion or stillborn fetus [16].

The results of our study revealed that maternal serum alpha-fetoprotein was significantly elevated in placenta accreta group (1.33 ± 0.38 MoM) compared to control group (0.66 ± 0.22 MoM). Also, serum alpha-fetoprotein has a high predictive value for placenta accreta in women with complete placenta previa with cutoff > 0.84 MoM, area under curve of 0.958, with a sensitivity of 92%, specificity = 82% PPV = 83%, NPV = 87.2% and accuracy of 85% ($p<0.01$). Our results are consistent with the previous studies indicating that elevated maternal serum AFP levels are strongly associated with MAP among women with placenta previa. Hung et al. [17] reported a strong significant association between elevated AFP and placenta accreta in women with placenta praevia (AFP levels ranged between 0.5 and 2.5 MoM in 89% of accreta patients). In addition, Zelop et al. [18] reported that there is a strong correlation between the extent of invasion and the elevation of serum AFP. Also, Lyell et al. [19] studied the relationship between maternal serum markers and morbidly adherent placenta in women with placenta previa (n=736). They found that maternal serum alpha-fetoprotein (>1.79 MoM) was associated with a nearly 3-fold increased risk for placenta accreta. Also, similar to our study, they found that the risk for MAP was increased by 23-36 fold in women with previa that had elevated AFP in addition to high previous CSs.

Similar to our findings, Dreux et al. [20] studied maternal serum markers and placenta accreta, they found that AFP concentration was 1.23 MoM in placenta accreta group (n=69) versus 0.99 MoM in control group (n=552), ($p<0.01$). In a recent study by Verma et al. [21], they found that AFP level was higher in 93.3% of cases with placenta previa with placental adherence. Also, they found a significant surgical intervention (80%) and

increased maternal morbidity (68.8%). They concluded that maternal serum AFP is an important biomarker for prognostication of placental adherence. Oztas et al. [22] studied the ability of serum AFP in the prediction of morbidly adherent placenta that requiring hysterectomy among women with placenta previa totalis. They found that according to the ROC analysis, the area under the curve was 0.742, the best AFP cut-off value was 1.25 MoM with 85.9% sensitivity and 71.4% specificity (p=0.036).

Conclusions

In conclusion, the results indicate a significant association between elevated serum alpha-fetoprotein level and placenta accreta. Also, serum alpha-fetoprotein has a high predictive value for placenta accreta in women with complete placenta previa centeralis. Further prospective studies are warranted to confirm our findings.

Ethical Considerations: The study protocol was approved by the ethical committee of the Obstetrics & Gynecology dept. at faculty of medicine, Minia University. All Participants had signed a written informed consent after they have been made aware of the purpose of the study, interventions, outcome and possible complications.

Source of Funding: This project was locally funded from El-Minia University.

Conflict of Interest: None.

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References

1. Oyelese Y and Smulian JC. Placenta previa, placenta accreta, and vasa previa. Obstetrics and gynecology, 2006; 107: 927-941.
2. Mehrabadi A, Hutcheon JA, Liu S, Bartholomew S, Kramer MS, Liston RM, Joseph KS; Maternal Health Study Group of Canadian Perinatal Surveillance System (Public Health Agency of Canada). Contribution of placenta accreta to the incidence of postpartum hemorrhage and severe postpartum hemorrhage. Obstet Gynecol 2015; 125: 814-821.
3. Zhang D, Siqin Y, Yanyan H, Yan S, Haofan S, Wei G. Risk factors, outcome and management survey of placenta accreta in 153 cases: a five-year experience from a hospital of Shanghai, China. Int J Clin Exp Med 2017;10(8):12509-12516
4. Wu S, Kocherginsky M, Hibbard JU. Abnormal placentation: twenty years analysis. AJOG 2005;192:1458–61.
5. Rasmussen S, Albrechtsen S, Dalaker K: Obstetric history and the risk of placenta previa. Acta Obstet Gynecol Scand 79: 502, 2000
6. Esakoff TF, Sparks TN, Kaimal AJ, et al. Diagnosis and morbidity of placenta accreta. Ultrasound Obstet Gynecol 2011;37:324-7.
7. Bergstrand CG, Czar B. Demonstration of a new protein fraction in serum from the human fetus. Scand. J. Clin. Lab. Invest. 1956; 8 (2), 174.
8. Terentiev AA, Moldogazieva NT, Structural and functional mapping of alpha-fetoprotein, Biochemistry (Mosc.), 2006; 71:120-132.
9. Rizzo A, Galgano M, Mutinati M, Sciorsci RL. Alpha-fetoprotein in animal reproduction. Research in Veterinary Science,2019; 123, 281–285.
10. Kabukçu A, Önderoğlu L, Laleli Y, Durukan T. Pregnancy outcome in patients with elevated maternal serum alpha-fetoprotein levels in second trimester. T Klin J Gynecol. 1996;6:287–9.
11. Öztürk H, Erkaya S, Altınbaş S, et al. The role of unexplained high serum alpha-fetoprotein (AFP) and human chorionic gonadotropin (hCG) levels in the second trimester to determine poor obstetric outcomes. Turk J Obstet Gynecol. 2014 Sep; 11(3): 142-147.
12. Katz VL,Chescheir NK, cefalo RC. Unexplained elevation of maternal serum alpha feto protein Obstetrical and gynaecological surgery 1990;45;719-26
13. Koster EC, Dashe JS, Mclntire DD and Ramus RM: the journal of maternal, fetal and neonatal medicine 2004, 16: 3-7.
14. Kupferminc MJ, Tamura RK, Wigton TR, Glassenber R, Socol ML. Placenta accreta is associated with elevated maternal serum alpha-fetoprotein. Obstet Gynecol 1993; 82(2): 266–269.
15. Krantz DA, Hallahan TW, Sherwin JE. Screening for open neural tube defects. Clin Lab Med. 2010;30:721–725.

16. Yu M, Xi L, Zhang J, and Zhang S. Possible connection between elevated serum α-fetoprotein and placental necrosis during pregnancy: A case report and review of literature. World J Clin Cases. 2018 Nov 6; 6(13): 675-678.
17. Hung TH, Shau WY, Hsieh CC, et al. Risk factors for placenta accreta. Obstet Gynecol 1999;93:545–50.
18. Zelop C, Nadel A, Frigoletto FD, et al. Placenta accreta/percreta/increta: a cause of elevated maternal serum alpha-fetoprotein. Obstet Gynecol1992;80:693-4.
19. Lyell DJ, AM Faucett, RJ Baer, YJ Blumenfeld, ML Druzin, YY El-Sayed, et al. Maternal serum markers, characteristics and morbidly adherent placenta in women with previa. Journal of Perinatology (2015), 1–5.
20. Dreux S, Salomon LJ, Muller F, et al. Second-trimester maternal serum markers and placenta accreta. Prenatal Diagnosis 2012, 32, 1–3.
21. Verma P, Singh KN, Ghanghoriya V. To study analyze maternal serum alpha-fetoprotein as a biomarker of placental adherence in low lying placenta. Int J Reprod Contracept Obstet Gynecol. 2016 Jun;5(6):1959-1963
22. Oztas E, Ozler S, Turhan AC, Yucel A. Analysis of first and second trimester maternal serum analytes for the prediction of morbidly adherent placenta requiring hysterectomy. Kaohsiung Journal of Medical Sciences (2016) 32, 579e585.

Health Promoting School in Surabaya, Indonesia: The Six Elements Implementation

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Abstract

Context: School health program has been developed by WHO through comprehensive approach in promotion efforts and health education in the schools, called health promoting school. Indonesia Ministry of Health translated HPS as Sekolah Berwawasan Kesehatan. There are six elements of HPS developed by WHO-SEARO are adopted by IMoH. Six elements of HPS will be easy to be implemented when school health program also adopts them. However, *UKS*as Indonesia school health program, only implements three elements called Trias *UKS*. This study aims to explore the potency faced by school in implementing the elements of HPS. A qualitative study was conducted to explore three state elementary school potencies to implement it. Totally 40 informants were involved in this study conducted with in-depth interview and focus group discussion. Results shows that there are slightly difference among three school in the potency to implement HPS, even they had differ characterictics. One school been coaching by Education Office-City of Surabaya, has implemented three elements well and has always been a champion of school health competition in Surabaya. Even though, the last two school have potency too. Need more advocate and socialization about the HPS implementation among school at Surabaya to gain the comprehensive approach in health and education sectors in Indonesia.

Keywords: *Health promoting schools, state elementary school, qualitative, Surabaya.*

Introduction

Globally, school health program has been developed by WHO and other international agencies since 1950 through comprehensive approach in promotion efforts and health education in the schools[1]. However, its implementation in each country varies greatly[1]. The schools should organize through holistic and comprehensive approach, called health promoting school (HPS). Health promotion efforts in the schools in the form of HPS has been identified effectively for enhancing health status of students in the schools[2,3,4,5,6].

HPS program endorsed by WHO has been adopted by Indonesias Ministry of Health[7]. There are six elements of HPS developed by WHO[8] are adopted by Pusat Promkes (Health Promotion Center) (2011)[7]. Six elements of HPS are easy to be implemented when *UKS* or school health program as technical implementing unit, also adopts them. However, in implementing program, *UKS* only implements three elements called Trias UKS (three elements of HPS). These include health education, health services in school, and health environmentally school, as well[9]. Others elements are not written clearly in the document of UKS and they have not yet been implemented well by UKS program.

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These are the first element about engagement of health and education staff, teacher, parent, community leader in health promotion effort, the fifth element about school policy implementation, and the sixth element about effort of overall public health enhancement.

HPS and UKS program have the same objective, enhancing health status of school chidren by involving school community. Inter-sector optimization and coordination of both programs may help the achievement of health status optimally in school age students. The engagement of various sectors internally and externally will strengthern the implementation of HPS elements[10,11,12]. Moreover, it emphasizes that health promotion program in school comprehensively will be work when there are collaborations inter sectors. School policy, intersector engagement, and effort of overall public health enhancement constitute three elements of HPS. These have not yet been implemented in UKS program. This study was aimed to explore the potency faced by school in implementing the six elements of HPS.

Method

A qualitative research was applied to explore processes and activities ofthe schools[13]. Three State Elementary Schools (SESs) located in Kelurahan of Tanah Kalikedinding, Subdistrict Kenjeran, City of Surabaya were selected. Selection of location was based on accessability and engagement in previous study. It was assumed that three SESs selected meet the standard of UKS for all SESs in Surabaya, although have relatively different characteristics. One of three schools has been coached by Education Office-City of Surabaya (EOCoS) during health school competition based on decree of Head of EOCoS number. 188/2638/436.6.4/2016. The rests have not yet been coached by this institution.

Indepth-interview was performed to totally 40 informants that included School Masters, teachers who coordinated UKS, representatives of teacher who taught students, school clerks, and chairperson of School Committee in each school. Secretary of UKS officer in Subdistrict of Kenjeran, UKS coordinator, EOCoS in the level of Subdistrict, Head of Public Health Center (PHC), UKS management in PHC of Tanah Kalikedinding, Subdistrict of Kenjeran was an informant too.

Valid data were obtained by interviewing the informants more than once, depending on their openness in expressing their opinions.

Results

The results describe potency of schools in Surabaya to implement six elements of HPS. These elements are written as main themes. These themes are described in several subthemes that describe challenges to implement each element or theme.

Main theme 1: Element 1 of HPS

The following paragraph shows that three schools have various implementation related to engagement of education and health staff, teachers, parents and community leaders in health promotion in school. Moreover, SES 1 often receive coaching program from EOCoS to join health school competition. They had been relatively implementing the element of across sector engagement. The challenges faced by UKS in implementation of element 1 as follows.

Subtheme 1: Depending on governmental institution (PHC) and EOCoS

Schools have routinely performed activities that are related to health with local PHC such as PHC Tanah Kalikedinding. But all activities depend on PHC program. They have not yet initiated to design program. There are various activities including routine scouting young physician in school.

"eee…clearly (its program) from PHC okay, there must be that activity.It is mandatory we follow (that program" (School Master 2)

Subtheme 2: Cooperation is to be done in conjuction to school accreditation

1. **Cooperation for school accreditation and competition participation:** SES 1 often make documentation in every cooperation to be held with out-school parties. According to informant, this documentation is used to meet the requirement for school accreditation. It is also used for preparing healthy school competition:

   "…according to accreditation instrument, school is better to organize cooperation with related several institutions with industry as well as governmental institution. Mainly police, then PHC, eee kelurahan (the kind of village in urban area), subdistrict. There is a kind of mutual benefit" (teacher 1, SES 1).

2. **Incidentally cooperation with private parties, not sustainable:** SES 1 is the most frequent to receive

and perform cooperation with private parties for engaging in healthy activities. The most frequent activity is student health competition accompanied by company products marketing. Moreover, few of non governmental organization (NGO) also has ever given training to students, but it is not sustainable due to limited funding.

Because of the unusual activity from private parties, school decides selectively. There has to be recommendation from EOCoS before private parties offer cooperation to schools.

Subtheme 3: Limited resources

1. **Limitation of funding and man power:** Cooperation with out-school parties and unsustain-activities due to resource limitation, both funding and man power, particularly companion teacher.
2. **Engagement of teacher limited to school hour:** In each school as subject of research, every teacher efforts to engage in enhancing student health. Minimum and the most frequent activity is reminding, companying and examining personal hygiene of student such as nail, hair and tooth cleanliness. That activity is limited to suggestion, there is no written regulation with sanction.

Subtheme 4: School Committee not yet optimal: School committee in SES 1 is relatively more active compared to other schools under study. School committee is frequently engaged in routine meeting for enrolling student, examination preparation and student graduation. School committee also participates in planning and implementing activities in school, particularly that is related to student activities directly. However, according to informant of school committee, its engagement is limited to school request, committee initiative is not possible, and it is difficult to expect liveline of committee member.

"The caretakers of committee are nine (person). Really that is very difficult. The works are overload, Mam(they are difficult to leave their jobs). Thus, really it is social matter, I can not force, even to find a substitute, no one wants. I am myself fooled. Eventhough I also work hehehe. That is okay.. that's fine, I am sincere. "(School committee 3).

Main theme 2: Elements 2, 3, and 4 (Trias UKS): Elements 2, 3, and 4 of HPS, known as Trias UKS. The challenges of Trias UKS as school health program in Indonesia can be considered as the challenges in implementing elements 2, 3, and 4 of HPS. The following subtheme is identified as challenges in implementing those elements.

Subtheme 1: Optimal implementation just for competition purpose: SES 1 is more optimal in implementing Trias UKS because it gets accompaniment from EOCoS in conjuction to health school competition. Almost every year SES 1 always represents Subdistrict to compete in health school competition in the level of City of Surabaya. This privilege did not be obtained by two other schools. Informants in SES 2 and SES 3 state that UKS has not yet be implemented optimally because of school conditions, in which they are renovated physically, and administration policy from EOCoS.

Subtheme 2: School still prefers physical environment to social environment: Three schools show different condition related to elements about healthful school living achievement. SES 1 has relatively achieved healthful school living, while two other schools have not yet achieved it optimally. School environment that has not yet been clean optimally, according to informant is resulted in many factors, including student habits at home.

Social environment surrounding school has not yet been main attention. However, even though a little, there is still attention from school to take care social environment of students when they are in school.

Subtheme 3:Health education is more suggestion, not yet to be curriculum: *"... Thus wherever I have opportunity I can speak with students, certainly about narcotics problem, alcoholic problem, smoking cigarette problem, promiscuity, that's really the points. Besides from teacher, wherever I have opportunity to speak, I directly deliver it"(School Master 2).*

Main theme 3: Element 5-implementation of school policy:

Subtheme 1: Policy issued by school depends on School Master: Policy can be formulated by school, it is adapted to school condition and objective. This is the right of School Master to develop school by considering guidance from EOCoS. According to School Master of SES 3, that formulation is requested by EOCoS every year, then it is reviewed, decided and signed by Head of EOCoS to be implemented.

Subtheme 2: School policy can not contradicting from EOCoS policy: *"Its policy can't discord far from decision that is ordered by EOCoS. Its policy must beinline with information of EOCoS ...including from PHC…. (School Master 2)*

Subtheme 3: Policy issued by school has not yet implemented sanction, just only suggestion: *"None (school sanction). Only suggestion, andbasically from EOCoS there is order something like this, ... Besides disturbing student health, it (smoking around the school) is also followed by those our students, (it) has been delivered something like that …." (School Master 2)*

Main theme 4: Element 6-Effort to Enhance Public Health Comprehensively: This element means that school participates in enhancing public health around the school.

Subtheme 1: The effort has not yet engaged the community around the school, it is only limited to competition purposes: According to an informant, there is a component of evaluation of competition that states contribution school cadre to people around the school. Its contribution includes posyandu (integrated services post) visits, observation of healthy housing. But, unfortunately those good activities are only for competition purposes. It is only three months continuously before and after competition. It is not routinely implemented, because of limited resources, mainly students in charge and teacher as companion.

Discussion

The principle of theelement 1 of HPS is a school engages across sectors in effort for enhancing health of school community. The concept of HPS gives organization context that the maximum impact of health promotion effort can be achieved through policy and coordination of program, particularly cooperation between health and education sectors[15,16]. The results show that engagement of across programs, across sectors and across private companies is still limited to competition purposes, completing accreditation documents and supporting fulfillment of certain institution target, such as sponsorship of private companies.

The results showed that School Master has been requested to organize cooperation with stakeholders actively. These include mainly alumni, private and industrial sectors as well. The request is difficult to realize by school when there is no clear regulation. The proactive School Master is strongly needed to make networking with stakeholders.

In implementing element one, the engagement of school committee is still low. The findings indicate that school committee as representatives of parents is really willing to be engaged in financing student activity. The reason of transparency and leadership of school master is the reinforcer to be willing to engage in it.

The achievement of element 2 of HPS, varies among three schools under study. The variation of physical environment may be due many factors although it has been decided as achievement indicator. The findings show that in general, physical building condition of SES in Surabaya is relatively good. According to informant, renovation can be done because Mayor budgets physical renovation for all SESs in Surabaya.

Three schools under study has not yet touched psycho-social environment. The findings show that environmental condition around school gives impact on psychosocial condition of school community. Two schools are located in crowded and busy areas. According to informant, this condition gives impact on particularly student interaction.

The teacher limitation in giving literacy of healthy environment is probably as challenge of second element implementation. This is in accordance with the results of study that teacher role minimumly in implementing school health promotion effort, because teacher has responsibility to teach based on curriculum and lacks of health training as well[16]. The importance of literacy and healthy behavior habituation is emphasized in the results of this study.

Guidelines for implementing UKS actually contain the importance of life skill development. This skill is used for behaving healthy and clean life for the students. Misunderstanding and bad policy of school contribute to non-optimal implementation. Enhancing literacy of holistic health concept[17] can be used for intervention effort. This literacy enhancement in the form of training, is not only for teacher but also for all school community including parent, has written as HPS indicator as well[8].

Element for enhancing overall community health has not yet been implemented by school optimally and sustainably. Actually, school can involve Coaching Team in Subdistrict level to enhance public health around school. Coaching team, in which one of its members is

Camat (Head of Subdistrict) has authority in Subdistrict. This authority can be used for coordinating across sector efforts in implementing school health program.

Other efforts are focusing of public health problems in each area, and involving of parent and community participation. School has to participate in planning and implementing public health efforts surrounding, although not many and not yet sustainable.

Conclusion

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Ethical Clearance: Ethical Committee of Faculty of Public Health, Universitas Airlangga

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Conflict of Interest: Nil

References

1. WHO. Promoting health through schools. Report of a WHO Expert Committee on Comprehensive School Health Education and Promotion. World Health Organization technical report series. 1997.
2. Lee A, Wong MCS, Keung VMW, Yuen HSK, Cheng F, Mok JSY. Can the concept of Health Promoting Schools help to improve students' health knowledge and practices to combat the challenge of communicable diseases: Case study in Hong Kong? BMC Public Health. 2008;
3. Lee A. Health-promoting schools: Evidence for a holistic approach to promoting health and improving health literacy. Applied Health Economics and Health Policy. 2009.
4. Loureiro MI. A study about effectiveness of the health promoting schools network in Portugal. Promot Educ. 2004;
5. McNall MA, Llchty LF, Mavis B. The impact of school-based health centers on the health outcomes of middle school and high school students. Am J Public Health. 2010;
6. Nansel, Tonja, R., Huang, Terry, T.K., Rovner, Alisha, J., Sanders-Butler, Yvonne. Association of school performance indicators with implementation of the Healthy Kids, Smart Kids program: case study. Public Health Nutr. 2009;
7. Kemenkes RI. Promosi Kesehatan di Sekolah. Pusat Promosi Kesehatan. 2011.
8. WHO. A Guide For Establishing Health Promoting Schools In The South-East Asia Region. Vol. 19, World Health Organization. 2003. 159–170 p.
9. Kemendikbud. Pedoman Pembinaan dan Pengembangan Usaha Kesehatan Sekolah. 2012.
10. Leurs MTW, Schaalma HP, Jansen MWJ, Mur-Veeman IM, St. Leger LH, De Vries N. Development of a collaborative model to improve school health promotion in the Netherlands. Health Promotion International. 2005.
11. Giles, W., Hunt, H., Lewallen, T. C., Potts-Datema, W., & Slade S. Whole School, Whole Community, Whole Child. ASCD USA [Internet]. 2014;16. Available from: http://www.ascd.org/ASCD/pdf/siteASCD/%5Cnpublications/wholechild/wscc-a-collaborative-approach.pdf
12. Lee A, Tsang C, Lee SH, To CY. A comprehensive "healthy schools programme" to promote school health: The Hong Kong experience in joining the efforts of health and education sectors. J Epidemiol Community Health. 2003;
13. Creswell JW. Qualitative Inquiry and Research Design : Choosing Among the Five Approaches. SAGE Publications, Inc. 2013.
14. WHO. Who's Global School Health Initiative. Heal Promot. 1998;
15. Rissel C, Rowling L. Intersectoral Collaboration for the Development of a National Framework for Health Promoting Schools in Australia. J Sch Health. 2000;
16. St Leger L. Australian teachers' understandings of the health promoting school concept and the implications for the development of school health. Health Promot Int. 1998;
17. WHO. Primary Health Care: Report of the International Conference on Primary Health Care, Alma-Ata. Int Conf Prim Heal Care. 1978;

Evaluation Context and Input of National Health Insurance in Ternate City

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Abstract

Context: Implementation of National Health Insurance (JKN) in several regions in Indonesia experiences differences in terms of expected outcomes. The recruitment of participants in business entities, especially the micro, small and medium segments, has also not been reported yet. The general objective of this research is to know the context and input in the implementation of national health insurance in Ternate City. The research method used is qualitative research. The informants in this study were the head of the Indonesian national health care insurance, the Head of the Health Service, the Head of Planning and Data, the Head of Health Financing, the Head of the Health Center, the Head of the Unit, the Director of the Dharma Ibu Hospital. Health insurance program policies in Ternate City are based on regulations issued by the Indonesian national health care insurance and Ternate Mayor Regulations. Inputs Health resources available at the health center and hospitals are mostly eligible, although there are still officers working health are not following their educational background. Payment of claims at the hospital is still experiencing delays while payments for capitation has proceeded according to the rules. Infrastructure facilities available at the health center and hospitals have fulfilled.

Keywords: *Health insurance, context, input, evaluation*

Introductions

The implementation of national health insurance in several regions in Indonesia experienced differences in terms of expected outcomes. The recruitment of participants in business entities, especially the micro, small and medium segments, has also not been reported yet. In addition, the distribution of participants, especially in first-level health facilities, was also judged to be uneven. Another problem that also needs attention is the availability of benefit packages and the readiness of a fair and equitable supply for every level of society. The stipulation and standardization of care classes were also stated to still need improvement. so that in the future it is expected that the health insurance benefit package will be pursued equally for all participants, both medical and non-medical benefits (care classes) both beneficiary participants and non-beneficiary[(1)].

The implementation of national insurance in Indonesia is a very serious challenge due to its large population, uneven population distribution, and diverse geographical conditions. In remote areas often do not get the same and adequate services because of the lack of facilities and qualified health workers like in big cities. Following is data on coverage of national health insurance membership in Indonesia in 2015 in each province, the current condition of membership in Indonesia is still very small at 53% of 133,423. 653[(2, 3)].

North Maluku officially became a Province after it was previously part of the Maluku Province. North Maluku is a group of islands with a land and water ratio of 24:76. It has 395 islands, 83% or around 331 islands that are uninhabited. Based on data in 2015, the total population of North Maluku Province registered as a participant in the national health insurance program was

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532,306 people, around 49.85% of the total population of 1,067,610. Most of the residents of North Maluku registered as participants of health insurance are recipients of assistance, of which there are around 328,965 people who are beneficiaries whose contributions are borne by the government[4].

The fact that there are still many complaints from the public both directly and through the mass media, such as convoluted procedures, there is no certainty in the period of settlement, less transparent requirements, and the attitude of officers who are less responsive in providing services. Based on the description of the problem, the purpose of this study is to determine the evaluation context and input of National Health Insurance in Ternate City.

Materials and Method

This research is a qualitative study. Research locations were carried out in several agencies related to the health insurance program consisting of the Indonesian national health care insurance, Ternate City Health Office, DarmaIbu Hospital and health center of Kota Baru Ternate. This research was conducted in October-November 2019. The procedure for selecting informants used a purposive sampling method. Researchers are the main instrument of research. As the main instrument, researchers act as planners, implementers, data collectors, analysis, interpreters of data and ultimately become reporters of research results[5]. Data analysis techniques consist of processing and preparing data for analysis, reading the entire data, and analyzing in more detail by codingthe data.

Findings:

Context: The implementation of the Health Insurance program is a cross-sectoral collaboration in which the Ministry of Health acts to regulate regulations including a tiered system, INA-CBG package rates. Health facilities as health service providers and social ministries/social services regulate related grant recipients. Policies implemented at the health center level are based on policies issued by the Indonesian national health care insurance and are guided by the regulations of the Mayor of Ternate. The mayor's regulatory policies govern the services provided to health insurance participants as well as incentive payments to health workers.

'Peraturanyang mengaturtentangpelayananterhadappeserta BPJS, kemudianmenyangkutdenganinsentifpetugasdihitungsesuaidenganperaturan yang disampaikan oleh peraturanwalikota yang adadisitu.."(GA, 49 tahun).

Policies implemented at the Dharma ibu Hospital following policies issued by the health insurance provider. Dharma Ibu Hospital follows every development and change of regulations issued by the Indonesian national health care insurance, especially related to input or reporting using the INA-CBGS application that has been developed. Kota Baru Health Center and Dharma ibu Hospital and Ternate City Health Office have carried out their respective functions. Kota Baru Health Center and Dharma ibu Hospital have provided health services to health insurance participants following existing regulations.

Input:

The Availability of Health Human Resources: The availability of health human resources has largely been met, although there are still some health workers needed. Based on the results of interviews with health workers who worked at the health center, information was obtained that the officer worked not following his field. for example in the input code section of the diagnosis, health workers who input the data are still in the learning process. It is not following his competence.

''Karena BPJS iniberhubungandengandiagnosa, kalausayakanbukanperawatdenganbidan, bukandibagianitutoh, jadikalausayadidiagnosaagaksulit Tapi tong belajartarada, kalaudibilangtidakbisa tong maubagaimana, jadibelajardengansendirinya, jadi Tanya tohinidiagnosanya, boleh tong belajar, tapiitupasienakanmenunggu lama karena tong haruscaridiagnosanya..."(SF, 52 Tahun).

The general administration section said that health human resources have been fulfilled but after further observation still found health workers who are not following their fields. Other health workers such as doctors, nurses and midwives have been fulfilled, but for the person in the input, the code section is still not appropriate.

Funds Availability: Funds were given by the Indonesian national health care insurance to the health center and hospitals have different payment systems.

'Itudihitungdarijumlahperkapita. Dalamartibahwapresentatif BPJS iniadaberjumlahsekian orang, kitahitungperkapita. Perkapita 6 ribu. Itupundihitung 6 ribukalaukitamemangmemenuhi target dari yang tigakerjas

amatadiadakontakkomunikasi..''(SF, 52 Tahun).

While the Dharma Ibu Hospital receives funds with a claim system. The capitation calculation is based on the number of residents registered in the national health insurance.

''...Merekamenggunakan INA CBGS, Pembayarannyaberdasarkanpaket, semuadidalamnyaterdapatperawatan, lab, lalukemudiansetiapbulannyakitamengklaim...''(SR, 56 Tahun)

In the Kotabaru Health Center the number of residents who have been accommodated by the national health insurance is 5000 participants from 31,268 total population. The capitation fund payment is paid through the Kota Baru Health Center account and is controlled by the Health Office of ternate. All forms of expenditure and disbursement of funds through health center accounts must be known by the Ternate City Health Office. When the Kota BaruHealth Center wants to buy drugs or equipment it must make a plan of needs that will then be submitted to the national health insurance manager to be signed and then the funds from the account can be disbursed. This is consistent with what was revealed by the kotabaru health center and Ternate City Health Office.

''Haruskonsultasiduluharusditandatangani oleh pihakdinaskesehatan'' (SF, 52 Tahun).

The ongoing disbursement process is felt to hamper the performance of the Kota Baru Health Center in terms of health services. Because every purchase of goods must be known by the Health Officer, the health center should have been able to disburse their funds and be able to submit proof of purchase thereafter.

''...Mungkinkendalanyatiapbulanlaporannyamasukke DinasKesehatanwalaupunRekening punya puskesmas, tapijikaakanpencairan/pembelianbarang dan obatharusmemintadaripihakDinasKesehatan. Prosesnyaagak lama..''(GA, 49 tahun)

Facilities and Infrastructure:

Health Center: Facilities and infrastructure available at Kota Baru Health Center are mostly available. Seen from the availability of chairs in the patient waiting room which is located in front of the patient registration counters, patient examination rooms, pharmacies, and laboratory support facilities. The condition of the Kota Baru Health Center looks neat and also clean. The service room is arranged in front of the building and the administration room is located at the back of the health center building.

''Untukpasien BPJS sendiri. Sarana dan prasarana yang kita punya disinimulaidaripelayanan,yangadaloket, pelayanansampaikeLaboratorium, kemudianpengambilanobat dan adapemeriksaandululewatdokteruntukmenanganipasien BPJS...''(SF, 52 Tahun).

The health services provided by the Kota Baru Health Center are not only given to sick people but also healthy people. This is a form of preventive health services. As a form of control, Kota Baru Health Center conducts data collection on each household, to see the number of household members and conduct health checks on them, such as blood pressure checks.

''Kalaupundiasehatdicektekanandarahnya, ituapanamanya. Baikkepalakeluargasampai anak. Orang belumsakitdicegahuntuktidaksakit. Jaditugaspuskesmasitupekerjaannyaberatkarenaharusturununtukmencegah orang untuktidaksakit. Jadikitapenyuluhan. Jadikitajal anketiaprumahataukalauadaposyandu''(SF, 52 Tahun).

Based on interviews with several patients visiting the health center, information was obtained that most of the facilities and infrastructure available at the Kota baru health center were available, such as the availability of patient waiting rooms and comfortable chairs to wait. Besides health workers in charge of providing friendly service and serve patients well.Most of the facilities and infrastructure are available at the Kota Baru Health Center. However, there are no USG facilities for pregnant women.

Hospital: Facilities and Infrastructure at the Dharma Ibu Hospital are available, visible from the presence of the emergency department, patient waiting room, administration and information department, several polyclinics, operating room, infant and toddler examination especially for immunization, elderly health examination, *Rontgen,* laboratory, *CT scan*, treatment room with various levels. The condition of the hospital looks neat, clean and floored. Hospital lifts consist of two where the first is a lift for patients and the other is used for visitors/patients' families. One of the highlights of the hospital is a beautiful view that can be enjoyed by patients and patients' families located just behind the hospital building. In this hospital, there is also a canteen which is neatly arranged and clean.

''Semuapelayananlengkap, igd, laboratorium, fotorongten,CT Scan''(SF, 52 tahun)

In addition to the facilities and infrastructure at

Dharma Ibu Hospital, it is also supported by an adequate number of health workers. Dharma Ibu Hospital has 4 general practitioners and 17 specialist doctors. If added together, the total number of employees working at the Dharma ibu Hospital is around 100 people. This was conveyed from the results of the interviewsconducted.

''Kami disinidokterumumnya 4, dokterspesialis 17, Total keseluruhanpegawaikuranglebih 100 orang''(SF, 52 tahun)

Based on the results of interviews conducted with the Kota Baru Health Center and the Dharma Ibu Hospital, information was obtained that most of the facilities and infrastructure were available.In its service, there are several types of services that are not funded.

Discussion

Context Evaluation: The evaluation includes an analysis of problems related to the program environment or objective conditions to be carried out. It contains an analysis of the strengths and weaknesses of certain objects. Stuffle beam states context evaluation as an institutional focus by identifying opportunities and assessing needs (1983). One need is defined as a gap (discrepancy view) of real conditions (reality) with the expected conditions (ideality). In other words, context evaluation is related to the analysis of the strengths and weaknesses of a particular object that is going to or is going on.

In Ternate, the policy or regulation related to the implementation of Health Insurance refers to the regulations issued by the Indonesian national health care insurance and the Mayor's regulations. Policies implemented at the health center level are based on policies issued by the health insurance provider body and are guided by the regulations of the Mayor of Ternate. The guardian policy regulates related services provided to health insurance participants as well as incentive payments to health workers.

Input Evaluation:

Availability of Human Resources: The availability of human resources in the implementation of health services plays an important role, especially in the current era of National Health Insurance. The national health insurance program began to be implemented in Indonesia in 2014 [(6)]. With the existence of a national health insurance program, there will certainly be changes in various ways. From the aspect of health providers, for example, they must provide services that are increasing due to an increase in demand for health services.

First level health facilities are the spearhead of health services in the community and have the function as the first contact of national health insurance participants so that they have a major impact on improving the health status of the community. According to the Republic of Indonesia's Presidential Regulation Number 32 of 2014 that what is meant by First Level Health Facilities hereinafter abbreviated as FKTP is a health facility that carries out non-individual health services specialist for observation, diagnosis, treatment, treatment, and/or other health services[(7)]The majority of Human Resources for Health at Kota Baru Health Center and Dharma Ibu Hospital have been fulfilled. Human Resources is a very important element and influences the improvement of all aspects of the health service system for all levels of society. Implementing health insurance policies are health service units, starting from the basic level to the advanced level. Human resources implementing health services in the National Health Insurance are doctors/ specialists, dentists, nurses, and midwives [(8)]. The results of research conducted by Lestari [(9)]showed that the lack of health workers compared to the existing health center makes the workload of health workers higher and incompatible with their duties and educational background.

Availability of Funds: The health insurance provider must issue an official report on the completion of the claim file no later than 10 days after the claim was submitted by an advanced referral health facility and accepted by the health insurance provider body. (4) In the event that a claim submitted by an advanced referral health facility as referred to in paragraph (1) does not fulfill the completeness of the claim file, the Health insurance organizing body returns all claim files to the advanced referral health facility and issues the minutes of returning the claim file.

Claim costs at the Dharma Ibu hospital experience delays (5) In the event that the national health insurance does not issue an official report on the completion of the claim file within 10 (ten) days as referred to in paragraph (3), the claim file is declared complete. (6) The 10 (ten) days as referred to in paragraph (4) shall be counted starting from the day of filing an advanced referral health facility claim which is marked by the issuance of proof of receipt of the claim[(10)].

Claims for the Dharma Ibu Hospital experienced delays in claim payment. This is in line with research often experiencing delays for one month. This happens when the health insurance provider will pay the hospital claim fee, but it turns out the patient file in this case the medical record has not been completed, as a result, it will experience delays in inputting because the files have accumulated which will affect the payment of claims for the hospital that is, it will be pending, and the claim fee will be paid one month in the future [(11)].

Conclusion

Health insurance program policies in Ternate City are based on regulations issued by the Indonesian national health care insurance and Ternate Mayor Regulations. Inputs Health resources available at the health center and hospitals are mostly eligible, although there are still officers working health are not following their educational background. Payment of claims at the hospital is still experiencing delays while payments for capitation has proceeded according to the rules.

Conflict of Interest: The authors declare there is no conflict of interest.

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References

1. Palutturi S, Sahiddin M, Ishak H, Hamzah. Community Motivation and Learning to Pay the National Health Insurance Contribution. Asian Journal of Scientific Research 2018;11(2):276-86.
2. Kemenkes RI. Profil Kesehatan Indonesia (Data dan Informasi). Jakarta: Kementerian Kesehatan RI, 2015.
3. Putrawan A, Junaid J, Ismail CS. Studi Kualitatif Pelaksanaan Jaminan Kesehatan Nasional oleh BPJS Kesehatan di Kecamatan Tinanggea Kabupaten Konawe Selatan. Jurnal Ilmiah Mahasiswa Kesehatan Masyarakat. 2017;1(3).
4. Effendi D. Laporan Hasil kunjungan Kerja Komisi IX DPR RI Provinsi Maluku Utara. Jakarta: Dewan Perwakilan Rakyat RI, 2015.
5. Creswell JW. Research Design: Pendekatan Kualitatif, Kuantitatif dan Mixed. Yogkarta: Pustaka Pelajar; 2013.
6. Kemenkes RI. Buku Pegangan Sosialisasi JKN dalam Sistem Jaminan Sosial Nasional. Jakarta: Kementerian Kesehatan RI; 2015.
7. Mujiati M, Yuniar Y. Ketersediaan Sumber Daya Manusia Kesehatan pada Fasilitas Kesehatan Tingkat Pertama dalam Era Jaminan Kesehatan Nasional di Delapan Kabupaten-Kota di Indonesia. Media Penelitian dan Pengembangan Kesehatan. 2017;26(4):201-10.
8. Tjeunfin R, Trisnantoro L, Zaenab SN. Gambaran Pelaksanaan Program Persalinan oleh Tenaga Kesehatan Era JKN Daerah Perbatasan di Puskesmas Ponu Kabupaten Timor Tengah Utara. Jurnal Kebijakan Kesehatan Indonesia: JKKI. 2016;5(2):73-80.
9. Lestari TRP. Analisis Ketersediaan Tenaga Kesehatan Di Puskesmas Kota Mamuju Provinsi Sulawesi Barat Tahun 2014. Kajian. 2017;21(1):75-88.
10. Muliana, Nurhayani, Balqis. Evaluasi terhadap Implementasi Kebijakan Tarif Pelayanan Kesehatan (Tarif INA-CBGS) di Rumah Sakit Umum Daerah Kota Makassar2015.
11. Irwandy I. Kajian Literature: Evaluasi Pelaksanaan Program Jaminan Kesehatan Nasional di Indonesia. Jurnal Kebijakan Kesehatan Indonesia: JKKI. 2016;5(3):110-4..

The Effectiveness Comparison of Type of Treatments in Decreasing of Total Dissolved Solid (TDS) and Total Suspended Solid (TSS) in Household Wastewater

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Abstract

Context: In Indonesia, the biggest source of wastewater producers comes from household activities. phytoremediation and biofiltration are some method that can handle domestic wastewater pollution. This study aims to determine the effectiveness comparison of the type of treatments in decreasing of TDS and TSS in Household Wastewater. The research method used in this research is pure experiment. The sample selection is based on the level of pollution that occurs in the ternate city area due to wastewater and has a high population density so that it is taken a sample in the eastern Makassar district. Media selection is based on its ability to reduce pollutant parameters of TDS and TSS as has been stated in several journals with biofiltration and phytoremediation approaches. The total sample used was 15 liters of domestic wastewater. This research was conducted for 4 weeks and all parameter was tested 4 times, the first test was at the first week, the second test was after treatment second weeks, the third test was after treatment 3rd week, the fourth test was after treatment 4th week. All tested parameter tests by using the gravimetry method. Phytoremediation by using water hyacinth is more effective in reducing levels of TDS and TSS in domestic waste than biofiltration by using banana stems.

Keywords: *Phytoremediation, biofiltration, total dissolved solid, total suspended solid.*

Introduction

World Health Organization estimates, that up to 80% of illnesses and infections in the world result from inadequate treatment of sewage and thus insufficient amount of clean water. WHO also reports that more than 3.4 million people die annually due to the activity of pathogens living in the aquatic environment[1].It can be said that water is a key component of socio-economic development and keeps the environment in good condition[2].

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A modern WWTP must fulfill several basic tasks. Besides the effective removal of contaminants from the influent sewage, the reduction of greenhouse gasses emission, energy-saving and the ability to reuse the part of resources such as the agricultural use of sewage sludge, must also be taken into account[3]. The untreated or insufficiently treated wastewater is a direct threat to the environment. Moreover, a discharge of untreated sewage into the receiving water body causes severe contamination resulting in eutrophication and intoxication of the aquatic organisms, as well as the chemical and biochemical transformations of pollutants causing the release of harmful gases disturbing the functioning of the ecosystems. All these factors cause a change in the biotic conditions and the physicochemical composition of wastewater receiver[4-7].

The problem of environmental pollution, especially water pollution in Indonesia, has shown quite serious symptoms. One of the causes of water pollution comes from factory industrial discharges or other activities that

simply dispose of wastewater without prior treatment into the river or the sea[8]. The amount of water pollution in North Maluku increased by 370 percent, compared to 2014. Analysis of the Domestic Wastewater Risk Index in Ternate City in 4 sub-districts, shows that the existing Domestic Wastewater needs serious attention considering the insecure septic tank coverage of>60%, the scope of pollution due to disposal of contents Unsafe Septic Tanks are in the range of 21.4-65.9% and Pollution coverage due to SPAL is>50% except for strata 0 of 12.5%. This will harm the quality of the surrounding environment, especially Clean Water Sources[9].

Phytoremediation involves the use of plants to remove, transfer, stabilize and/or degrade contaminants in soil, sediment, and water. This plant-based technology has gained acceptance in the past ten years as a cheap, efficient and environmentally friendly technology especially for removing toxic metals[10]. Biofiltration is a process in which an otherwise conventional granular filter is designed to remove not only fine particulates but also dissolved organic compounds through microbial degradation. Technologies that can be used to remove pollutants include flocculation, adsorption, (bio) filtration, ion exchange, (advanced) oxidation processes and membrane filtration[11].

This study aims to determine the effectiveness comparison of the type of treatments in decreasing of TDS and TSS in Household Wastewater.

Material and Method

Laundry wastewater sampling by taking a combined sample of time (morning, afternoon and evening) and place (5 places in RT 01) by taking samples of 1000 ml per one take. For instance, the sample was 15000 ml of wastewater. The method of measuring TDS and TSS uses the gravimetric method in which Gravimetry is one of the quantitative analysis method of a substance or component that has been known by measuring the weight of the component in a pure state after going through a separation process. The biggest part of the gravimetric analysis involves the transformation of elements or radicals into pure stable compounds that can be immediately converted into meticulously weighed forms[12].

TDS calculation

$$TDS = 1000/V \times (F - B) \times 1000 = ..mg/L$$

Information:

B = weight of the Vaporizer Cup(g)

F = weight of the Vaporizer Cup+dissolved residue(g)

TSS Calculation

$$TSS = 1000/V \times \{G \times (C+D)\} \times 1000 = \ldots. mg/L$$

Information:

C = weight of the Vaporizer Cup(g)

D = Filter Paper weight(g)

G = weight of the Vaporizer Cup + filter paper filter(g)

The sample selection is based on the level of pollution that occurs in the ternate city area due to wastewater and has a high population density so that it is taken a sample in the eastern Makassar district. Media selection is based on its ability to reduce pollutant parameters of TDS and TSS as has been stated in several journals with biofiltration and phytoremediation approaches.

The number of samples taken is adjusted to the needs of research where the number of samples taken based on the place and the combined time can be accumulated as much as 15000 ml. Number of places x amount of time x liters per take 5x3x1000 ml=15000 ml. The research was carried out for 4 weeks by looking at the effectiveness of bioreactors made by conducting tests on the first week to the fourth day. The research method used in this research is pure experiment. The total sample used was 15 liters of domestic wastewater. This research was conducted for 4 weeks and all parameter was tested 4 times.

Phytoremediation processes rely on the ability of plants to take up and/or metabolize pollutants to less toxic substances[13]. The main purpose of the biofilter is to remove the dissolved organics, the suspended particles are removed in conventional filter before subjecting the wastewater[14].

Findings:

Based on the results of research conducted in the Chemical Laboratory, Environmental Health department, Health Polytechnic of Ternate can be seen in the following table 1.

Table 1: The result of TDS and TSS tests on two media in 4 weeks

TDS	TSS	Unit	Week	Treatments
625	475	Mg/l	1	Phytoremediation
665	563	Mg/l	2	Phytoremediation
485	450	Mg/l	3	Phytoremediation
311	417	Mg/l	4	Phytoremediation
625	475	Mg/l	1	Biofiltration
563	418	Mg/l	2	Biofiltration
525	480	Mg/l	3	Biofiltration
755	417	Mg/l	4	Biofiltration

Information: TDS= Total Dissolved Solid, TSS= Total Suspended Solid

Discussions

Based on the results of the treatment for 4 weeks the results obtained are the first examination on the sample of wastewater before treatment with water hyacinth (Eichhornia) and banana stems (Musa SP) there are two different values where the value of TDS 625 mg/L and TSS 475 mg/L. Based on the Kementrian Lingkungan Hidup [15] concerning Water Pollution Control Procedures, the results obtained are categorized as high, this is because the intermediate limit of TDS in domestic wastewater under the regulation is 500 mg/L. Meanwhile, the results obtained from the TSS Test are 475 mg/L, based on Kementrian Lingkungan Hidup [15] No. 01 of 2010 concerning Water Pollution Control Procedures, this result has exceeded the threshold because the highest standard for TSS quality in domestic wastewater is 350 mg/L.

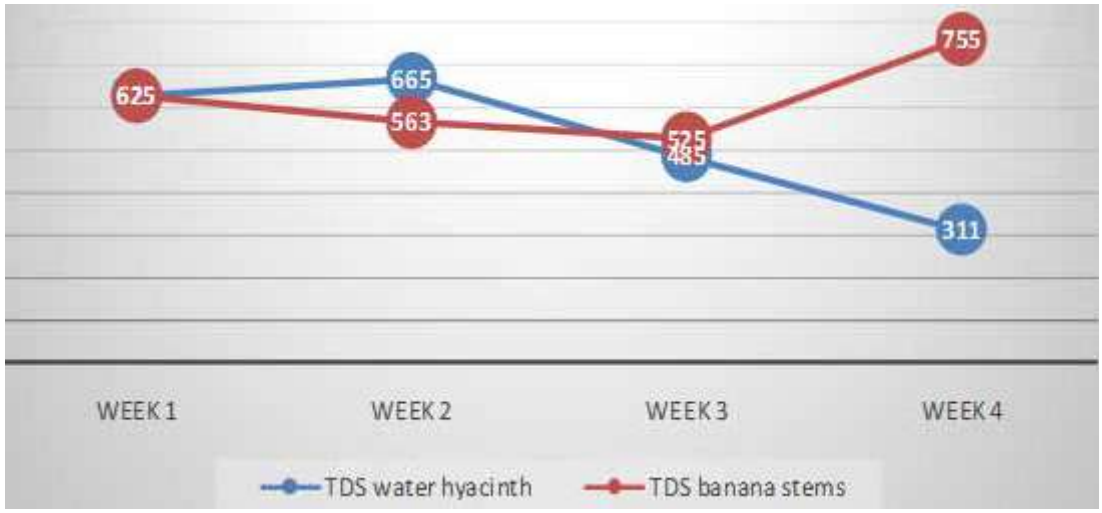

Figure 1: The comparison of TDS number by using water hyacinth and banana stem on wastewater for 4 weeks

In the results of treatment using water hyacinth for 2 weeks, the results obtained TDS values increased to 655 mg/L compared to before treatment but it dropped dramatically on the 3rdweek and 21 ie 485 mg/L and 311 mg/L. TDS value increase on 2nd week with treatment using water hyacinth because on the 2nd week the water hyacinth plants do the absorption process through the roots. this is because the process of photosynthesis allows the release of oxygen by water hyacinth increasing TDS. While the value of TDS on 3rd week decreased to 485 mg/L. the decrease TDS value on the 3rd week is due to water hyacinth being able to grow well so water hyacinth can reduce levels of water pollutants. aquatic plants such as water hyacinth can be developed as a cleaning pollutant levels in liquid waste where water hyacinth can absorb various water pollutants, including Lead, cadmium, which may be dissolved in water so that water hyacinth can reduce TDS levels[16].

The TDS value 4th week was further decreased by 311 mg/L. According toMagar, Khan [17]hhis is due the roots of Water hyacinths naturally absorb pollutants including lead, mercury, and some organic compounds which are carcinogenic and have concentrations of approximately 10,000 times that is present as in generically found water because water hyacinth can adapt well until the

4th week on wastewater so that this makes the reduction in TDS values more significant. This is in line with research conducted byMoyo, Chapungu [18]stated that water hyacinth was remediating the river as noted by the significant reduction of electrical conductivity (25% decrease), total dissolved solids (26%), sulfates (45%), phosphates (33%) and total hardness (37%) between the sample points SR1 and SR3.

According toKementrian Lingkungan Hidup [15] concerning Water Pollution Control Procedures and TDS quality standards allowed for domestic wastewater, the TDS value 4th week has been in the low category on the results of the treatment using banana stems, the TDS value on the 2nd week after treatment was reduced to 563 mg/L, on the 3rd week it also decreased to 525 mg/L but increased dramatically on the 4th week to 775 mg/L. The decrease in TDS 2nd week is due to the fact that the biofiltration method using banana stems is useful to inhibit the growth of some pathogenic bacteria and filter out solid material in the waste so that the biofiltration method can reduce levels of solid pollutants. Decreasing levels of pollutants after the process biofiltration occurs significantly day 6 to 97.23% compared with control[19].

Decreased TDS on the 3rd week because banana stems have carbon content and this content serves to filter dissolved particles through biofiltration method so that the banana stems can reduce TDS. Meanwhile, on the 3rd week the TDS increases dramatically because the banana stems have organic properties if left exposed to water for more than 2 weeks, the banana stems will rot and affect the biofiltration process so the results obtained are not homogeneous. This happens because the banana stems occur eutrophication process so that this decay affects the value of TDS and TSS[20].

According toKementrian Lingkungan Hidup[15] concerning water pollution control procedures and TDS quality standards allowed for domestic wastewater, the TDS value on the 4th week has been in the medium category.

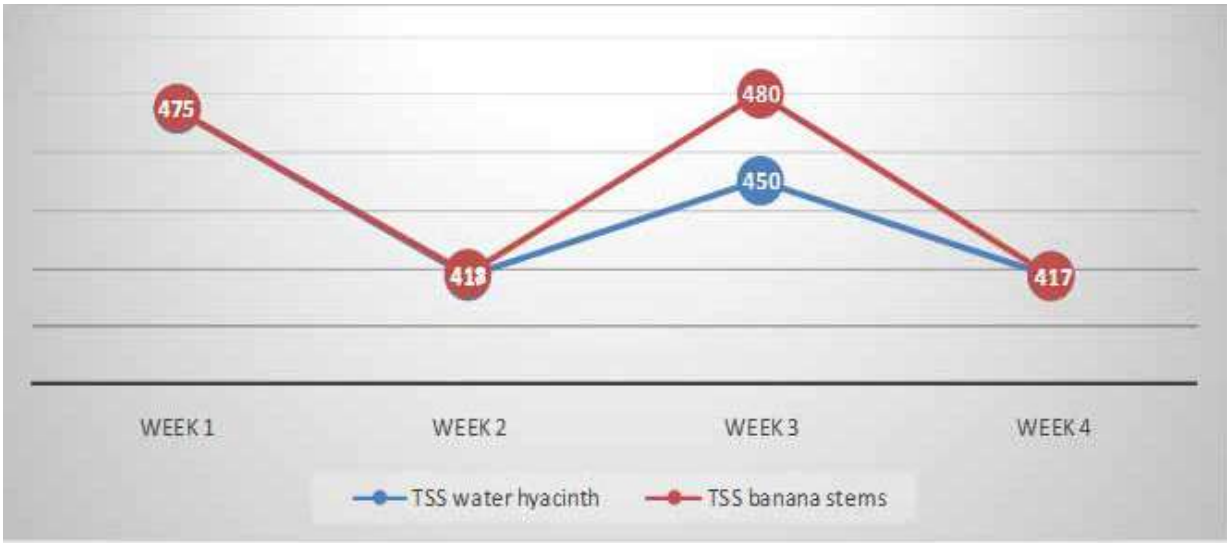

Figure 2: The comparison of TSS number by using water hyacinth and banana stem on wastewater for 4 weeks

The value of the TSS in treatment using water hyacinth for 2 weeks decreased to 417 mg/L compared to before treatment, but on the 3rd week TSS increased to 450 mg/L and suddenly decreased dramatically on the 4th week to 417 mg/L. The decreasing value of TSS on the 2nd week is because water hyacinth can clarify liquid waste and reduce solid particles contained in wastewater. These results are following research conducted byRuhmawati, Sukandar [21]stated that the reduction in TSS levels, the average percentage decrease in TSS levels for contact time 2 days 47.43%, for contact time 4 days 74.85%, and for contact time 6 days by 80.63%. the decrease in TSS is due to the function of water hyacinth weeds in purifying liquid waste and absorbing solid

particles so that it will create good conditions for the phytoremediation process.

The decreasing value of TSS by using water hyacinth on 4thweek because phytoremediation by using water hyacinth is able to absorb solid particles contained in wastewater. Phytoremediation processes rely on the ability of plants to take up and/or metabolize pollutants to less toxic substances. The uptake, accumulation, and degradation of contaminants vary from plant to plant. The plants used in phytoremediation are generally selected on the basis of their growth rate and biomass, their ability to tolerate and accumulate contaminants, the depth of their root zone, and their potential to transpire groundwater. The plants used in phytoremediation should not only accumulate, degrade or volatilize the contaminants but should also grow quickly in a wild range of different conditions[13]. The technology of Phytoremediation offers a viable solution to water pollution[22].

According toKementrian Lingkungan Hidup [15] No. 01 of 2010 concerning Water Pollution Control Procedures and TSS quality standards allowed for domestic wastewater, the TSS value on the 4th week still in the high category. This shows that although the TSS value has decreased, it still takes a long time to comply with the standards set by the environment ministry. Meanwhile, the TSS results obtained of the treatment using banana stems 2nd week after treatment reduced to 418 mg/L compared to before treatment and on 3rd week increased to 480 mg/L, but decreased dramatically on day 4th week to 417 mg/L. The decreasing value of TSS on 2nd week because biofiltration by using banana stems is able to filter out solid particles contained in wastewater. there is a high possibility for the effective application of biofilters for the removal of toxic heavy metals from contaminated water on a large scale. In short, the biofilters are having emerging applications for the treatment of heavy metals contaminated wastewater. It is very important to note that a good system to biofiltration provides the best condition for the microorganisms and, consequently, will achieve a high efficiency[14].

The increasing value of TSS on 4th week because of the composition of banana stems that have organic properties so that bacteria will easily develop and make banana stems rot. banana stems that are too long exposed to water can interfere with the biofiltration process due to natural decay. This happens because the banana stems occur eutrophication process so that this decay affects the value of TDS and TSS[20].

Conclusions

Phytoremediation by using water hyacinth is more effective in reducing levels of TDS and TSS in domestic wastewater than biofiltration by using banana stems.

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References

1. Ibrahim A, Onyenekwe P, Nwaedozie I. An efficiency assessment of lower Usuma water treatment plant in Abuja metropolis, Nigeria. IOSR Journal of Environmental Science, Toxicology and Food Technology. 2014;8(12):46-53.
2. Molinos-Senante M, Donoso G. Water scarcity and affordability in urban water pricing: A case study of Chile. Utilities Policy. 2016;43:107-16.
3. Arnell M. Performance Assessment of Wastewater Treatment Plants. Multi-Objective Analysis Using Plant-Wide Models. 2016.
4. Młyński D, Chmielowski K, Młyńska A. Analysis of hydraulic load of a wastewater treatment plant in Jasło. Journal of Water and Land Development. 2016;28(1):61-7.
5. Al-Zahiri A. Assessment of Performance of Wastewater Treatment Plants in Jordan. International Journal of Civil and Environmental Engineering. 2015:1-6.
6. Masłoń A, Tomaszek J. Evaluation of the Effectiveness of Wastewater Treatment Plant in Lubaczów. Czasopismo Inżynierii Lądowej, Środowiska i Architektury. 2013;60(3/13):209-22.
7. Garbowski T, Wiśniewski J, Bawiec A. Analysis and Assesment of the Wastewater Treatment Plant Operation in the City of Kłodzko. Journal of Ecological Engineering. 2018;19(2).
8. Aini A, Sriasih M, Kisworo D. Studi Pendahuluan Cemaran Air Limbah Rumah Potong Hewan di Kota Mataram. Jurnal Ilmu Lingkungan Undip. 2017;15(1):42-8.
9. Global D, LLC. Penyehatan Lingkungan Untuk Semua (Iuwash Plus) Quarterly Progress Report 10.

Jakarta: USAID/Indonesia Office of Environment, 2019.

10. Shaikh MM, Al Suhaimi AO, Hanafiah MM, Ashraf MA, Harun SN. Study on migration of phenolic and volatile organic compounds from plastic pipes used in plumbing home networks into tap water. Desalination and Water Treatment. 2018;112:344-50.
11. Reungoat J, Escher B, Macova M, Farré MJ, Argaud FX, Rattier M, et al. Biofiltration For Advanced Treatment Of Wastewater: Technical Report No. 73. Queensland: Urban Water Security Research Alliance 2012.
12. Badan Standardisasi Nasional. SNI 6968.72:2009: Air Dan Air Limbah – Bagian 72 : Cara Uji Kebutuhan Oksigen Biokimia (Biochemical Oxygen Demand. Jakarta: Badan Standardisasi Nasional; 2009.
13. Oh K, Cao T, Li T, Cheng H. Study on application of phytoremediation technology in management and remediation of contaminated soils. Journal of Clean Energy Technologies. 2014;2(3):216-20.
14. Kumar K, Sridevi V, Harsha N, Lakshmi M, Rani K. Biofiltration and its application in treatment of air and water polutants-a review. International Journal of Application or Innovation in Engineering & Management 2 (9). 2013;2(9):226-31.
15. Kementrian Lingkungan Hidup. Peraturan Menteri Negara Lingkungan Hidup Nomor 01 Tahun 2010 Tentang Tata Laksana Pengendalian Pencemaran Air Menteri. Jakarta: Kementerian Lingkungan Hidup; 2010.
16. Gupta P, Roy S, Mahindrakar AB. Treatment of water using water hyacinth, water lettuce and vetiver grass-A review. Resources and Environment. 2012;2(5):202-15.
17. Magar R, Khan AN, Honnutagi A, editors. Waste water treatment using water hyacinth. Conference: Innovation in engineering: Competitive strategy perspective, At 32nd Indian Engineering Congress, The Institution of Engineers (India); 2017.
18. Moyo P, Chapungu L, Mudzengi B. Effectiveness of water Hyacinth (Eichhornia crassipes) in remediating polluted water: The case of Shagashe River in Masvingo, Zimbabwe. Advances in Applied Science Research,. 2013;4(4):55-62.
19. Sali GP, Suprabawati A, Purwanto Y. Efektivitas Teknik Biofiltrasi Dengan Media Sarang Tawon Terhadap Penurunan Kadar Nitrogen Total Limbah Cair. Jurnal Presipitasi: Media Komunikasi dan Pengembangan Teknik Lingkungan. 2018;15(1):1-6.
20. Garno YS. Dampak Eutrofikasi Terhadap Struktur Komunitas dan Evaluasi Metode Penentuan Kelimpahan Fitoplankton. Jurnal Teknologi Lingkungan. 2016;13(1):67-74.
21. Ruhmawati T, Sukandar D, Karmini M. Penurunan Kadar Total Suspended Solid (TSS) Air Limbah Pabrik Tahu Dengan Metode Fitoremediasi. Jurnal Permukiman. 2017;12(1):25-32.
22. Luqman M, Butt TM, Tanvir A, Atiq M, Hussan MZY, Yaseen M. Phytoremediation of polluted water by tress: A review. African Journal of Agricultural Research. 2013;8(17):1591-5.

Environmental Health Risk Analysis of Carbon Monoxide Exposure among High Activity Communities Along "X" Street, Yogyakarta

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Abstract

Background: The most exhaust-gas produced by motor vehicles consists of 71% carbon monoxide and it becomes an impact on air pollution and human health risk. This study aims to analyze the environmental health risk health of carbon monoxide exposure to high activity communities at X Street, Yogyakarta.

Method: This study was an observational study with Environmental Health Risk Analysis (EHRA) approach. This study was conducted in 2019 with 269 respondents. The respondents were chosen by using a purposive sampling method with the criteria; they had been work five years and a minimum age of nineteen years old. Besides, carbon monoxide measurement was conducted in three zones.

Findings: The average carbon monoxide concentration was 7,5035 mg/m^3,Weight (Wb) median was 60 kg,Exposure time (tE) was 11 hours/day,Exposure duration (Dt) was 10 years, and Inhalation rate (R) was 0,83 m^3/hour. Besides, the intake real-time value of non-carcinogen was 0,395 mg/kg/day with 0,329 of Risk Quotient (RQ) level. There were sixteen respondents with (RQ>1) value that might have the risk. Hence, risk management was needed by decreasing the concentration value and the inhalation rate.

Conclusion: The main risk of carbon monoxide exposure was a respiratory disorder in real-time and lifetime duration. The Technical Implementation Unit of Environmental Agency needed ISPU measurement by routinely to monitor the carbon monoxide at X Street and recommended to use the Personal Protective Equipment (PPE) or mask.

Keywords: *Air pollution***,** *Carbon Monoxide, EHRA, Risk management.*

Introduction

Air pollution can cause poor health effect. According to the Air Quality Index (IQAir)[1] that Indonesia has first ranks in Southeast Asia and 11th ranks as the most polluted country in the world. The main source of air pollution are transportation, motor vehicles, almost 60% of the pollutants produced consist of carbon monoxide (CO)[2]. World Health Organization (WHO)[3] reported that air pollution causes the death of approximately 7 million people worldwide that 29% had lung cancer, 24% had a stroke, 25% had coronary heart disease, and 43% had lung disease.

Incomplete combustion of vehicles will produce CO gas. The inhalation path of CO gas into the human body through the respiratory and circulates throughout the body sucked into the lungs and binds to blood hemoglobin in the form of COHb. This mechanism will lack of oxygen and it can cause symptoms of poisoning to the body[4]. Long-term exposure to CO can cause headaches, dizziness, nausea, vomiting, blood vessel dilation, blurred vision,chest pain, weakness, confusion, pulmonary edema, pulmonary arrest, cardiac arrest, seizures, and coma[5].

Special Region of Yogyakarta especially X street that various vehicles crowded the road not only during rush hours but also even jammed because it is one of the tourist destinations, business or economic center[6]. Based on Environmental Agency[7] data that the quality of CO ambient air carried out in front of the Bringharjo market was 1,789.44 µg/Nm^3. Central Statistics

Agency[8] reported that the number of motorized vehicles of Yogyakarta city reached 4,616,016 vehicles. The high volume of vehicles with the small and narrow area of highway causes a high amount of vehicle density, it is inversely proportional to the speed of vehicles passing through the road and increase the concentration of pollutants. The lower speed of vehicles will result in higher concentrations of pollutants that present on road[9]. The high concentration of CO can endanger human health[10]. The communities at high risk of CO poisoning to people who have high activity along the X street likely traders and Trans Jogja bus stops officers who work more than 8 hours per day.

The research objective is examinating the magnitude of the environmental health risk of CO exposure as early dectection of health risk in high-activity communities along X Street, Yogyakarta City.

Material and Method

This study was using the Environmental Health Risk Analysis (EHRA) method to determine the magnitude of health risks due to CO exposure to the high activity communities along X Street in Yogyakarta. This study was conducted in 2019. The subjects were high-activity communities along X Street and using purposive sampling technique.

Subjects were traders and Trans Jogja bus stop officers who taken based on the length of time at the research location more than 5 years of work period and over 19 years old. The total sample amount of 269 people. The object used as the ambient air of CO along X Street that taken in 3 zones. The variables including: CO concentration (C), inhalation rate (R), respondent's body weight (Wb), exposure time (tE), frequency of exposure (fE), duration of exposure (Dt), intake (I), health risk (RQ) value, and risk management.

Results

The EHRA variable have median value i.e. body weight of 60 kg,exposure time of 11 hours/day, exposure frequency of 353 day/year, duration of exposure of 10 year. It is result complete shown in table 1.

Table 1:The Distribution Frequency of EHRA Variables on Respondents

Variable	High activity communities				Total	
	Traders		Bus Stop Officers			
	N	%	N	%	n	%
Weight (Kg)						
>60	117	43	5	2	122	45
≤60	143	54	4	1	147	55
Total	260	97	9	3	269	100
Exposure Time (hours/day)						
>11	129	48	0	0	129	48
≤11	131	49	9	3	140	52
Total	260	97	9	3	269	100
Exposure Frequency (day/year)						
>353	116	43	8	3	124	46
≤353	144	54	1	0	145	54
Total	260	97	9	3	269	100
Duration of Exposure (year)						
>10	115	43	5	2	120	45
≤10	145	54	4	1	149	55
Total	**260**	**97**	**9**	**3**	**269**	**100**

Source: Primary Data,2019

The determination of intake rate in this study based on the default value (NAAQS) EPA[11] that is equal to 0,83 m^3/hour and the RfC value used for CO risk agents is 1,24 mg/kg/day. The results of measurements of CO in ambient air along X Street conducted in one measurement in zone I:6.15 mg/m^3,zone II:8,255 mg/m^3,and zone III:8,334 mg/m^3.With a mean value of 7,5035 mg/m^3,a median of 8,255 mg/m ^{3},a minimum of 6,15 mg/m^3,a maximum of 8,343 mg/m^3.

The table 1 showed that the majority respondents on traders have body weight ≤60 kg amount of 54%, exposure time ≤ 11 hours/day amount of 49%, exposure frequency ≤ 353 days/year amount of 54%, and duration of exposure ≤ 10 years amount of 54%. Based on the value of each variable in Table 1 showed that the median value of intake rate 0,395 mg/kg/day.

Table 2: The Respondents Frequency Based on Intake Rate Value In Realtime and Lifetime Exposures

Intake Rate (mg/kg/day)	High activity Communities								Total			
	Traders				Bus Stop Officers							
	Realtime		Lifetime		Realtime		Lifetime		Realtime		Lifetime	
	n	%	n	%	n	%	n	%	N	%	N	%
>0,395	131	49	259	96	3	1	9	3	134	50	268	99
≤0,395	129	48	1	1	6	2	0	0	135	50	1	1
Total	260	97	260	97	9	3	9	3	269	100	269	100

Table 3: The Respondent Frequency Based on RQ Value in Realtime and Lifetime Exposures

RQ Value	High activity Communities								Total			
	Traders				Bus Stop Officers							
	Realtime		Lifetime		Realtime		Lifetime		Realtime		Lifetime	
	n	%	n	%	n	%	n	%	N	%	N	%
>1	16	6	82	30	0	0	1	1	16	6	83	31
≤1	244	91	178	66	9	3	8	3	253	94	186	69
Total	260	97	260	96	9	3	9	4	269	100	269	100

Source: Primary Data, 2019

Based on table 3, it is known that respondents who work as traders in the realtime estimation with RQ value of >1 as much as 6% and the estimated lifetime duration with RQ value >1 amount of 30%, it means the traders is not safe for their health. The following table below is the calculation table for risk management.

Table 4: Risk Management of CO Safe Concentration in Respondents

Zone	Wb (Kg)	R (m^3/hour)	fE (day/year)	Concentration in Exposure Duration (Year)					
				5	10	15	20	25	30
I	60,23	0,83	332,531	592,609259	296,304629	197,536420	148,152315	118,521852	98,768210
II	61,72	0,83	362,073	557,721626	278,860813	185,907209	139,430406	111,544325	92,953604
III	61	0,83	352,681	565,894508	282,947254	188,631503	141,473630	113,137902	94,315751

Source: Primary Data, 2019.

Table 4 showed that the concentration of safe inhalation of air containing CO gas with average body weight, intake rate and frequency of exposure of respondents will decrease until the duration of exposure of 30 years.

Table 5: Risk Management of CO Gas Inhalation Rate in Respondents

Zone	Wb (Kg)	C (mg/m^3 /hour)	fE(day/ year)	Inhalation Rate in Exposure Duration (Year)					
				5	10	15	20	25	30
I	60,23	6,15	332,531	79,978253	39,989127	26,659418	19,994563	15,995651	13,329709
II	61,72	8,255	362,073	55,920128	27,960064	18,640043	13,980032	11,184026	9,320021
III	61	8,343	352,681	56.297811	28,148906	18,765937	14,074453	11,259562	9,382969

Source: Primary Data, 2019.

The table 5 shown that the higher concentration of CO in the air correlate with the decrease of inhalation rate which become safe for repondents to the health risk of noncarcinogenic diseases and the inhalation rate will decrease according to increases the duration of exposure.

Discussions

CO gas potentially as toxic from the presence of air pollution from vehicle exhaust fumes, especially those which using gasoline fuel. The air pollution will cause the decrease of air quality level and human health[12]. CO gas concentration compared with the CO quality standard according to Governor Decree[13] which amounted to 30000 µg/m^3 or 30,000 mg/m^{3,} it means that CO concentration levels along X street were still below the predetermined quality standard. The different CO concentration in the ambient air obtained is due to several factors including temperature, humidity, wind speed and air pressure[14].

The calculation of the intake value is influenced by the concentration of the risk agent in the air, the inhalation rate, exposure time, duration of exposure, and body weight. Based on the intake calculation it is known that the daily exposure time and annual exposure frequency is directly proportional to the intake value. It means that the annual frequency of exposure to the respondent caused by risk agent correlate with intake value that against health problems due to risk agent exposure[15]. Other factors that influence the amount of intake are age, working period, smoking habits and use of personal protective equipment (PPE)[16].

RQ value is obtained from the comparison between the intake rate with RfC value[21] and it has a relationship that intake compared with the RfC value, becomes the risk characteristics value. The RfC value used in this study was 1,24 mg/kg/day. It is obtained from calculations using the intake formula with default values for each variable, which is the difference in the concentration value. The concentration value is obtained from the RfC of CO in mg/m ^{3} which is the standard in NAAQS[10].

CO compounds can be toxic to the human body because the reaction between CO and hemoglobin (Hb) in the blood. Hb in humans functions as a transport system to carry oxygen in the form of oxyhemoglobin from the lungs to the body's cells and carry CO_2 in the form CO_2 Hb from the body's cells to the lungs. Hb can form carboxyhemoglobin with the presence of CO. If the reaction occurs, the blood's ability to transport oxygen is reduced. The affinity of CO to hemoglobin is 200 times higher than in affinity of oxygen to hemoglobin, as a result of CO and O_2 together in the air and is formed as COHb in the number of far more than the O_2Hb[11]. The highest percentage of hemoglobin bound in the form of COHb is getting worse, the effect on human health[17].

The first risk management is a decrease in CO concentrations so that all populations are safe from the health problems of CO exposure the concentrations must be reduced below the average concentration. To reduce the concentration of CO gas risk agents along X Street, it can reduce the capacity of the main pollutant source likely motor vehicles. Reducing the capacity of motorized vehicles can be done with the existence of a car-free day action weekly routine action along X Street, Yogyakarta City. This will affect the reduction of pollutants due to motorized vehicles. The previos study related to the reduction of CO concentration with the car-free day was conducted by other study[18] reported that air quality monitoring of CO generated from motor vehicle emissions has been decreased by car-free day action at the intersection of Semarang City. The subsequent reduction in ambient air concentration by planting trees or phytoremediation. Phytoremediation is a method by using forage plants to move, accumulate and change harmful contaminants into harmless substances. The yellow palm (Chrysalidocarpus lutescens) can be

planted, it is very effective for absorbing toxic gases into the stomata from vehicle fumes, besides plants that have broad hairy leaves and rough surfaces[19].

The second risk management is reduction of inhalation by using PPE to minimize the possibility of exposure to inhaled CO gas from ambient air. This study in line with previous study[20] to reduce the amount of exposure to security guards and parking attendants at Campus X Yogyakarta can be done with preventive measures by using a PPE.

The high concentration of CO in the ambient air will affect a health risk to CO intake into the body. So, the higher concentration of CO positive correlates with a higher intake value and it can be prevented by using PPE such as masks. Previous studies reported that the average COHb levels of respondents who use masks are lower than respondents who do not use masks[21].

The socialization was held by Technical Management Unit (UPT) in collaboration with the Department of Yogyakarta Tourism, the Environment Agency, and Academic Higher Education to educate the use of PPE and provide information related to health risks due to CO gas emissions. The socialization is expected to reduce the magnitude of risks arising from motor vehicle emissions, especially in CO gas, for high-activity communities along X Street,Yogyakarta City.

Conclusion

CO exposure to high activity communities will impact their health because respondents have RQ >1. Risk management through the reduction of concentration and decrease of the inhalation rate in high activity communities along X Street, Yogyakarta City.

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References

1. IQAir. 2018 World Air Quality Report. Accessed 2019,18th July available on https://www.airvisual.com/world-most-polluted-cities?.2018.
2. Fardiaz, S. Water and Air Pollution.Yogyakarta:Canisius,2015;Pp.91-103.WHO (World Health Organization).A Leading Cause Of Non-Comunicabel Disease Death.2018.Accessed on August,3rd 2019,available on https://who.int.
3. Aprilia, D.N. Environmental Health Risk Analysis of Carbon Monoxide (CO) Gas Exposure to Toll collectors in Semarang. Public Health Journal. 2017; 5 (3):2356-3346.
4. Ogunseye,O.O.,Ana.,G.R.E.,Chiara.D.C.,andShendell,D.G.,Carboxyhaemoglobin Levels among Traders Exposed to Vehicular Emissions in Three Motor Parks in Ibadan Nigeria.Journal of Environmental and Public Health.2018; Vol.2018, pp. 1-8.
5. Pamungkas,R.E., Environmental Health Risk Analysis (EHRA) Due to Exposure to Carbon Monoxide (CO) Through Inhalation at Traders Along the Front Street of Projo Ambarawa Market, Semarang District. Public Health Journal. 2017;5 (5):2356-3346.
6. Environmental Agency. Ambient Air Quality Data. Yogyakarta Environment Agency. 2015.
7. Central Statistics Agency.Land Transportation Statistics Data.Yogyakarta Central Statistics Agency.2017.
8. Purita, E.D., Management of public transportation on Malioboro Street in Yogyakarta.Report. Yogyakarta State University Yogyakarta. 2013.
9. Srinivas,R.,Big,G.,Pshin,S.,Role Transportation in Elevated CO Levels Over Delhi during the Onsent Phase of Monson. Atmospheric Environment.2016; Vol.140, pp. 234-241.
10. NAAQS.Criteria Air Pollutants: NAAQS Table. Retrieved March, 2019, from https://www.epa.gov/criteria-air-pollutants/naaqs-table.2016.
11. Sumantri,A., Environmental Health. Jakarta: Kencana Prenada Media Group. 2013.
12. Decree of the Governor. DIY No. 153 of 2003 concerning Regional Ambient Air Quality Standards in the Special Province of Yogyakarta
13. Zheng, B., Chevallier,F., Ciais, P.,Yin, Y.,Deeter, M.,Zhang, Q.,He, K., Rapid Decline In Carbon

Monoxide Emissions And Export From East Asian Between Years 2005 And 2016. Environmental Research Letters. 2018; 13(8) : 1245-1356.

14. Hazsya, M., Relationship of Carbon Monoxide (CO) Concentration and Risk Factors with Co-Hb Concentration in Blood at Risk Communities Along Setiabudi Road Semarang.Public Health Journal.2018; 6 (6):2536- 3346.
15. Iriyana,I. The Effect of Air Pollution Exposure and Smoking Habits on Lung Function in Bus Drivers in Tirtonadi Terminal Surakarta.Report. Muhamadiyah University Surakarta. 2014.
16. Dermitaz, I., Aksit, H.,and Zehra. 2016. Assessment of Exposure to Tobacco Smoke:Measurement of exhaled Carbon Monoxide and Hair Nicotine. Turkish Journal of Medical Sciences. 2016; 4(4) :739-745.
17. Putra, Raditya,N., Analysis of the Impact of Car Free Day Activities on Air Quality Carbon Monoxide (CO) in the Area Around Simpang Lima Using the Caline 4 Program and Surfer Case Study in Semarang City. Journal of Environmental Engineering. 2017;6(1): 1-11.
18. Kurubaran, A.,Krisna, V.,Vignesh,K., and Bhaskaran, A., Air Pollution Monitoring System using Android Application.International Journal of Current Research and Review. 2018; 10(21) :112-115.
19. Musfirah dan Rangkuti, A.F. 2018.Hubungan Durasi Pajanan PM 10 dengan Kapasitas Vital Paksa Paru Satpam Dan Petugas Parkir Di Kampus X Kota Yogyakarta.Jurnal Keperawatan Dan Kesehatan Masyarakat. 2018; 7(2):133-142.
20. Anggraini, D.N., Rahardjo, M.,Nurjazuli, Relationship between Traffic Density and Co-Hb Concentration in High-Risk Communities Along Semarang City National Road.Journal of Public Health. 2016; 4(2):139-148.
21. Jihan, F., Rohim, T.A., Noeroel, M., Mulyono. Analysis of Correlation between Toluene Exposure and Health Risk Characterization on Printing Worker of Plastic Bags Industry. Indian Journal of Public Health Research & Development. 2019; 10(6): 411-415.

The Effect of Work Satisfaction on the Quality of Health Services (Literature Review)

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Abstract

Introduction: Job satisfaction is a crucial factor that affects the productivity of human resources. While the health service organizations have the primary goal of providing the best quality health services for patients. Therefore, it is important to review the published articles about the effect of job satisfaction on health service organizations to understand how job satisfaction determines the quality of health services.

Method: This study is a literature review. Articles were collected from Proquest, Google Scholar, PUBMED, Emarldsight, and Science Direct and other relevant journal portals. Inclusion criteria in the selection of articles are 1) articles written in English or Indonesian, 2) articles are the research or systematic review relevant to the keywords, 3) articles were published in the year 2000 to 2019.

Result: Of the 16 articles reviewed, 15 studies prove that job satisfaction has a significant effect on patient satisfaction, performance, patient safety, quality of service, and the motivation to quit the job. On the other hand, one study shows that job satisfaction is not significantly related to patient satisfaction.

Conclusion: Employee job satisfaction is an important variable that must be considered by health service organizations to achieve competitive & high-quality performance in providing health services for the patients.

Keywords: *Job satisfaction, Health services, Quality.*

Introduction

Job satisfaction is defined as the degree to which people like or dislike their work(1). It is a crucial factor that affects the productivity of human resources. In any organization, human resources are considered as one of the most important assets that serve as an engine within the organization to provide a sustainable source of energy and service delivery(2). There are several things related to the importance of job satisfaction. First, that all people deserve to be treated fairly and with respect. Satisfaction is a reflection of good treatment, so it is considered as an indicator of emotional well-being or physiological health. Second, that job satisfaction can cause employee behavior that affects organizational functions. Furthermore, job satisfaction can be an indicator of the functioning of the organization(3)

The goal of a health service organization is to Providing a high quality of health services is required a committed and high-quality workforce. The presence of highly qualified and motivated staff is a key aspect of the health system performance. Many organizations recognize the importance of a potential relationship between job satisfaction and several expected organizational outputs, such as performance, absenteeism, staff turnover, and employee productivity (5).

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The quality of health services is associated with satisfaction, loyalty, and productivity and the profitability of the patients[6]. The quality and continuity of the relationship between the patient and the doctor affect the quality of the medical services provided. The quality of interaction between doctor and patient depends on the attitude and personality of the doctor towards empathy, compassion and honesty and technical expertise to gain the patients' trust[7].

It is important for health service organizations to understand the relationship between job satisfaction and customer satisfaction and the overall customer experience[8]. Therefore, this literature review's aim is

to collect and analyze research articles about job satisfaction in health service organization employees to understand how job satisfaction can affect quality of health services. This analysis is done by compressing, collecting, and focusing on the impact of job satisfaction on the quality of health services, both directly and indirectly.

Method

Literature review were based on the Prisma method which consists of 5 stages. The first stage was the identification of articles based on inclusion and exclusion criteria. The inclusion criteria for selected articles were 2000 – 2019 publication time, focus on the effect or impact of job satisfaction. The exclusion categories are articles related to the keywords but not studying the case on health workers or health service organizations.

As for the search of secondary data, initial exploration was obtained in five publishers; Emeraldinsight, Proquest, Pubmed, Google Scholar, and Science Direct. The second stage was the screening by using specific keywords; job satisfaction, healthcare, and service quality. The total of literature found based on those keywords was 879 articles. Furthermore, the data was extracted using inclusion criteria, and 187 articles were obtained. Meanwhile, 102 articles were eliminated since they did not comply with the inclusion criteria.

The third stage was accessibility, of 60 articles that have been extracted (and 35 articles are eliminated), 25 articles were selected based on the titles and abstracts. These 25 articles were then extracted again by considering the inclusion category until 16 articles were determined to be reviewed. This is the included stage. Those 16 articles were then selected for further study. These are the articles:

1. Healthcare workers' satisfaction and patient satisfaction-where is the linkage? by Janicijevic I Et al. The Result is the effect of health care worker satisfaction on patient satisfaction has a relatively low level of significance[9].
2. Interrelating employee satisfaction and customer satisfaction in the healthcare Industry Interrelating Employee Satisfaction & Customer Satisfaction in Healthcare Industry by Anand Shobhit Et al. The result is a high correlation between employees and customer satisfaction[10]
3. Effect of Job Satisfaction on the Turnover Intention of Employees in Indonesia by Pawesti Ristia. The result is job satisfaction has a significant and negative effect on the turnover intentions of the employee [11]
4. Job satisfaction and organizational commitment for nurses by Al-Aameri Ahmed S. The result is a strong and positive correlation between job satisfaction and organizational commitment. [12]
5. Congruent Satisfaction: Is There Geographic Correlation Between Patient and Physician Satisfaction by Jennifer DeVoe et al. The result is the job satisfaction of doctors is strongly correlated with patient health satisfaction [13]
6. The effects of health worker motivation and job satisfaction on turnover intention in Ghana: a cross-sectional study by Marc Bonenberger et al. The result is job satisfaction is significantly correlated to the motivation of the employee to quit the job [14]
7. Is the job satisfaction of primary care team members associated with patient satisfaction? By Joachim Szecsenyi et al. The result is patient satisfaction is positively correlated with general job satisfaction from non-physicians but no significant correlation was found for doctors' job satisfaction and patients' satisfaction. [15]
8. Impact of Job Satisfaction on Quality of Care Among Nurses on the Public Hospital of Lahore, Pakistan by Asima farman et al. The result is job satisfaction of the nurses and the quality of healthcare services are positively correlated[16]
9. Relationship Between Job Satisfaction Among Frontline Staff And Patient Satisfaction: Evidence From Community Health Centers In South Carolina by Ashley Lynn Barnes. The result is there is no significant relationship between patient satisfaction

and the job satisfaction of the Front Line Service (FLS) staff.[17]

10. Job Satisfaction of Nursing Staff and Patients' Perception of Quality care in a Tertiary Teaching Hospital, Odisha by Dharitri Swain. The result is patients' perceptions about the overall quality of healthcare are positively related to the job satisfaction of the nursing staff.[18]
11. A study of the relationship between job satisfaction, organizational commitment and turnover intention among hospital employees by Ali Mohammad Mosadeghrad et al. The result is employee job satisfaction and organizational commitment are closely interrelated and correlated with turnover intention.[19]
12. The Relationship Between Nurse Job Satisfaction and Patient Safety by Sherrie B. Lee. The result is a strong and positive correlation was found between nurse job satisfaction and patient safety.[20]
13. Is the Professional Satisfaction of General Internists Associated with Patient Satisfaction? By Jennifer S Haas et al. The result is doctors whose job satisfaction levels are higher can support the satisfaction of the patients compared to patients of doctors whose job satisfaction levels are lower.[21].
14. The relation between job satisfaction and job performance in healthcare services by Ch. Platis et al. The result is a strong correlation between nurse job satisfaction with job performance.[22].
15. The relationship between nurses' job satisfaction and inpatient satisfaction: An exploratory study in a Taiwan teaching hospital by Tzeng Huey Ming et al. The result is the job satisfaction of nurses is significantly correlated with the satisfaction of the inpatients(23)
16. An investigation of job satisfaction, organizational commitment and role conflict and ambiguity in a sample of Chinese undergraduate nursing students by Wu, L et al. The result is a positive relationship between job satisfaction and organizational commitment, and a negative relationship between job satisfaction and role conflict and ambiguity.(24)

Results

Seven of the 16 articles investigated the effect or relationship between job satisfaction and patient satisfaction in health care organizations. In general, it has been proven that job satisfaction had a significant effect on job satisfaction with a correlation coefficient of 0.882[10], 0.628[13], 0.73[21], 0.765[23]. However, three of the seven articles stated an insignificant relationship between job satisfaction and patient satisfaction[17] and also had a low level of significance[9][15].

In addition, three of the 16 articles examined the relationship between job satisfaction and employee commitment to the organization[12][19][24]. Job satisfaction and organizational commitment were found to have a positive correlation. Correlation coefficients of 0.59[12], 0.637[19], and 0.464[24] showed a significant relationship between these 2 variables.

Three of the 16 articles examined the relationship between job satisfaction and the motivation to quit the job[11][14][19]. Job satisfaction and the motivation to quit the job were found to have a negative correlation, with high levels of coefficient of -0,832[11] and 0.56[14]. On the other hand, a negative correlation was also found with a low correlation coefficient of 0.452[19].

Furthermore, two of the 16 articles investigated the relationship between job satisfaction and health service quality[18][16]. A positive and significant correlation was found, with a correlation coefficient of 0.612[16] and 0.46[18].

Finally, one study proved a positive and strong correlation between job satisfaction and patient safety with the correlation coefficient of 0.871(20). However, one other study proved a positive and significant correlation between job satisfaction with the productivity and performance of the employee, with a correlation coefficient of 0.76[22].

Discussion

The findings of this literature review emphasized that job satisfaction of the employees in health service organizations is indeed strongly related to patient satisfaction. The job satisfaction of nurses is significantly and positively correlated with the inpatient satisfaction with pain management, this is related to four indicators of satisfaction with hospitalization, namely the explanation of care, treatment method, pain management, and direction on how to continue the self-care at home and follow-up care[23].

One of the most influential aspects of patient satisfaction is the job satisfaction of the employee

with the time available to complete their works which affect the duration the patients spend with the doctor. It was explained that more satisfied doctors might be better able to answer patients' questions and problems. Doctors who are more satisfied with their professional lives can communicate better or empathize more with their patients[21].

The most important job satisfaction factors affecting service quality are workload, staff scheduling, and work pressure. Work pressure is the factor that most determines the level of job satisfaction of nurses and the provision of quality care[16]. Desired outcomes also include attention to aspects of personal care, such as complaints and patient expectations, the patient's desire to be respected, and patient participation in decision making[26].

Job satisfaction also affects employee commitment to the organization that is characterized by three factors, including 1) acceptance of organizational values, 2) willingness to work hard on behalf of the organization, and 3) motivation to remain an employee of the organization(12). The results of this study are consistent with other studies[19], but in this study, organizational commitment is seen from 3 aspects; affective, sustainability, and normative commitment. Affective commitment is defined as a psychological bond with the organization, ongoing commitment as a cost associated with leaving the organization, and normative commitment as a perceived obligation to remain with the organization[19]. The organization will be strong if its staff shows commitment and dedication to the organization and acts for the benefit of the organization. When employees fail to carry out the tasks assigned voluntarily, the quality of the services provided by the organization will be under the expectation[4].

Job satisfaction has also been proven to have a significant effect on the motivation to quit the job[11][14][19]. The factors that most influence the employees' motivation to quit the job are low organizational commitment (especially affective commitment), lack of job satisfaction and dimensions (especially organizational policy), lack of job security and management, and supervision[19].

Patient safety in this study was defined as a condition where patients were not disadvantaged by limited nursing resources, ineffective communication, or lack of administrative support. The elements of patient safety reviewed are the area or work unit, supervision, communication, frequency of adverse events reporting and facilities[20].

Conclusion

In the service sector, especially in the health service organization, the service quality is strongly affected by the employees' behavior in serving the patients and deals directly with customers. Job satisfaction has a significant effect on the service quality of health service organizations, both directly and indirectly. The direct effect is related to customer satisfaction, patient safety, performance, and customer perceptions of the quality of service delivery. In addition, the indirect effect occurs in the association with organizational commitment, productivity, and the motivation to quit the job.

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References

1. Spector Pe. Job Satisfaction: Application, Assessment, Cause, And Consequences. Sage Publication. 1997.
2. Mosadeghrad Am. Factors Influencing Healthcare Service Quality. Int J Heal Policy Manag. 2014;3(2):77–89.
3. Bhatnagar K, Srivastava K. Job Satisfaction In Health-Care Organizations. Ind Psychiatry J. 2012;21(1):75.
4. Zeithaml Va, Berry Ll, Parasuraman A. The Behavioral Consequences Of Service Quality. J Mark. 1996;60(2):31–46.
5. Yee Rwy, Yeung Acl, Cheng Tce. The Impact Of Employee Satisfaction On Quality And Profitability In High-Contact Service Industries. J Oper Manag. 2008;26(5):651–68.
6. Mosadeghrad Am. Factors Affecting Medical Service Quality. Iran J Public Health. 2014;43(2):210–20.
7. Ditto Ph, Moore Ka, Hilton Jl, Kalish Jr. Beliefs About Physicians: Their Role In Health Care Utilization, Satisfaction, And Compliance. Basic Appl Soc Psych. 1995;17(1–2):23–48.
8. Kirkman Bl. Job Satisfaction And Job Performance: Is The Relationship Spurious? 2008.

9. Janicijevic I, Seke K, Djokovic A, Filipovic J. Healthcare Workers Satisfaction And Patient Satisfaction-Where Is The Linkage? [Internet]. Vol. 17, Hippokratia. 2013 [Cited 2019 Jan 31]. Available From: Https://Www.Ncbi.Nlm.Nih.Gov/Pmc/Articles/Pmc3743622/Pdf/Hippokratia-17-157.Pdf
10. Anand S, Dwivedi R. Interrelating Employee Satisfaction And Customer Satisfaction In The Healthcare Industry Interrelating Employee Satisfaction & Customer Satisfaction In Healthcare Industry. Int Bull Manag Econ. 2019;X(February).
11. Pawesti R, Rinandita W. Pengaruh Kepuasan Kerja Terhadap Intensi Turnover Karyawan Di Indonesia. Ecopsy. 2016;2(3).
12. Al-Aameri As. Job Satisfaction And Organizational Commitment. Manag Res Rev. 2016;39(12):1663–94.
13. Devoe J, Fryer Ge, Straub A, Mccann J, Care Sm, Jan N, Et Al. Congruent Satisfaction : Is There Geographic Correlation Between Patient And Physician Satisfaction ? Linked References Are Available On Jstor For This Article : Congruent Satisfaction : Is There Geographic Correlation Between Patient And Physician Satisf. Med Care [Internet]. 2007;45(1):88–94. Available From: Https://Www.Jstor.Org/Stable/40221379
14. Bonenberger M, Aikins M, Akweongo P, Wyss K. The Effects Of Health Worker Motivation And Job Satisfaction On Turnover Intention In Ghana: A Cross-Sectional Study. Hum Resour Health. 2014;12(1):1–12.
15. Szecsenyi J, Goetz K, Campbell S, Broge B, Reuschenbach B, Wensing M. Is The Job Satisfaction Of Primary Care Team Members Associated With Patient Satisfaction? Bmj Qual Saf. 2011;20(6):508–14.
16. Asima F, Robina K, Muhammad H, Ali W, Gillani Sa. Impact Of Job Satisfaction On Quality Of Care Among Nurses On The Public Hospital Of Lahore, Pakistan. Saudi J Med Pharm Sci [Internet]. 2017;3(6). Available From: Http://Scholarsmepub.Com/Wp-Content/Uploads/2017/07/Sjmps-36a444-449.Pdf
17. Barnes Al. Relationship Between Job Satisfaction Among Frontline Staff And Patient Satisfaction : Evidence From Community Health Centers In South Carolina By Ashley Lynn Barnes Bachelor Of Science North Greenville University, 2002 Master Of Business Administration. University Of South Carolina; 2015.
18. Swain D. Job Satisfaction Of Nursing Staff And Patients 'Perception Of Quality Care In A Tertiary Teaching Hospital, Odisha. Asian J Nurs Educ Res. 2016;6(3):283.
19. Mosadeghrad Am, Ferlie E, Rosenberg D. A Study Of The Relationship Between Job Satisfaction, Organizational Commitment And Turnover Intention Among Hospital Employees. Heal Serv Manag Res. 2008;21(4):211–27.
20. Lee Sb. The Relationship Between Nurse Job Satisfaction And Patient Safety. University School Of Nursing; 2013.
21. Haas Js, Cook Ef, Puopolo Al, Burstin Hr, Cleary Pd, Brennan Ta. Is The Professional Satisfaction Of General Internists Associated With Patient Satisfaction? J Gen Intern Med. 2000;15(2):122–8.
22. Platis C, Reklitis P, Zimeras S. Relation Between Job Satisfaction And Job Performance In Healthcare Services. Procedia - Soc Behav Sci [Internet]. 2015;175:480–7. Available From: Http://Dx.Doi.Org/10.1016/J. Sbspro.2015.01.1226
23. Tzeng Hm, Ketefian S. The Relationship Between Nurses' Job Satisfaction And Inpatient Satisfaction: An Exploratory Study In A Taiwan Teaching Hospital. J Nurs Care Qual. 2002;16(2):39–49.
24. Wu L, Norman Ij. An Investigation Of Job Satisfaction, Organizational Commitment And Role Conflict And Ambiguity In A Sample Of Chinese Undergraduate Nursing Students. Nurse Educ Today [Internet]. 2006 May;26(4):304–14. Available From: Https://Linkinghub.Elsevier.Com/Retrieve/Pii/S0260691705001917
25. Lohr Kn, Wehling Jh. Medicare: A Strategy For Quality Assurance, I: A Recapitulation Of The Study And Definition Of Quality Of Care. 1991.
26. Baker A. Book: Crossing The Quality Chasm: A New Health System For The 21st Century. Bmj. 2001;

Respiratory Symptoms of Housewives Exposed to SO_2 From Steel Industry in West Cikarang, Indonesia

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Abstract

Context: The steel industry is one of the industries that use coal for the production process to produce various pollutants, one of which is sulfur dioxide (SO_2). Exposure to SO_2 can irritate the respiratory tract and trigger symptoms such as cough, phlegm, shortness of breath, and wheeze. This article aims to determine the effects of SO_2exposure based on the amount of intake on respiratory symptoms in housewives living around the steel industry.

This cross-sectional study was conducted on housewives who lived in Sukadanau Village, West Cikarang Sub-district, Bekasi Regency, West Java. In assessing the effects of SO_2 exposure, the amount of intake of SO_2 is used.

Respiratory symptoms experienced by housewives who live around the steel industry are cough (30.7%), phlegm (16.7%), shortness of breath (13.2%), and wheeze (4.4%). A significant relationship between intake of SO_2 and respiratory symptoms was found only in shortness of breath (OR 36.65, 95% CI 2.95 - 455.18).

Housewives who live around the steel industry experience respiratory symptoms such as cough, phlegm, shortness of breath, and wheeze due to intake of SO_2. Where intake of SO_2 is significantly associated with shortness of breath. Further studies are needed by using concentrations that can describe each region.

Keyword: *Sulfur dioxide, respiratory symptoms, steel industry*

Introduction

Industrial development plays an important role in terms of a country's economic development through its contribution to employment[1]. However, industrial activities also have a negative impact which acts as a contributor to air pollution by producing pollutants from production processes that use various energy sources such as coal, crude oil, and natural gas which can produce various types of pollutants such as SO_2, NO_2, CO, HC, and PM[2].

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Sulfur dioxide (SO_2) is one of the pollutants that is mostly generated from the use of coal and petroleum energy by industrial activities such as petroleum refining, sulfuric acid industry, steel industry, etc[3,4]. Studies in steel industry in China show that SO_2 can be emitted from the pelletizing, sintering, and the melting process in the furnace[5]. SO_2 is a colorless gas, has a pungent odor, and dissolves easily in water so it can cause acid rain[6]. SO_2 exposure can irritate the respiratory tract and trigger symptoms such as cough, phlegm, shortness of breath, and wheeze[4,7,8].

People who live in industrial areas will be more often exposed to SO_2 and experience health impacts. Studies conducted in the petrochemical and steel industry areas show that people who live near the industry with a distance of ≤5 km have a lower average FEV_1 compared to those who are>10 km[9]. As the health effects of SO_2 exposure are mentioned, respiratory inflammation due to

SO_2 exposure can continuously encourage cough, mucus secretion, and aggravating asthma that makes sufferers more vulnerable to respiratory infections[10].Another study related to the steel industry showed that SO_2 exposure in the industrial space ranged from 0.19 - 18.69 mg/m^3 and found that 42.36% of smelting workers had COPD[11]. Also, studies conducted around the steel industry show that people who live near the industry with a distance of 3.3 km and 8.8 km experience respiratory inflammation that is assessed through higher levels of FeNO compared to those at a distance of 27.7 km[12]. Sukadanau is a village in West Cikarang District and is the location of steel industry operations. Housewives are one of the groups potentially exposed to SO_2 emitted by the steel industry. Because most housewife activities only at home or in the surrounding environment, so they are longer exposed to SO_2 emitted by the steel industry and have the potential to experience health effects in the form of respiratory symptoms. Based on research that estimates the risk of SO_2 around the power generation industry, housewives have an inhalation rate above the average compared to other groups ≥ 10.98 m^3/day due to the length of time housewives around the location industry[13]. Therefore, the aim of this study was to determine the effect of SO_2 exposure based on the amount of intake on respiratory symptoms in housewives living around the steel industry.

Material and Method

A cross-sectional study was conducted on housewives who lived in Sukadanau Village, West Cikarang Sub-district, Bekasi Regency, West Java. This village is the location where the steel industry operates and has a maximum distance of 2000 m from the industry. The population of housewives in Sukadanau Village is around 7083 which is spread over 13 residents. The sample size is obtained by estimating proportions[14], then by using the Stratified Proportional Random Sampling technique, the sample is divided based on the distance of the house from the steel industry. The distance consists of <500 m (n = 30), 500-1000 m (n = 30), and>1000 m (n = 54), so that a sample of 114 housewives is obtained. There are several criteria that must be met, namely housewives are predominantly in the home environment, have lived at least 1 year, do not use firewood as cooking fuel, do not have a history of asthma and tuberculosis. The questionnaire data collection was conducted in October - November 2019.

Exposure Assessment: SO_2 concentrations were obtained through air quality monitoring data conducted by the Bekasi Regency Environmental Department. Measurements were made at 13 points. One of the measurement points is the point adjacent to Sukadanau Village and the steel industry, which is called "Warung Bongkok T-junction" (Figure 1). This measurement was carried out in 2 periods, namely 14 days each period which was carried out sustainably during 2013 - 2015. The concentration of SO_2obtained was used to calculate the intake of inhalation exposure using the formula in the Environmental Health Risk Assessment[15,16]:

$$I = \frac{C\left(\frac{mg}{m^3}\right) x\ R\left(m^3/h\right) x\ tE\left(\frac{h}{d}\right) x\ fE\left(\frac{d}{yr}\right) x\ Dt\ (yr)}{WB\ (kg)\ x\ Tavg}$$

I = Intake of chemical agent (mg/kg bw/day)

C = Average concentration of SO_2in ambient air over the exposure period (mg/m^3)

R = Rate of intake (default for daily intake rate 20m^3or equivalent0,83m^3/hour[17])

Te = Time of exposure(hour/day)

Fe = Frequency of exposure(day/year)

Dt = Duration of exposure (*real time,* year)

Wb = Weight (kg)

Tavg = Time of average period (Dt x 365 day/year for non-carcinogenic substances)

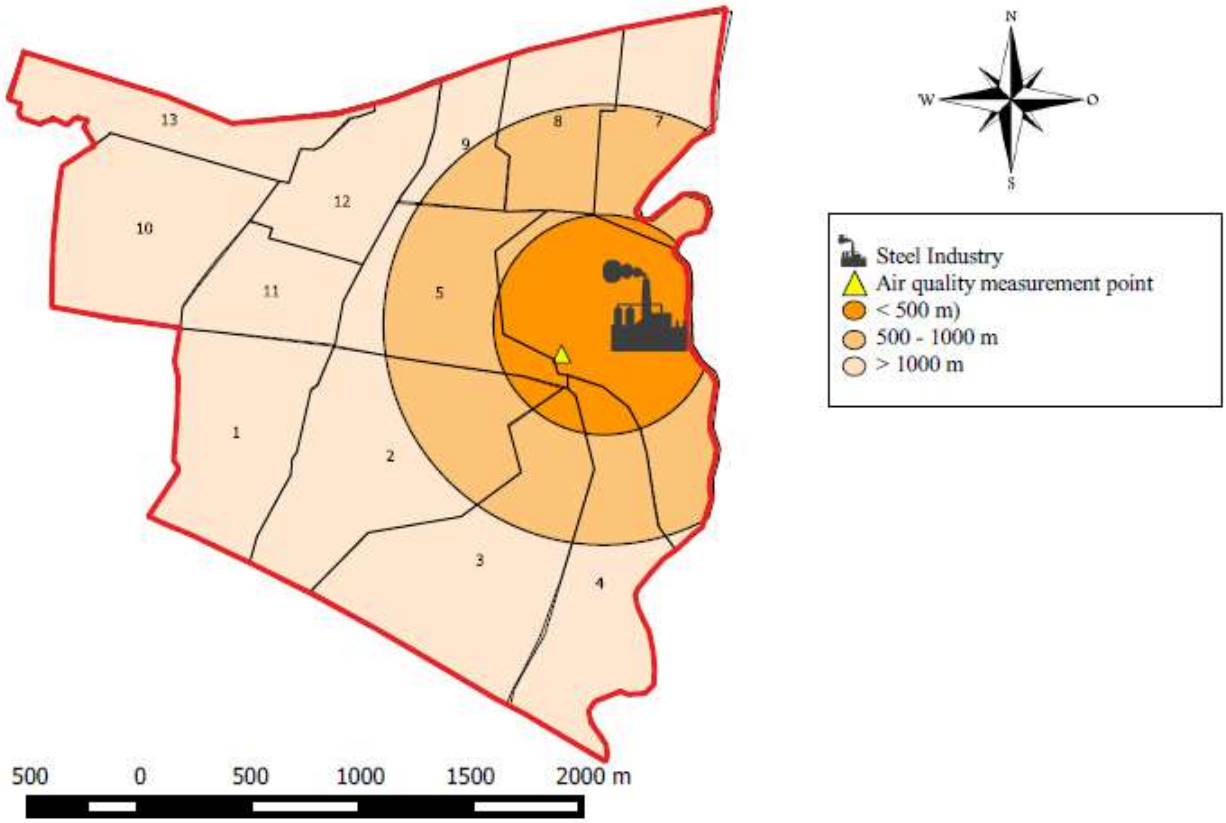

Figure 1: The location of measurement points, the steel industry, and Sukadanau village were obtained from the analysis using Quantum GIS 2.8.1

Health Questionnaire: Data collection using the American Thoracic Society Questionnaire for Symptom (ATS-DLD-78-Adult) questionnaire[18]. This questionnaire was modified following the needs of researchers that are only using questions related to respiratory symptoms that can be caused by SO_2, namely cough, phlegm, shortness of breath, and wheeze. And weight measurements were taken to calculate the amount of intake for each subject.

Statistical Analysis: Bivariate analysis in this study used the Chi-square test. Then, the multivariate analysis in this study uses a multivariable logistic regression test. There are two models used in the analysis. The first model looked at the effect of intake on respiratory symptoms by controlling age, length of stay, and passive smoking. While the second model controls age, length of stay, passive smoking, body weight, insufficient ventilation, and interactions between intake and weight. The interaction between these variables is considered because weight is used in calculating the amount of intake.

Result

Table 1: Characteristics of housewives and home environmental conditions

Characteristics (n = 114)	N	%
Intake of SO_2		
> 0.0077 mg/kg/day	58	50.9
≤ 0.0077 mg/kg/day	56	49.1
Age		
> 30year	51	44.7
≤ 30year	63	55.3
Length of stay		
> 10 year	58	50.9
≤ 10year	56	49.1
Passive smoking		
Yes	67	58.8
No	47	41.2
Ventilation		
Insufficient	75	65.8
Sufficient	39	34.2

Table 1 shows that 50.9% of housewives had an intake of SO_2 per day > 0.0077. Most of them aged

≤ 30 years (55.3%), lived> 10 years in Sukadanau Village (50.9%), passive smoking at home (58.8%), and insufficient home ventilation (65.8%).

The most common respiratory symptoms were cough (30.7%) followed by phlegm (16.7%), shortness of breath (13.2%), and wheeze (4.4%). Table 2 shows the differences in respiratory symptoms experienced by housewives based on the intake of SO_2. It was seen that symptoms of phlegm and wheeze were more experienced by those who had a higher intake of SO_2 (>0.0077 mg/kg/day) than those who had lower intakes. There was a significant association between intake of SO_2 with phlegm (OR 1.08, 95% CI 0.40 - 2.91) and wheeze (OR 1.47, 95% CI 0.23 - 9.16).

Table 2: Respiratory symptoms based on the intake of SO_2 in housewives

Intake of SO_2 (mg/m^3)	Respiratory Symptoms (Cough)		Total n (%)	P-Value	OR (95% CI)
	Yes n (%)	No n (%)			
> 0.0077	20 (34.5)	38 (65.5)	58 (100)	0.473	1.43
≤ 0.0077	15 (26.8)	41 (73.2)	56 (100)		(0.64 – 3.2)
	(Phlegm)				
> 0.0077	10 (17.2)	48 (82.8)	58 (100)	0.0005*	1.08
≤ 0.0077	9 (16.1)	47 (83.9)	56 (100)		(0.40 – 2.91)
	(Shortness of breath)				
> 0.0077	12 (20.7)	46 (79.3)	58 (100)	4.597	4.60
≤ 0.0077	3 (5.4)	53 (94.6)	56 (100)		(1.22 – 17.34)
	(Wheeze)				
> 0.0077	3 (5.2)	55 (94.8)	58 (100)	0.0005*	1.47
≤ 0.0077	2 (3.6)	54 (96.4)	56 (100)		(0.23 – 9.16)

*Sig. P < 0.05

Table 3 shows that the odds ratio for all symptoms were elevated after controlling for age, length of stay, and passive smoking in the first model. However, only shortness of breath was statistically significant (OR 4.62, 95% CI 1.21-17.66). In the second model, also only the odds ratio of shortness of breath was elevated and statistically significant (OR 36.65, 95% CI 2.95 - 455.18).

Table 3: Association between intake of SO_2 and respiratory symptoms experienced by housewives

	Cough OR (95% CI)	Phlegm OR (95% CI)	Shortness of breath OR (95% CI)	Wheeze OR (95% CI)
Intake of SO_2[a]($0.0077\ mg/m^3$/day)	1.38 (0.61 – 3.12)	1.12 (0.41 – 3.03)	4.62 (1.21 – 17.66)*	1.24 (0,19 – 8.00)
Intake SO_2[b] ($0.0077\ mg/m^3$/day)	1.22 (0.38 – 3.84)	0.53 (0.13 – 2.10)	36.65 (2.95 – 455.18)*	0.38 (0.03 – 4.34)

[a]Adjusted for age, length of stay, passive smoking

[b]Adjusted for age, length of stay, passive smoking, weight, ventilation insufficient, interaction intake and weight

*Sig. P < 0.05

Discussion

The steel industry is one industry that uses coal in its production process. About 75% of coal is used in blast furnaces and 25% is used in the process of sintering and coking[19,20]. The production process using coal will produce one of the pollutants, namely sulfur dioxide (SO_2)[21].Because, coal contains about 1.04-5.25% sulfur in America, and 1.04-5.25% in East Kalimantan, Indonesia[22,23]. Therefore, people who live around the steel industry can be exposed to SO_2 produced from

the steel industry and can gradually experience health impacts. This can be seen from the amount of intake received each day.

In this study, the amount of intake is used to see its effect on respiratory symptoms. The average concentration of $SO_2$was 0.026 mg/m^3. Intake data obtained were not normally distributed, so that the median value used as intake of SO_2 in housewives was 0.0077 mg/kg/day. From the results obtained intake of SO_2> 0.0077 mg/kg/day and ≤ 0.0077 mg/kg/day is not so much different. This is because the concentration used in the calculation is only based on measurements at the same point for all housewives in 13 resident of Sukadanau Village. While the intake of each person will be different, this is influenced by the concentration of chemical agents as the formula used[15,16]. As the study by Sunarsih et al (2019), the amount of SO_2 intake was higher than NO_2 in their study due to higher SO_2 concentrations[24]. The amount of intake is also influenced by other factors such as body weight and activities[17,25]. Thus, the use of concentration values also causes subjects not to be compared based on distance from industry, statically (p> 0.05).

Even though, the results obtained that phlegm and wheeze were more experienced in those who had a higher intake of SO_2 (> 0.0077). So, housewives who have intake > 0.0077 mg/kg/day 1.08 times to experience phlegm and 1.47 times to experience wheeze compared to housewives who have intake ≤ 0.0077 mg/kg/day. There are no studies that directly address the intake of SO_2 in communities around the steel industry. However, other studies around the petrochemical industry that also emitted SO_2 show that those who are around the industry have higher phlegm more than those who do not live around the industry (p <0.05)[26]. Other related studies also show that for each increase of 10 µg/m^3 SO_2, wheeze also increases with OR = 1.02[27].However, after controlling for confounding factors both in models 1 and 2, only shortness of breath was statistically significant. In line with other studies in industrial areas which show that shortness of breath is significantly related to SO_2 exposure[28].

Conclusion

Regardless of the limitations of this study. Housewives who live around the steel industry experience respiratory symptoms such as cough, phlegm, shortness of breath, and wheeze due to intake of SO_2. Although only shortness of breath is significantly related. However, the overall intake of SO_2 can cause respiratory symptoms. Further studies using concentrations that can describe each region are needed to understand the effect of intake of SO_2 on respiratory symptoms.

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References

1. Jerumeh TR, Ogunnubi CS, Yusuf SA. Industrial Pollution and its Attendant Effects on Public Health in. 2015;6(24):164–75.
2. Hao J, Li G. Air Pollution Caused by Industries. Point Sources Pollut Local Eff its Control. 2009;I(I):171–9.
3. Fardiaz S. Polusi Air dan Udara. Yogyakarta: Kanisius; 1992. Available from: https://books.google.co.id/books?id=x1z3WSQM5VkC & printsec=frontcover & source=gbs_ge_summary_r & cad=0#v=onepage & q & f=false
4. Sharma SB, Jain S, Khirwadkar P, Kulkarni S. The Effect of Air Pollution on The Environment and Human Health. Indian J Res Pharm Biotechnol. 2013;1(3):391–6.
5. Wu X, Zhao L, Zhang Y, Zheng C, Gao X, Cen K. Primary Air Pollutant Emissions and Future Prediction of Iron and Steel Industry in China. Aerosol Air Qual Res. 2015;15(4):1422–32. Available from: https://doi.org/10.4209/aaqr.2015.01.0029
6. HPA. Sulphur Dioxide, General information. 2010.
7. ATSDR. Managing Hazardous Materials Incidents, Sulfur Dioxide (SO2) CAS 7446-09-5; UN 1079. U. S. Department of Health and Human Services. 2014. Available from: http://www.atsdr.cdc.gov/MHMI/mmg116.pdf
8. The Center for Research Information. Health Effects of Project Shad Chemical Agent : Sulfur Dioxide [CAS 7446-09-5]. Natl Acad. 2004;1–63.

9. Hong E, Lee S, Kim GB, Kim TJ, Kim HW, Lee K, et al. Effects of environmental air pollution on pulmonary function level of residents in Korean industrial complexes. Int J Environ Res Public Health. 2018;15(5).
10. Khan RR, Siddiqui MJA. Review on Effects of Particulates; Sulfur Dioxide and Nitrogen Dioxide on Human Health. Int Res J Environ Sci. 2014;3(4):70–3.
11. Silvana B, Afrim T. Chronic Obstructive Pulmonary Disease in Iron-Steel and Ferrochrome Industry Workers. Cent Eur J Public Health. 2010;18(2):93–8. Available from: https://doi.org/10.21101/cejph.a3548
12. Acat M, Aydemir Y, Yazici O, Turğut M, Çörtük M, Cąkar M, et al. Comparison of the Fractional Exhaled Nitric Oxide Levels in Adolescents at Three Schools Located Three Different Distances from a Large Steel Mill. Can Respir J. 2017 [cited 2019 Oct 7];2017:1–6. Available from: https://doi.org/10.1155/2017/6231309
13. Wahyuddin PP, Susilawaty A, Basri S. Risiko Paparan Sulfur Dioksida (SO2) pada Masyarakat yang Bermukim Disekitar PT. PLN (Persero) Sektor Tello Tahun 2014. Hig J Kesehat Lingkung. 2016;2(1):8–14. Available from: http://journal.uin-alauddin.ac.id/index.php/higiene/article/view/1800
14. Lemeshow S, Jr. DWH, Klar J, Lwanga SK. Besar Sampel dalam Penelitian Kesehatan. Yogyakarta: Gadjah Mada University Press; 1997.
15. Louvar JF, Louvar BD. Health and Environmental Risk Analysis: Fundamentals with Applications. New York: Prentice Hall; 1998.
16. enHealth. Environmental Health Risk Assessment. Guidelines for assessing human health risks from environmental hazards. Canberra: Australian Department of Health; 2012.
17. USEPA. Risk assessment guidance for superfund (RAGS), Volume I: Human health evaluation manual (HHEM)—Supplemental guidance, interim final. Environ Prot. 1991;I(202):28.
18. American Thoracic Society. American Thoracic Society Questionnaire for Symptoms (ATS-DLD-78-Adult). 1978. Available from: www.atsjournals.org
19. World Steel Association. Energy Use in the Iron and Steel Industry. Energy Use in Steel Industry. 2019. Available from: worldsteel.org
20. Johansson MT. Bio-synthetic natural gas as fuel in steel industry reheating furnaces - A case study of economic performance and effects on global CO2 emissions. Energy. 2013;57:699–708.
21. Chen W, Xu R. Clean coal technology development in China. Energy Policy. 2010;38(5):2123–30. Available from: http://dx.doi.org/10.1016/j.enpol.2009.06.003
22. S. K. Kawatra TCE. Coal Desulfurization: High-efficiency Preparation Method. Taylor & Francis e-Library; 2001. Available from: https://books.google.co.id/books?id=JEr5czdSX_gC & pg=PA133 & dq=kawatra+eiselle+2001 & hl=en & sa=X & ved=0ahUKEwj86aqEjKzlAhUJ63MBHcjMDaYQ6AEIKTAA#v=onepage & q=kawatra eiselle 2001 & f=false
23. Artiningsih A, Widodo S, Firmansyah A. Studi Penentuan Kandungan Sulfur (Sulphur Analysis) dalam Batubara Pada PT. Geoservices Samarinda. J Geomine. 2015;02:68–71.
24. Sunarsih E, Suheryanto S, Mutahar R, Garmini R. Risk Model of Air Pollution Exposure (NO2, SO2, TSP and Dust) and Smoking Habits To The Lung Function Of Bus Driver In Palembang City. Kesmas Natl Public Heal J. 2019;13(4):204.
25. ATSDR. Public Health Assessment Guidance Manual. Public Heal Serv Agency Toxic Subst Dis Regist Atlanta, Georg. 2005;(January):1–357.
26. Idavain J, Julge K, Rebane T, Lang A, Orru H. Respiratory symptoms, asthma and levels of fractional exhaled nitric oxide in schoolchildren in the industrial areas of Estonia. Sci Total Environ. 2019;650:65–72. Available from: https://doi.org/10.1016/j.scitotenv.2018.08.391
27. Linares B, Guizar JM, Amador N, Garcia A, Miranda V, Perez JR, et al. Impact of air pollution on pulmonary function and respiratory symptoms in children. Longitudinal repeated-measures study. BMC Pulm Med. 2010;10:62.
28. Amster ED, Haim M, Dubnov J, Broday DM. Contribution of nitrogen oxide and sulfur dioxide exposure from power plant emissions on respiratory symptom and disease prevalence. Environ Pollut. 2014;186:20–8. Available from: http://dx.doi.org/10.1016/j.envpol.2013.10.032.

Efficacy of Endoscopic Transantral Versus Transorbital Surgical Approaches in the Repair of Orbital Blow-Out Fractures (Randomized Clinical Trial)

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Abstract

Objective: to assess the efficacy of endoscopic transantral surgical approach versus traditional transorbital surgical approach (control group) in orbital blow out fractures in terms of postoperative clinical and digital radiographical assessments

Design: Blind, randomized, controlled clinical trial.

Patients: From January 2017 to January 2019, 12 patients with unilateral/bilateral pure orbital blow out fractures were equally assigned to study endoscopic transantral and control transorbital groups.

Intervention: In the study group, fractures were repaired with the endoscopic transantral approach while the control group, fractures were repaired via the transconjuctival surgical approach.

Outcomes Measures: The patients (subjective assessment) were followed up on amonthly basis for 6 months following surgery for the evaluation of the eye movement, double vision resolution, enophthalmos correction, and esthetics.

Results: A significantly better outcome, regarding enophthalmos and diplopia improvement, was found in the endoscopically controlled group. Endoscopically controlled reconstruction of orbital floor fractures seems to be a more accurate and successful treatment.

Keywords: *Orbital blow-out, endoscopic transantral, transorbital/ transconjuctival, diplopia resolution*

Introduction

Orbital floor fracture is one of the most common facial skeleton fractures after mid facial trauma, accounting for up to 40% of cranio-facial injuries. Patients may complain of ocular symptoms, aberration of aesthetic appearance, and dysesthesia around the damaged cheek. [1]

The indication for repair of orbital wall fractures is based on the clinical symptoms, exophthalmometry and computed tomography (CT). The timing of treatment, surgical technique and type of reconstruction material used is debated. Some advocate following the post trauma course for the development of diplopia or enophthalmos before starting treatment. [2]

Although a variety of approaches to orbital floor fractures have been proposed, satisfactory postoperative results have not been obtained in all cases. The key to

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successful surgical repair of these injuries is adequate exposure, visualization of the posterior bone shelf, and anatomical reconstruction of the entire defect. The traditional approach exposes the orbital floor, but it is difficult to see the posterior edge of the fracture and the condition of the herniated tissue before and after reduction of the orbital contents. Posterior dissection is the most difficult maneuver and is a common reason for failure of orbital floor repair.[3]

Transmaxillary endoscopic visualizationof the orbital floor offers an excellent view of the entire defect and the surgical reconstruction.[4]

The presented study is to to assess the efficacy of endoscopic transantral surgical approach versus traditional transorbital surgical approach (control group) in orbital blow out fractures in terms of postoperative clinical and digital radiographical assessments

Material and Method

The trial was planned as a randomized, prospective, blinded controlled clinical trial. The sample size was calculated in accordance with Hundepool (2012)[5] and Kim (2015)[6] indicated that the probability of diplopia resolution among controls is 0.33. If the true probability among cases is 0.77, we will need to study 6 patients in each group to be able to reject the null hypothesis that the exposure rates for case and controls are equal with probability (power) 0.8. The sample size was calculated using the PS program (Power and Sample Size Calculation software version 3.1.2; Vanderbilt University, Nashville, Tennessee).

The Research Ethics Committee of Oral and Dental Faculty, Cairo University, approved the study on January 23, 2017. The trial was registered on ClinicalTrial.gov (ClinicalTrials.gov identifier: NCT03011047)

From January 2017 to January 2019, 12 patients were accepted for randomization with pure unilateral/bilateral orbital blowout fractures and were planned for repair. The procedure, its risks, and possible postoperative complications were thoroughly explained to all patients, and they were asked to sign an informed consent form.

All the surgeries were performed at Oral and Maxillofacial Surgery Department, Faculty of Dentistry, Cairo University. The 12 patients were randomly assigned into 2 identical groups using a special website called Researcher Randomizer (https://www.randomizer.org/).

(Group A): six patients managed with transantral endoscopic approach. **(Group B):** six patients managed with transconjunctival approach.

The randomization codes were enclosed in a sequentially numbered, identical, opaque, and sealed envelope. The patient's guardians were asked to select one envelope. The investigator was aware of the randomization process for the specific group and treated accordingly. Outcome assessors, data collectors, and statistical analysts were blinded throughout the study.

Preoperative Preparation:

- A clearance from the ophthalmology Department, Faculty of Medicine, Cairo University after examination of papillary reflexes, motility restriction, measurement of the visual acuity, and confirmation of the presence of preoperative diplopia on upward gaze.
- Clinical preoperative photos were taken to ensure restricted eye elevation due to muscle entrapment in orbital floor fracture site.
- Preoperative orbital CT SCAN.

Operative Details:

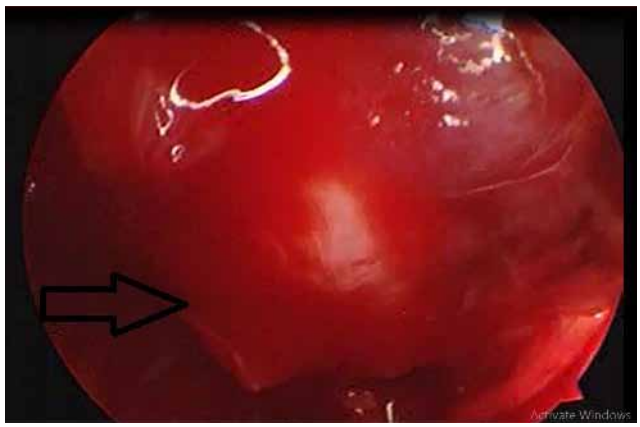
1. With the patient in a supine position, general anesthesia was induced. An uncuffed, nasal right angle endotracheal tube (RAE) was placed and taped to the midline to the forehead.
2. Forced duction test to confirm the presence of the inferior rectus muscle herniation into the maxillary sinus.

Surgical Step (Study Group):

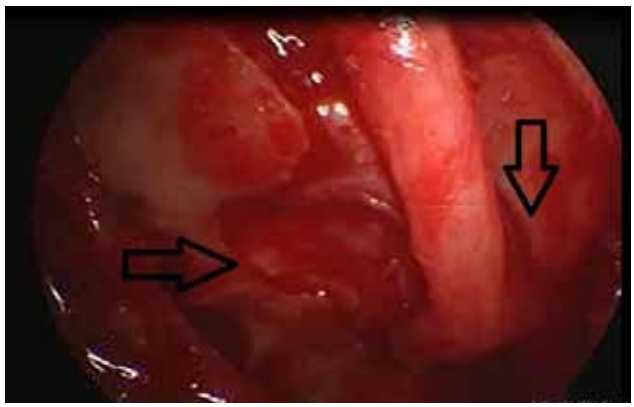
1. Local anesthesia was injected into the upper gingivobuccal sulcus above the canine area.
2. A 4-5 cm horizontal incision was made just superior to the sulcus extending from the lateral incisor to the first molar area
3. The periosteum and overlying soft tissue were gently elevated from the underlying maxillary bone, not reaching to the level of the infraorbital foramen using a periosteal elevator (to avoid the vessels injury).
4. 2 holes (wide enough to house the sinus scope; one for the sinus scope and for the suction tube while the other one of the used instruments.) were made into the anterior maxillary wall with an electric fissure

bur, care should be taken to avoid injury to dental roots, infraorbital vessels or the nasal aperture

5. The maxillary sinus and prolapsed orbital contents were visualized employing a 30-degree endoscope 3(sinus scope 4 mm, 30 degrees short one 17 cm) (Storz: https://www.karlstorz.com/eg/ar/ index.htm GERMANY.)
6. Removal of all the sinus membrane using a curved hemostat
7. Confirmation of forced duction test via endoscopic view.
8. The herniated orbital contents were reduced by digital manipulation or by using surgical instruments (curved Freer elevator), without removing the mucosa with periosteal orbital preservation, checked with pulse test (The test is performed by applying gentle pressure on the globe while visualizing the transmitted movement of the orbital floor from below pressure on the eyeball through the maxillary sinus)

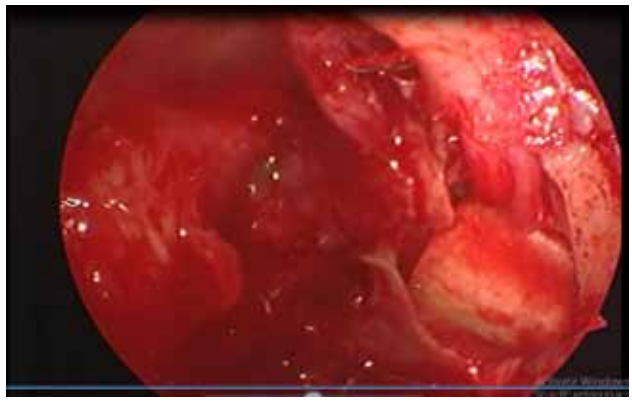


Intra-operative endoscopic view of the left maxillary sinus of an orbital floor fracture, through the antral window. The orbital floor was fractured, and periorbital soft tissue was herniated into the maxillary sinus (arrow).



Intra-operative endoscopic view of the fractured bony margins after reduction (arrows).

1. A reinforced collagen membrane4 was cut larger than the defect size and inserted sub-periosteally below the fracture margins, then it stabilization tested by pulse



Intra-operative endoscopic view of the left maxillary sinus of the reconstructed orbital floor fracture with collagen membrane, through the antral window. (Arrow)

2. A forced duction test was performed to confirm correct positioning of the orbital floor and to avoid entrapment of the orbital contents before closing
3. Transconjunctival with lateral canthotomy incision was used in all cases.
4. The transconjuctival incision will be sutured in 3 layers, periostial and subcutical layers will be closed with a 6 /0 Vicryl interrupted, then the skin for the lateral canthotomy was sutured with 6/0 Prolene8 interrupted sutures.

Postoperative Period and Follow-Up:

1. All patients were discharged from the hospital at the surgery day.
2. An oral antibiotic (endoscopic group) and I.V antibiotic(for transorbital group)was prescribed for 5 postoperative days.
3. Sutures were removed on the sixth postoperative day (transorbital group).
4. All complications presenting as infection, wound dehiscence, or hypertrophic scarring were recorded.
5. Patients were scheduled for the following follow up visits:-

    - **First visit:** At 2nd day after surgery for clinical

and radiographic assessment.

- **Second visit:** At 15th day postoperative to assess gradual diplopia resolution and enophthalmus correction.
- **Third visit:** Final evaluation for the presence of diplopia and the degree of enophthalmos was performed 3 months after surgery.
- **Fourth visit:** At 6 months postoperative to assess the patient radiogaphically with CT CSAN.

Statistical Method: Data management and statistical analysis were performed using the Statistical Package for Social Sciences (SPSS) version. 25.18

Numerical data were summarized using means, standard deviations, median and ranges. Categorical data were summarized as percentages. Data were explored for normality by checking the data distribution and using Kolmogorov-Smirnov and Shapiro-Wilk tests. Comparisons between the 2 groups with respect to normally distributed numeric variables were done using the t-test and Mann Whitney for not normally distributed variables. For categorical variables, differences were analyzed with Chi square or Fisher exact test as appropriate. Enophthalmous Incidence from before to after was assessed by McNemar test. All p-values are two-sided. P-values ≤0.05 were considered significant.

Group A (endoscopic):

(A)

(B)

Clinical photo showing (A) Preoperative left limited elevation due to muscle entrapment in left orbital floor fracture site. (B) Postoperative photo after left orbital floor reconstruction.

Result

Ophthalmic Symptoms: Diplopia and enophthalmos measurements of the day before surgery and three months after surgery were compared to evaluate the outcome.

1. **Diplopia Improvement:** Twelve patients reported diplopia before surgery, of which postoperative improvement was seen in 7 patients. In three patients, diplopia persisted at the extreme upper gaze post-surgery, but improved within the 3-month follow-up period.

   In Group Endoscopic; 4 patients out of 6 (66.7%) of the patients had complete improvement the other hand, 3 patients out of 6 (50%) of the control group had complete improvement. This was statistically not significant, p=0.788

Frequencies (n), percentages and results of fisherexact test for Diplopia Improvement for the tested groups.

Endoscopic Group				**Control Group**		
		Count	**%**	**Count**	**%**	**P value**
Diplopia Improvement	Complete	4	66.7	3	50.0	
	Partial	1	16.7	2	33.3	0.788
	Residual	1	16.7	1	16.7	

P≤0.05 is significant

2. **Enophthalmous correction:**

Enophthalmos resolved postoperatively in eight of ten patients.

Enophthalmous Incidence	Before Surgery	After Surgery	P Value
Endoscopic Transantr	4	0	0.0056
Trans conjunctival	6	2	

*(P > 0.05).

Frequencies (n) and results of Mcnemar test forEnophthalmous:

3. **EOM (Extra-ocular muscles) limitation:** Three out of 12 patients had improved extra-ocular muscle limitation postoperatively (20%).

Postoperative Complication:

1. No significant intra-operative or post-operative complications were found in both groups.
2. Mild orbital pain and hypoesthesia of the infra-orbital nerve occurred in both groups and improved with time.
3. Periorbital postoperative edema was significant in the control group.
4. In the endoscopic group, four patients complained of numbness of the alveolar ridge where the gingivobuccal incision was made; due to numbness of the infra-orbital nerve, which recovered in time.
5. One patient from endoscopic group developed maxillary sinusitis at 4 weeks post-surgery, with symptoms of cheek pain, swelling, and nasal discharge. The sinusitis symptoms resolved later on after consultation with an ENT specialist.
6. None of the patients reported any subjective changes in facial appearance secondary to the antrostomy
7. The total surgery time in the present two groups depended on the fracture size and difficulty. The extra surgery time was 45 min, on average, for the transorbital approach; may be due to time for mesh adjustment and fixation and layered suturing of the incision.

Discussion

The management of orbital blowout fractures and the ideal timing for fracture repair has been controversial. The time to operation (time lapse) was considered as the period of time from the day of injury to the day of surgical repair. In general, this was targeted at two weeks, commensurate with a resolution of edema/ hematoma. The mean time lapse of study patients in Group (Endoscopic) was 8.3±9.4days and range (2-27) while in Group (Control) was 10.6±11.1days and range (2-29) (P value 0.809 which is statically nonsignificant). Old traumatized patients were more likely to have residual post-operative diplopia. Surgical repair of blowout fractures within two weeks of trauma decreases the incidence of residual diplopia (to avoid muscles fibrosis; this explain the 20% of EOM limitation). This was proved by Hosal and Beatty 2002[7]; their study concluded that diplopia improved faster in patients who had surgery within 7 days of trauma than in patients who had surgery after 14 days. However, Egbert et al. 2002[2]found that the incidence of diplopia was not significant in patients having surgery within one month of injury.

Resolution of significant diplopia was achieved in 7 patients out of 12 cases in the 3rd month postoperative follow up. Three patients continued to have diplopia at 6 months postoperative follow up, however less than the pre-operative diplopia. No case had diplopia worsened by surgery. In endoscopic group 4 patients out of 6 (66.7%) of the patients had complete improvement the other hand, 3 patients out of 6 (50%) of the control group had complete improvement. This was statistically not significant, p=0.788. Other studies comparable to ours have reported a similar incidence at 66% and 70%. [8-11] Only one study to date has demonstrated a significantly lower incidence (20.2%) of diplopia resolution.[12]

Failure of diplopia to improve after adequate repositioning of orbital tissue is not an infrequent outcome after surgery for BOF, as we found in our study. There are a few explanations for residual diplopia even after adequate surgery. The first possible explanation is that entrapment, contusion, or hematoma of ocular muscle by fractured bony fragments may influence muscle function even after adequate repositioning. Second, there may be an undetected, persistent palsy of the oculomotor nerve. Third, altered orbit position may occur.(13-17)

Conclusions

Within the limitations of the present study, it could be concluded that: In general, it can be concluded that traditional surgical approaches provide difficult visualization of the posterior part of the orbital floor. Endoscopically controlled reconstruction provides,

besides improved visualization, confirmation of correct implant placement, and reduction of herniated orbital tissues. Video projection for teaching purposes and documentation is possible.

Recommendations

Further studies are recommended to be done on of patients with pure orbital blowout:

1. Prospective, randomized studies are warranted to study this new technique further.
2. Endo-nasal endoscopic approach for medial orbital walls' fractures.
3. A larger sample size.

Funding: The study was self-funded

Competing Interests: No conflict of interest

Ethical Approval: The Ethics and research committee, Faculty of Dentistry, Cairo University approved the study and patients' consent was obtained.

References

1. Zhang, S., Y. Li, and X. Fan. Application of endoscopic techniques in orbital blowout fractures. Frontiers of medicine, 2013. 7(3): p. 328-332.
2. Egbert JE, et al. Pediatric orbital floor fracture. Direct extraocular muscle involvement. Ophthalmology. 2000;107:1875–1879.
3. Jin, H.-R., et al. Endoscopic versus external repair of orbital blowout fractures. Otolaryngol Head Neck Surg 2007;136(1):38–44.
4. Kakibuchi M, et al. Combination of transconjunctival and endo-nasal-transantral approach in the repair of blowout fractures involving the orbital floor. Br J Plast Surg 2004;57:37–44.
5. Hundepool, A., et al., Open reduction versus endoscopically controlled reconstruction of orbital floor fractures: a retrospective analysis. International journal of oral and maxillofacial surgery, 2012. 41(4): p. 489-493.
6. Kim, J.Y., G. Choi, and J.H. Kwon, Transantral Orbital Floor Fracture Repair Using a Folded Silastic Tube. Clinical and experimental otorhinolaryngology, 2015. 8(3): p. 250-255.
7. Hossal, B.M. and R.L. Beatty. Diplopia and enophthalmos after surgical repair of blowout fracture. Orbit, 2002. 21(1): p. 27-33.
8. Park, D.H., et al., Endoscopic application in aesthetic and reconstructive facial bone surgery. Plast Reconstr Surg, 1998. 102(4): p. 1199-209.
9. Moura, L.B., et al., Reconstruction of orbital floor defects assisted by transantral endoscopy. Oral Maxillofac Surg, 2016.
10. Bartoli D, et al.: Retrospective analysis of 301 patients with orbital floor fracture. J Craniomaxillofac Surg 43:244, 2015.
11. Fernandes, R. and E.B. Strong, Endoscopic repair of orbital floor fractures. Operative Techniques in Otolaryngology-Head and Neck Surgery, 2008. 19(3): p. 209-213.
12. Ramphul, A., and Hoffman, G. (2016). Does Pre-Operative diplopia determine the incidence of postoperative diplopia after repair of orbital floor fracture? An Institutional Review. Journal of Oral and Maxillofacial Surgery. http://doi.org/10.1016/j.joms.2016.10.036
13. Bullock J., et al. Mechanisms of orbital floor fractures: a clinical, experimental, and theoretical study. Trans Am Ophthalmol Soc. 1999; 97: 87–113.
14. Jones D. and Evans J. ‘’Blowout" fractures of the orbit: An investigation into their anatomical basis. J Laryngol Otol 1967;81:1109- 1120.
15. Adeyemo W., et al. Mechanisms of orbital blowout fracture: a critical review of the literature. Niger Postgrad Med J. 2008;15(4):251-254.
16. Dingman RO and Natvig P. The Zygoma. Surgery of Facial Fractures 1st edition 1964. WB Saunders Philadelphia, USA. pp.234-235.
17. Antonyshyn O, Gruss JS and Kassel EE. Orbital "blow-in" fractures: clinical and CT features. J Comput Assist Tomogr. 1989;13:1017-22.

Relationships of Workloads, Working Conditions and Dual Role Conflict with Nursing Stress

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Abstract

Context: Jobs in the health sector such as nurses are often assumed to be jobs that have a high risk of stress. This study aims to determine the relationship between workload, working conditions and dual role conflict with nurses' work stress. The study was conducted at the Abepura Regional Mental Hospital in October 2016 using a cross-sectional design. The research sample was nurses in Abepura Regional Mental Hospital, amounting to 62 people who were selected using a simple random sampling technique. Bivariate analysis was performed to show the relationship between the dependent and independent variables used the chi-square test with a significance level of $p < 0.05$. The results showed that the majority of respondents experienced heavy work stress (90.3%), heavy workloads (88.7%), non-conducive working conditions (54.8%) and severe dual role conflict (85.5%). Workload ($p = 0.016$), work environment ($p = 0.022$) and dual role conflict ($p = 0.024$) related to nurses' work stress. It is necessary to re-arrange the workload and shift adjusted to the nurse's ability, to create conditions that are conducive and comfortable and provide communication space to discuss the role conflict felt by the nurse.

Keywords: *Job stress, workload, dual role conflicts, work conditions, nurses*

Introduction

The hospital is one form of a health facility that is organized both by the government and the private sector. Hospitals in carrying out their functions are expected to pay attention to social functions in providing health services to the community. The success of hospitals in carrying out their functions is characterized by the quality of service quality by the hospital. Hospital quality is highly influenced by several factors, including the most dominant is human resources (HR) [(1)].

Hospital management will not be separated from the existing human resources. Human resource management is essentially an integral part of overall hospital management and human resources are the most important capital and wealth of all activities carried out in the hospital. The success of this hospital is also influenced by knowledge, skills, creativity, and motivation of staff and employees in this case nurses for 24 hours (divided into 3 shifts, namely morning shifts, evening shifts, and night shifts) that deal directly with patients [(2)].

Jobs certainly bring workers to certain situations that expose them to demands or excessive workloads that make them experience work stress. Job stress is a process of perception that is individualized. In general, employees experience work stress due to stressors coming from individuals, groups, organizations, and non-work, this work stress will have an impact on the behavior, cognitive, and physiological workers[(3)].

Jobs in the health sector such as nurses are often assumed to be jobs that have a high risk of stress. This can be understood from at least three things, namely the workload that must be supported, the influence of patients being served and working conditions[(4)]. Excessive workloads such as caring for too many patients, nurses will have difficulty in maintaining high nursing standards can cause stress and working conditions because nurses

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feel unable to provide the support needed by co-workers and face the problem of labor limitations [5].

The resulted of a preliminary study conducted on 2 female nurses showed that conflict is more pronounced during morning shifts and night shifts. This is also supported by the distance of their residence away from the workplace. So they often feel tired after work but have to do more household chores. Sometimes nurses feel stressed and can cause anxiety. Nurses in the room always brought their children who were under five to go to work. The reason for the nurse is because no one is looking after her child at home. The impact of taking the child to the hospital also makes the nurse worried.

This study aimed to determine the relationship between workload, working conditions and dual role conflict with nurses' work stress.

Material and Method

The study was conducted at the Abepura Regional Mental Hospital in October 2016 using a cross-sectional design. Sample was nurses in Abepura Regional Mental Hospital, amounting to 62 people who were selected using a simple random sampling. Samples recruited in the study were nurses aged 20-50 years, working in one hospital with a shift system and willing to be respondents as evidenced by having signed informed consent. Data collection was carried out using a questionnaire. Characteristics of sample are age, sex, education, length of work and position. The research variables consist of dependent variables (work stress) and independent variables (workload, working conditions, and dual role conflict). Bivariate analysis to measure the relationship between the independent and dependent variable with $\alpha = 0.05$.

Findings:

Characteristics of Respondents: Table 1 showed that the age of respondents was mostly in the productive age, which is aged 20 - 35 years, amounting to 51 people (82.3%). Most respondents were female nurses, as many as 54 people (87.1%). 56 people (90.3%) nurses graduated from Diploma in Nursing. The working period of nurses mostly has worked for <5-10 years, namely 57 people (91.9%).

Relationship between workload, working conditions and dual role conflict with work stress

Table 2 showed that respondents who had light workload tended to experience mild stress as many as 3 people (42.9%) higher than respondents who had heavy workloads who experienced mild stress. Respondents who experienced light workloads with heavy stress amounted to 4 people (57.1%) lower than respondents who experienced heavy workloads and experienced heavy stress as many as 52 people (94.5%). Statistical test resulted using chi-square obtained P-value = 0.016. There is a relationship between workload and the level of work stress.

Table 1: Characteristics of respondents

Characteristics	n	%
Age (Year)		
20 – 35	51	82.3
36 – 45	11	17.7
Sex		
Man	8	12.9
Female	54	87.1
Education		
School of Health Nurses	1	1.6
Diploma	56	90.3
Bachelor	5	8.1
Length of working (Year)		
< 5 – 10	57	91.9
11 – 15	5	8.1
Position		
Functional Nurse	4	6.5
Managing Nurse	31	50.0
Head of Room	2	3.2
Contract Nurse	25	40.3
Total	62	100

Table 2: Relationship between workload, working conditions and dual role conflict with work stress

Variable	Work stress				Total		P-value
	Light		Weight				
	n	%	n	%	n	%	
Workload							
Light	3	42,9	4	57,1	7	100	0.016
Weight	3	5,5	52	94,5	55	100	
Working conditions							
Conducive	0	0	28	100	28	100	0.022
Not conducive	6	17,6	28	82,4	34	100	
Dual role conflict							
Light	3	37,5	5	62,5	8	100	0.024
Weight	3	5,6	51	94,4	54	100	

Table 2 showed respondents who stated that conducive working conditions tended to experience stress with more severe levels than those who experienced mild stress levels, amounting to 28 people (100%). Respondents who stated that the working conditions were less conducive that could cause nurses in mild stress conditions amounted to 6 people (17.6%) lower than respondents who stated the working conditions were less conducive and experienced severe stress as many as 28 people (82, 4%). Statistical test resulted using chi-square obtained P-value = 0.022. There is a relationship between working conditions and the level of work stress.

Table 2 showed the respondents who experienced mild levels of dual role conflict and experienced less stress with a total of 3 people (37.5%). Respondents who felt severe dual role conflict and experienced lower levels of mild stress were 3 people (5.6%), respondents who experienced dual role conflict with mild levels with heavy stress levels were 5 people (62.5%) more low compared to respondents who experienced severe double role conflict with heavy work stress as many as 51 people (94.4%). Statistical test resulted using chi-square obtained P-value = 0.024. There is a relationship between dual role conflict with the level of work stress.

Discussion

1. **Workload:** The resulted showed that respondents' statements about high workload were 55 people and low was 7 people. This showed that the workload felt by nurses in carrying out their duties is felt high. The resulted of the study are no different from Haryanti, Aini (6) that the workload perceived by nurses is high because the patients served are emergency patients, thus requiring speed, accuracy and consistent time at work, making nurses workloads high. Respondents who stated that the workload was high, was caused by the fact that in their work the leaders had many demands on the work that had to be done, so they had to be demanded to provide quality services and deal with patients with various characteristics. According to Haryanti, Aini (6) factors that influence nurses' workloads are patient conditions that are always changing, the average number of hours of care needed to provide direct services to patients exceeds a person's ability, the desire to achieve work, high job demands and care documentation nursing.

   Respondents who stated the low workload of 7 people could be caused by external factors from the nurse itself, that is, the responsibility given to him was not much, so he did not feel burdened with his work. The workload felt by nurses is highest at productive ages (20 to 35 year). This is likely due to the physical condition of the nurse in dealing with work done. This is the following research by Ratri and Parmitasari[2], that nurses aged 31-39 years experience a high workload caused by physical deterioration, so they are easily tired and feel the work done is not following their bodily capabilities. This is due to the demands of ability from the level of education they have. The same thing found byMubin (7)that the high workload felt in higher education is due to the moral burden they bear with the education they have, so they have to work better than nurses with lower education below.

   Nurses who felt a high workload on nurses who worked <5 years to 10 years were 51 people. This can be caused by the routine he does so that it causes boredom. This is the following research conducted by Haryanti, Aini (6), that nurses who feel a high workload are caused by the boredom of routine work done in connection with fast and responsive actions to patients in critical condition.

2. **Working Conditions:** The result obtained that the majority of respondents stated that the working conditions were not conducive as many as 53 people and conducive as many as 9 people. Respondents stated that the working conditions were not conducive because nurses had to deal with the patient's family, where the patient's family had an increased anxiety level after one of his family was treated in the intensive care unit. Also, nurses stated that the work conditions that are not conducive due to outdated equipment are still being used which is feared to experience sudden damage and will certainly affect the services provided to patients. As a result of problems arising from working conditions in hospitals that cover the work environment both physically and socially, for example, relationships with anxious patients' families and conditions of work equipment cause nurses to feel uncomfortable at work.

   Nurses who state conditions are conducive to work because nurses have adapted to working conditions experienced, including dealing with family anxiety and working equipment conditions. Judging from the nurse's tenure that nurses who feel the conditions

of work are not conducive to nurses with ten years of service, this is due to the tenure they have, the nurse knows the deficiencies that exist in care in the hospital. A similar sentiment was expressed by Mubin (7) that nurses with long working years are more aware of their working conditions including lack of equipment and facilities and infrastructure needed in carrying out nursing care, in addition to the condition of patients who need serious attention supported by adequate equipment.

The resulted of the study were no different with Ahsan, Noviyanti (8) that nurses who worked in the inpatient room stated that the working conditions were not pleasant. Due to the duty of nurses in receiving and caring for patients must be able to deal with at the same time calm the anxiety of patients and patients' families. Working conditions are seen as having an important role in the comfort, peace, and security of work. The creation of comfortable working conditions will help employees to work harder so that productivity and job satisfaction can be increased. Good working conditions are work conditions that are free from physical disturbances such as noise, lack of lighting, and pollution and are free from psychological or temporary disturbances such as the privacy of the employee and the setting of working hours [9]. But from the nurse's statement that the perceived working conditions are not conducive is facing the patient's family with increased anxiety caused by not being able to keep together with the patient, as well as outdated equipment. While the sound produced by the engine, air circulation, and lighting and room temperature are adequate and are felt not to be a problem at work.

3. **Dual Role Conflict:** The resulted of this study also indicate that there is a significant relationship between multiple role conflicts with work stress on nurses. This means that nurses who have a high role conflict, the level of work stress experienced by nurses are high. While nurses who have low dual role conflict, the level of work stress experienced by nurses is low. The resulted of this study are supported by research by Lambert, Hogan (10) found that there is a positive and significant relationship between dual role conflict with work stress.

   Also, research conducted by Nasir and Nusi (11) found that there were work and household conflicts. Conflict in the family will not occur if there is a balance between roles in the family with work. An employee who has a family has a dual role, besides acting like a wife and mother, she also acts as a breadwinner. This dual role is very risky with conflict because in general women tend to prioritize their families (husband and children) overwork. This can hamper the implementation process of achieving its performance. The dual role conflict they experience is a factor triggering work stress. This is according to the resulted by Long, Azami (12) show that women who work are more likely to experience conflicts and problems and emphasize the importance of family problems rather than work when the family is the most important domain for most women.

   The same thing also expressed by Qamari (13), one of the strategies that can be applied by women who work is social support, which maintains good relations with colleagues around and superiors, it is very important to prevent unnecessary problems. Moral and emotional support from colleagues and superiors can make you more excited about work. Their presence can also play a role in helping when facing family problems. Social support at work can contribute, especially employee productivity and welfare [14]. Also, social support according to Johnson, Johnson (15)can increase productivity through increased motivation, quality of reasoning, job satisfaction and reducing the impact of work stress.

Conclusion

Workload, working conditions and dual role conflict are related to nurses' work stress. More workload felt by nurses, non-conducive working conditions and heavy dual role conflict increase work stress for nurses. It is necessary to re-arrange the burden and shift adjusted to the nurse's ability, to create conditions that are conducive and comfortable and provide communication space to discuss the role conflict felt by the nurse.

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References

1. Nugroho AS, Pramadi A, Tondok MS. Studi Deskriptif Burnout dan Coping Stres pada Perawat di Ruang Rawat Inap Rumah Sakit Jiwa Menur Surabaya. Calyptra. 2012;1(1):1-6.
2. Ratri MSS, Parmitasari DLN. Coping stress pada beban kerja perawat ruang Unit Pelayanan Intensive Psikiatri (UPIP) dan ruang kresna Di RSJD DR. Amino Gondohutomo Semarang. PSIKODIMENSIA. 2014;13(2).
3. Setiyana VY. Forgiveness dan stres kerja terhadap perawat. Jurnal ilmiah psikologi terapan. 2013;1(2):376-96.
4. Kurnia E. Pengaruh Mekanisme Koping Terhadap Kekebalan Stres Kerja Pada Karyawan Rumah Sakit Baptis Kediri. Jurnal Penelitian STIKES Kediri. 2010;3(1):29-35.
5. Deviana M, Novitayani S. Hubungan Stres Kerja dengan Kinerja Perawat Pelaksana di Rumah Sakit Jiwa Aceh. Idea Nursing Journal. 2018;9(3):32-6.
6. Haryanti, Aini F, Purwaningsih P. Hubungan antara beban kerja dengan stres kerja perawat di Instalasi Gawat Darurat RSUD Kabupaten Semarang. Jurnal Manajemen Keperawatan. 2013;1(1).
7. Mubin MF. Koping Perawat Terhadap Stress Kerja Di Ruang Rawat Inap Bougenvile Rumah Sakit Telogorejo Semarang Tahun 2oo4. JURNAL LITBANG. 2005;2(3).
8. Ahsan A, Noviyanti LW, Primanoviasari TS. Hubungan Beban Kerja Perawat Dengan Penerapan Prinsip Tujuh Benar Dalam Pemberian Obat Pada Pasien Di Ruang Rawat Inap. Jurnal Kesehatan Mesencephalon. 2018;4(2).
9. Mangkunegara AP. Evaluasi Kinerja SDM. Jakarta: Refika Aditama; 2011.
10. Lambert EG, Hogan NL, Barton SM. The nature of work-family conflict among correctional staff: An exploratory examination. Criminal Justice Review. 2004;29(1):145-72.
11. Nasir R, Nusi NE. Tekanan kerja, tekanan rumah tangga dan komitmen kerja dikalangan pegawai dan anggota wanita polis Diraja Malaysia (PDRM). Jurnal Psikologi Malaysia. 2001;15:21 - 37.
12. Long CS, Azami A, Kowang TO, Fei GC. An Analysis on the Relationship between Work Family Conflict and Turnover Intention: A Case Study in a Manufacturing Company in Malaysia. International Business Management. 2016;10(3):176-82.
13. Qamari I. Peran Dukungan Suami dalam memoderasi Pengaruh Tuntutan Waktu Peran Kerja terhadap Konflik Peran Ganda pada Karyawati Bank. Jurnal Pusat Studi Wanita. 2007;1(10).
14. Hodson R. Group relations at work: Solidarity, conflict, and relations with management. Work and occupations. 1997;24(4):426-52.
15. Johnson DW, Johnson RT, Stanne MB. Cooperative learning method: A meta-analysis. Minneapolis: University of Minnesota 2000.

Intention of Diabetic Foot Ulcer Prevention Model Based on Social Support and Personal Agency Perspectives

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Abstract

Context: A diabetic foot ulcer is one of the complications occurred on diabetes mellitus patients. The incident rate of diabetic foot ulcer improves each year significantly. The research was to arrange the intention of diabetic foot ulcer prevention model based on social support and personal agency perspectives. This study was included in a cross-sectional study using a questionnaire and a simple random sampling technique on 10 health centers (puskesmas). The research instrument for social support consisted of family's support and friend's support, personal agency consisted of perceived control and self-efficacy, and intention consisted of diet intention, consuming medicine intention, physical activity intention, and foot/blood sugar controlling intention. The data analysis applied SEM-PLS software. The diabetes mellitus patients who did not have ulcer were 329. There was correlation between social support and personal agency of diabetic foot ulcer prevention by having Coefficient value for 0,68, and T value for 16,27, there was correlation between personal agency and intention to prevent the diabetic foot ulcer by having coefficient value for 0,57 and T value for 2,96, and there was correlation between social support and intention to prevent the diabetic foot ulcer by having coefficient value for -0,27 and T value for 2,08. The social support contributed highly to the intention through a personal agency, and the social support contributed directly to intention in preventing the diabetic foot ulcer. It is suggested that diabetes patients should get supports from family and friends to improve the perceived control and self-efficacy hence the intention of diabetic foot ulcer prevention can be improved.

Keywords: *Social Support, Personal Agency, Intention, Diabetes*

Introduction

A diabetic foot ulcer is one of the dead causes in the world, and it can attack whoever the individual is. Diabetes triggers morbidity such as blindness, kidney failure, and non-traumatic amputations(1)WHO predicts that the increase of Diabetes Mellitus sufferers in Indonesia reached 8,4 million in 2000 and will be about 21,3 million in 2030(2). In 1990, Indonesia was in the 16th place for diabetes, while it was ranked 6th in 2010 and changed to the 5th place in 2015.

Amputation is done every day for diabetes mellitus patients in the world (3) Data from (4). Riskesdas revealed that Indonesia was ranked 10th for the world's highest foot amputation number. Besides treatment and healthy lifestyle, the patients' behavior is one of the determining factors of the success in preventing the diabetic foot ulcer so that it can decrease the amputation incident rate. The effect of amputation that is occurred in patients with diabetic foot ulcer can cause longer treatment periods, the higher treatment costs, and the more decrease the patients' life qualities. The effect of a diabetic foot ulcer is strongly perceived by the patients, thus, the roles and supports of family are really helpful. The support can be instrumental such as the provision of facilities that can support the patients' activities and the companion during treatment periods in health center, and also material and transportation to the treatment place. Good support from

the family improves the intention of diabetic foot ulcer prevention. This study aims at arranging the intention model of the diabetic foot ulcer prevention behavior based on the perspective of social support and personal agency in city of Gorontalo.

Material and Method

This was a cross-sectional study that had been conducted from December 1st, 2018 to May 31st, 2019 on respondents suffering from the diabetes mellitus. The samples were 329 respondents out of 1516 population. They were diabetes mellitus sufferers who did not have foot ulcer aged 18 years and over, and had been selected by simple random sampling technique. The variables consisted of social support (X1) which was everything around the individuals that influenced the behaviors of them in preventing the diabetic foot ulcer. The social support (X1) itself comprised of family's support (X1.1), and friend's support (X1.2). The question items included assessment support, instrumental support, informational support, and emotional support.

Other than social support (X1), the personal agency was another independent variable (X2). It was the individual's self-ability to prevent diabetic foot ulcer consisting of a perceived variable (X2.1) and self-efficacy (X2.2). The last was the dependent variable namely intention (Y), the strong desire of the individuals themselves to prevent the diabetic foot ulcer involving the dieting intention (Y.1), physical activities intention (Y.2), consuming medicines intention (Y.3), and foot and blood sugar controlling intention (Y.4). The questionnaire had been ethically tested at Airlangga University of Surabaya, and it had owned its validity and reliability tests. Data analysis was completed by SEM PLS (Partial Keast Square) software.

Findings: The research result at Table 1 shows that the diabetes patients for elderly category aged 52 - 65 years are 214 (64,3%), female category consisted of 240 respondents (72,9%), respondents who are Senior High School graduates achieve 223 (67,8%), and those who do not have job (housewives and retired employees) are 215 (65,3%).

Table 1: Respondents' Charateristics, 2019

Characteristics	Classification	Frequency	Percentage	Mean ± SD Min - Max
Age	Late Adult (35– 45 years)	30	9,0	Mean: 57.29 SD : 8.88 Min :35 Max : 84
	Early Elderly (46 – 55 years)	62	18,6	
	Late Elderly (56 – 65 years)	214	64,3	
	Elderly> 65 years	23	6,9	
Sex	Male	89	27,1	
	Female	240	72,9	
Job	Unemployment	215	65,3	
	Farmer	61	18,6	
	Private Employee	30	9,1	
	Civil Servant	23	7,0	

Table 2 reveals that respondents who have family's support in less category are 71 respondents (21,3%) and those who receive support from friends in less category are 95 (28,4%), and there are 174 respondents (52,9%) who receive social support in a sufficient category.

Table 2: Social Support, Personal Agency and Intention to Prevent Diabetic Foot Ulcer Variable

Variable	Indicator	Category	Total	Percentage	Mean ± SD Min - Max
Social support	Family's Support	Less	71	21,3	44,65 ± 13,32 20 - 60
		Sufficient	116	34,7	
		Good	141	42,2	
	Friend's Support	Less	95	28,4	44,61 ± 14,06 25 - 64
		Sufficient	107	32	
		Good	127	38	

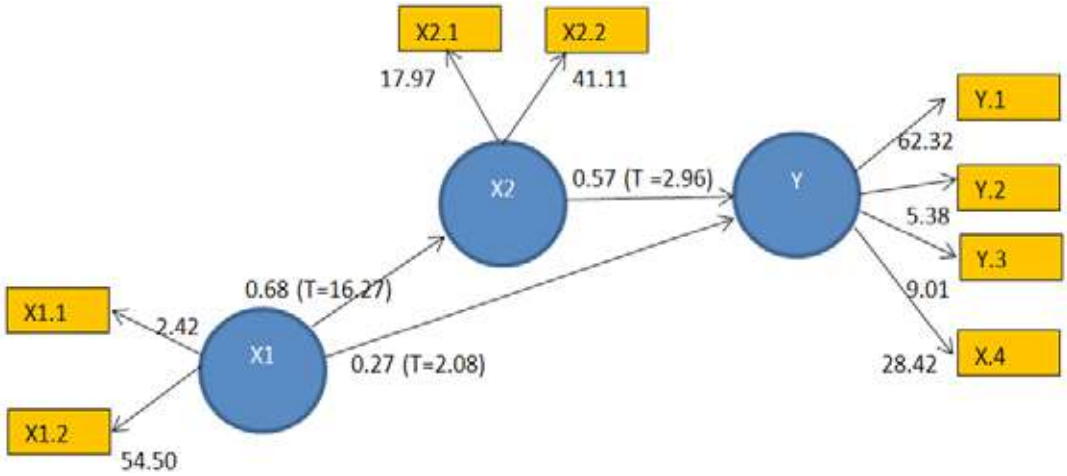
Variable	Indicator	Category	Total	Percentage	Mean ± SD Min - Max
Overall Social Support Score		Less	48	14,6	89,93 ± 17,68 37 - 128
		Sufficient	174	52,9	
		Good	107	32,5	
Personal agency	Perceived control	Less	157	47,7	18,89 ± 6,04 7 - 34
		Good	172	52,3	
	Self efficacy	Less	175	53,2	13,44 ± 1,80 8 - 16
		Good	154	46,8	
Overall Personal Agency score		Less	168	51,3	32,38 ± 6,08 19 - 46
		Good	161	48,9	
Intention	Dieting	Less	119	36,2	10,04 ± 1,33 6 - 12
		Good	210	63,8	
	Physical activities	Less	121	36,8	6,73 ± 0,92 4 - 8
		Good	208	63,2	
	Consuming medicines	Less	119	36,2	6,72 ± 0,87 4 - 8
		Good	210	63,8	
	Foot and blood sugar controlling	Less	119	36,2	6,76 ± 0,90 3 - 8
		Good	210	63,8	
Overall Intention Score		Less	160	48,6	30,27 ± 2,84 21 - 36
		Good	169	51,4	

Table 2 shows that almost all perceived control in a high category are 172 respondents (52,3%), respondents who have a low category of self-efficacy are 175 (53,2%), and the total of personal agency is in less category for 168 respondents (51,1%). Then, 210 respondents (63,8%) are in high category of dieting intention, 208 respondents (63,2%) are in high category of physical activities intention, 210 respondents (63,8%) are in high category of consuming medicine intention, and 210 respondents (63,8%) are in high category of foot/blood sugar controlling intention.

Table 3: Cross Loadings with Convergent Validity and Reliability Result

Construct and Indicator		Loading (λ)	T-statistics	Chronbach's Alpha	Information
Social support	X1.1	0.968	2.42	0,96	Valid & Reliable
	X1.2	0.971	54,50		
Personal agency	X2.1	0.954	17,97	0,85	Valid & Reliable
	X2.2	0.762	41,11		
Intention	Y.1	0.989	62,32	0,97	Valid & Reliable
	Y.2	0.987	5,38		
	Y.3	0.989	62,32		
	Y.4	0.83	27,28		

Table 3 reveals that there is no loading factor for less than 0,5 and T-statistical value is less than 1,96, hence all variables are considered significant and all latent constructs are reliable and marked with the Chronbach's Alpha score which is higher than 0,6.



X1 = Social Support, X2 = Personal Agency, Y = Intention

Picture 1; Statistical T Value of Structural Model

Discussion

Picture 1 reveals that there is direct correlation between social support with personal agency of diabetic foot ulcer prevention for 0,68 unit with T-statistical value for 16,27 (T_{count} is higher than T_{critic}(1,96), there was a direct correlation between personal agency and intention of diabetic foot ulcer prevention for 0,57 unit with T-statistical value for 2,96, and there was direct correlation between social support and intention of diabetic foot ulcer for -0,27 unit with T-statistical value for 2,08.

The social support comprises assessment support, instrumental support, informational support, and emotional support. The research result at picture 1 reveals that there is correlation between social support with the personal agency of diabetic foot ulcer prevention. It is found out that the informational and instrumental supports are required by the patients. The supports can be in the form of discussion among the family members about diabetic foot ulcer prevention and treatment to give when there is an indication of wound to occur and preparing appropriate meals for the diabetes patients. The positive impact felt by the respondents is the improvement of personal agency or individual ability to observe the symptoms of diabetic foot ulcer, and the patients become more confident to do the diabetic foot ulcer prevention.

Family support is required in this phase to assist the patient in preventing potential injury. Diabetic foot ulcer symptoms consisting of less to nothing sensation, dry skin, paralysis in foot area, and callus can be found[5]. Diabetic foot ulcer is one of the sensory nerve defects which can cause the decrease of pain sensation at half to all part of foot area[6]. Normally, people who get injured require 2 to 5 days for the inflammation phase till the wound healing process[7].

One of the family support categories experienced less by the respondents is assessment. The support is in the form of dieting support. The family, basically, suggests the patient do a diet, yet there is not any limitation for foods supply, for example, the food containing many calories. Therefore, the respondents are not maximal in running their diet. The research conducted by May beery S.L and Lindsay S., exposes that the behavior of the people around the patients who support the diabetes patient treatment program will increase the obedience of the patients in taking treatment[8].

The research result at picture 1 shows that there is a correlation between personal agency and intention of diabetic foot ulcer prevention. The questionnaire result shows that the respondents are difficult to do physical activities 3 times a week based on the programs of the health center. It is because the respondents are not capable of doing that especially for those who have activities as the housewives. Respondents think that their tasks as housewives are more important than doing exercise. Respondents believe that doing activities as housewives can fulfill the need for physical activities for diabetes sufferers.

The lack of personal Agency, according to the health workers, is initiate by patients having many activities at home. The respondents' ages are in late elderly category

for 56 - 65 years. Their household activities should be adjusted with their ability, hence, the patients should focus only on diabetic foot ulcer prevention and other complications. The nurses, in this case, are having crucial roles in improving the personal agency. According to Hsieh Y. L., et al. the health officers are responsible in improving the patients' intention to follow the diabetes complication treatment because a high personal agency will improve the intention of diabetic foot ulcer prevention[9].

Hence, the health officers and the family can do an orientation to patients about how to prevent any injury when doing activities and how to do foot treatment. If it is well-oriented, it will improve the diabetes patients' intention, hence they will obediently conduct the treatment program. It is strengthened by Pakaya which states that orienting the patients to rules and treatments will improve the intention and obedience of patients in following the treatment[10]. It is also supported by Pinidiyapathirage J., et al., that personal agency in self-efficacy is one of the important predictors to improve diabetes patients' intention in doing physical activities[11]

Table 2 shows that the family's support which is in a low category is 21,3%. The lack of family's support, in terms of instrumental support, strongly influences the behavior of diabetic foot ulcer prevention. The instrumental support is performed by helping the patient to do physical activities; the family can accompany the patient to visit the health center. By doing that, the patient will be more enthusiastic to follow the treatment. The study conducted by Lengerke V., K. en L., states that supports from all parties, including family, will improve the intention of patients to prevent the diabetic foot ulcer[12].

The questionnaire result shows that social support from friends strongly helps the individual to visit the health center. The result is supported by Shuhaida N, M, H., et al., that social support has a significant correlation with blood sugar controlling behavior[13]. Social support is a heterogenic concept in which it can help o improve the mental health in terms of intention and physical health in preventing he diabetic foot ulcer[14]. The intention is also influenced by attitude, perceived norm, and personal agency[15].

According to Ajzen and Fisben, to do an intention, there should be mutual cooperation with ones who support the intention itself, because intention is determined by the environment or situational[16]. Faries D. M.,has stated that there is often a gap between intention of an individual with the expected result in which the respondents who have intention are difficult to realize it in behavior[17].

Conclusion

The developing model of intention to prevent the diabetic foot ulcer is influenced by supports from family and friends in order to improve the intention through personal agency variable. It is suggested that there should be further research related to knowledge and motivation in improving the intention to prevent diabetic foot ulcer.

Conflict of Interest: None

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Ethic and Consent: The ethics commissions of health research at Faculty of Nursing, Universitas Airlangga (Number 1173-KEPK) approves to the protocol by giving informed consent of research and consent form to be respondents by guaranteeing the confidentiality of research.

References

1. Chand, G., Mishra, A. K., Kumar, S., & Agarwal A. Diabetic foot. Clinical Queries: Nephrology,. 2012;1(2), 144–150.
2. Perkeni. Konsensus Pengelolaan Dan Pencegahan Diabetes Mellitus tipe 2 di Indonesia. In 2015.
3. Huang, Y. Y., Lin, K. Der, Jiang, Y. Der, Chang, C. H., Chung, C. H., Chuang, L. M., Shin SJ. Diabetes-related kidney, eye, and foot disease in Taiwan: An analysis of the nationwide data for 2000-2009.,. J Formos Med Assoc. 2012;111(11), 637–644.2012.09.006.
4. Riskesdas. Riset Kesehatan Dasar (Basic Health Research) 2013;1–306
5. Susanto H. Kaki Diabetes, Etiologi dan Patofisiologi (Diabetes foot, etiology and pathophysiology), Simphosium & Workshop, Comprehensive Management Of Diabetes and Its Complication. In 2018.
6. Wibiosono S. Diagnosis Diabetes Mellitus, Simphosium & workshop, Comprehensive Management Of Diabetes and Its Complication. In 2018.
7. Rabbia J. Special Problem and Interventions,

Impaired integumentary integrity, article by Mosby, Inc., an affiliate of Elsevier Inc. 2012

8. Mayberry L. S, O., CY. Family Support, Medication Adherence, And Glycemic Control Among Adults With type 2 diabetes. Diabetes Care. 2012;35(6):1239–45.
9. Hsieh YL, Lee FH, Chen CL, Chang MF, Han PH. Factors Influencing Intention to Receive Examination of Diabetes Complications. Asian Nurs Res (Korean Soc Nurs Sci)[Internet]. 2016;10(4):289–94. Available at: http://dx.doi.org/10.1016/j.anr.2016.10.004
10. Pakaya N. Hubungan Orientasi Pasien Dengan Kepatuhan Pasien/ Keluarga Dalam Menjalankan Aturan di rumah sakit Unhas (Relationship Between Patient Orientation / Family Obedience In Carrying Out The Rules At The Hasanuddin University Hospital)Makassar. J Health Sport. 2015;Vol. 9 No.:1507–20.
11. Pinidiyapathirage J., Jayasuriya R., Cheung N.W., & Schwarzer R. Self-efficacy and planning strategies can improve physical activity levels in women with a recent history of gestational diabetes mellitus,. J Psychol Heal. 2018;
12. Lengerke V. T, K. B, L., K. Patients' intention to speak up for health care providers' hand hygiene in inpatient diabetic foot wound treatment: a cross-sectional survey in diabetes outpatient centres in Lower Saxony, Germany,. J homepage http//www.tandfonline.com/loi/cphm20,. 2016;
13. Shuhaida N., H, M., Suhaila S., Y., M., Azidah A., K., Norhayati M., N., Nani D., Juliawati M. depression, anxiety, stress and socio demographics faktors forr poor glycaemic control in patients with tipe II diabetes,. J Taibah Univ Med Sci. 2019;268–76.
14. Pesantes M.A. et al. Family Support and Diabetes: Patient's Experiences From a Public Hospital in Peru. jounal Qual Heal Res 2018. 2018;Vol. 28(12:1871 –1882.
15. Rimer G & . Health behavior and health education, theory, research and practice. four. C. T Orleans; 2008.
16. Ajzen and Fisben. Attitudinal And Normative Variables As Predictors Of Specific Behaviors. J Pers Soc Psychol. 1973;27 no 1:41–57.
17. Faries MD. Why We Don't "Just Do It": Understanding the Intention-Behavior Gap in Lifestyle Medicine. Am J Lifestyle Med. 2016;10(5):322–9.

The Development of Diabetic Foot Ulcer Prevention Model Based on Psychosocial Perspectives, Attitude, Intention, Coping Mechanisms

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Abstract

Context: Objective: Foot ulcer is one of the diabetic complications that causes death in the world. Preventive behavior can be used to prevent diabetic foot ulcers. Therefore, this study aims at developing a model of diabetic foot ulcer prevention based on psychosocial, attitude, intention and coping mechanisms. The study used a cross-sectional study design to look at the relationship between variables using simple random sampling in 329 respondents, ages 18-85 years, who made an inspection visit at a health care center. The research instrument consisted of psychosocial variables namely knowledge and stress, attitude, intention, coping mechanisms, and foot ulcer prevention . Furthermore, the data were analyzed using SEM-PLS software. Results shows most of the respondents were in the youth category ages 18 - 65 years. Analysis of shows that there is a psychosocial influence on attitude T = 10,92, there is an effect of attitude on intention T = 2,43, there is an influence of intention on coping mechanisms T = 8,28, there is an influence of intention on Foot ulcer prevention T = 2,57, there is an influence of coping mechanisms on foot injury prevention T = 5,02. Knowledge, stress, attitude, intention and coping mechanisms contribute to prevent diabetes foot injuries. The Conclusions Knowledge, stress and attitude variables contributed the most indirectly to diabetes foot injury prevention. Contributions are directly affected by coping mechanisms and intentions.

Keywords: *Psychosocial, Attitude, Intention, Coping Mechanisms, ulcer*

Introduction

Diabetes mellitus (DM) is a non-communicable disease because of abnormalities of insulin secretion in beta cells, insulin action, or both.[1] Indonesia is one of the countries with the highest number of diabetic ranked 5th in the world.[2] Research conducted by Hena M. Shows that prevention of diabetic complications can be prevented by increasing behavior from subjective attitude to norms perceived control of behavior, knowledge and behavioral intentions.[3] This study aims to develop a model of diabeticfoot ulcer prevention based on psychosocial, attitude, intention, and coping mechanisms.

Material and Method

The study used a cross-sectional study design on 329 respondents from January 2019 to May 2019. Diabetic patients were selected using simple random sampling with the criteria for patients having ever / never diabetic foot ulcers at the age of 18-85 years.[2] The research variable was psychosocial that is consist of respondent's knowledge of diabetes and patient' stress that refers to the DDS (distress scale),[4]coping mechanisms refers to problem management and emotional regulation, attitude, intention, and Foot ulcer prevention. The research instrument was tested by a questionnaire and the result showed that it is valid and reliable.

Findings: Table 1 shows that the majority of respondents were young people aged 18 - 65 years, the majority were female (72,9%), most were high school education (67,8%), most were married (99,39%).

Table 1: Respondents' Charateristics diabetic patients

Characteristics	Classification	Frequency	Percentage	Mean ± SD Min - Max
Age :	Youths (18– 65 years)	306	93	Mean: 57,29
	Middle-aged adults (66 – 79 years)	19	5,8	SD : 8,88
	Elderies (80 – 99 years)	4	1,2	Min : 35
Sex	Male	89	27,1	
	Female	240	72,9	
Education Level	Higher Education	57	17,3	
	Senior High School	223	67,8	
	Elementary School/ Junior High School	34	10,3	
	Non-students	15	4,6	
Marital status	Married Single	327 2	99,39 0,61	

Table 2 shows that knowledge about DM is in most good category (89,4%), most did not experience the stress of 254 respondents (77,2%) and severe stress (1,4%). The experiential attitude was mostly in good category (53,5%), the instrumental attitude was mostly in poor category (54,1%), total attitude score was in most categories (56,5%). The intention scores were mostly high (51,4%), coping mechanisms for problem management indicators were mostly non-adaptive categories (52,6%), Emotional regulation indicators were mostly non-adaptive categories(57,1%), total preventing diabetic foot complications were mostly in the good category (52,9%).

Table 2: Psychosocial, attitude, Intention, coping mechanisms and Foot ulcer prevention for diabetic foot complications

Variable	Indicator	Category	Total	Percentage	Mean ± SD Min - Max
Psychosocial	Knowledge of DM	Low Moderate Good	3 32 294	0,9 9,7 89,4	93,26 ± 10,95 39 - 100
	Stress	Not stress Low Moderate High	254 40 31 4	77,2 12,2 9,2 1,4	13,64 ± 3,72 9 - 32
Attitude	Experiential attitude	Less Good	153 176	46,5 53,5	11,82 ± 1,66 6 – 18
	Instrumental attitude	Low Good	178 151	54,1 45,9	13,39 ± 1,80 8 - 16
Overall attitude score		Low Good	186 143	56,5 43,5	25,22 ± 3,02 18 - 32
Intention	Dietary	Low High	119 210	36,2 63,8	10,04 ± 1,33 6 - 12
	Physical Activity	Low High	121 208	36,8 63,2	6,73 ± 0,92 4 - 8

	Taking Medication	Low High	119 210	36,2 63,8	6,72 ± 0,87 4 - 8
	Blood glucose monitoring	Low High	119 210	36,2 63,8	6,76 ± 0,90 3 - 8
Overall intention score		Low High	160 169	48,6 51,4	30,27 ± 2,84 21 – 36
Copingmechanisms	Problem management	Non-adaptive Adaptive	173 156	52,6 47,4	26,60 ± 3,64 16,32
	Emotional regulation	Non-adaptive Adaptive	188 141	57,1 42,9	36,30 ± 4,72 22 – 44
Foot ulcer prevention	Diet	Low Good	176 153	53,5 46,5	6,17 ± 1,23 3 - 8
	Physical Activity	Low Good	164 165	49,8 50,2	12,76 ± 2,31 4 - 16
	Taking medication	Low Good	178 151	54,1 45,9	7,10 ± 0,99 4 - 8
	Blood glucose monitoring	Low Good	175 154	53,2 46,8	6,18 ± 1,22 3 - 8
Overall Foot ulcer prevention score		Low Good	155 174	47,1 52,9	32,27 ± 3,75 18 - 40

Table 3 shows that the psychosocial construct variables, attitude, intention, coping mechanisms, and preventive measures averaged above 0,5, T values above 1,96, Chronbach's Alpha scores> 0,6 are valid and reliable.[5]

Table 3: Cross Loadings with Convergent Validity and Reliability Result

Construct	**Indicator**	**Loading (λ)**	**T-statistics**	**Chronbach's Alpha**	**Information**
Psychosocial	Knowledge	0,96	49,48	0,96	Valid & Reliable
	Stres	0,97	93,73		
Attitude	Eksperiential attitude	0,96	106,11	0,96	Valid & Reliable
	Instrumen attitude	0,96	55,81		
Intention	Diet	0,98	62,32	0,97	Valid & Reliable
	Physical Activity	0,98	5,38		
	Taking medication	0,98	62,32		
	Monitoring	0,83	27,28		
Coping mechanisms	Problem management	0,95	24,41	0,92	Valid & Reliable
	Emotional regulation	0,90	40,57		
Foot complications prevention	Diet treatment	0,90	28,83	0,89	Valid & Reliable
	Physical Activity Action	0,71	41,89		
	Taking medication Action	0,75	9,01		
	Monitoring Action	0,86	28,42		

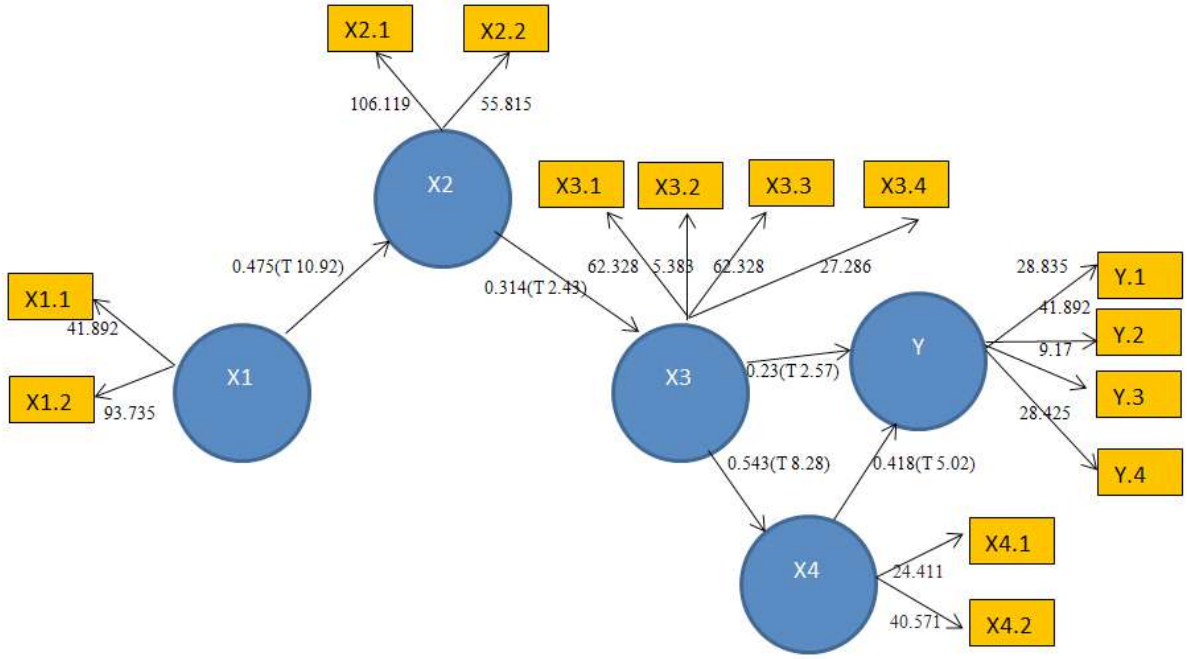

Figure 1: X1 = Psychosocial, X2 = Attitude, X3 = Intention, X4 = Coping Mechanisms, Y = foot complications prevention.

Discussion

1. **Psychosocial influence on attitude:** Figure 1 shows that there is a direct psychosocial influence on the attitude of patients in Gorontalo. Respondents reported the cause of the patient's stress because they had suffered complications to the foot and had an amputation of the toe. This condition causes patients to often think of their illness, which can trigger stress. Respondents report that stress not only affects the lives of individuals but can also trigger an increase in blood sugar. The results of research conducted by Tomayahu M. and Adam L that stress can increase blood sugar levels in diabetic patients. These results indicate that there is a significant relationship with stress with an increase in blood sugar levels.[6]

   Respondents reported an increase in knowledge and attitude since attending counseling on diabetic foot complications prevention. Research conducted by Khunkaew S. that low knowledge can reduce the attitude of diabetic patients towards patient blood sugar control.[7] This is reinforced by research conducted by Abbasi Y. F., et al., That knowledge has a significant relationship with increasing patient attitudes.[8]Diabetic patients report an increased knowledge can change the attitude of patients in preventing diabetic foot ulcers. This is indicated by positive changes in terms of experiential attitude in which patients report happy doing physical activity every day.

2. **Effect of attitude on intention:** Figure 2 shows the influence of attitude towards the intention to prevent diabetic foot ulcers. The results showed respondents reported rarely doing physical activity. Some respondents also reported that the implementation of the diet was not carried out to the maximum, did not carry out the diet continuously, and carried out the diet only at certain times. Respondents also reported having the habit of consuming sweet foods and drinks in the morning and evening. Nevertheless, the patient's attitude towards taking medicine is quite good, where the patient does not feel bored by taking diabetes medication every day. Diabetes medication is always taken every month in accordance with the stock of drugs given by the health center. According to Ajzen, I., & Fishbein, M. Behavioral intentions of someone in behavior are closely related to individual attitudes and normative beliefs about the behavior in question. If attitudes and beliefs are good, it will increase individual intentions in behavior.[9]This was confirmed by Lestarina W.N. that a positive attitude towards treatment has a significant relationship to the patient's blood sugar control. A positive

attitude that adheres to treatment will increase the intention to frequently control diabetes treatment.[10] This is in line with research conducted by Abbasi F.Y. that there is a significant relationship between attitude and practice for diabetes prevention.[8] A positive attitude of patients towards the prevention of diabetic foot complications can increase patient intention. Research conducted by Putri M. shows that there is a significant relationship between attitude and the intention of the elderly with diabetes in visiting health services.[11] This result shows that attitude gives the biggest contribution to increasing intention to prevent diabetic foot ulcers.

3. **Effect of intention on coping mechanisms:** Table 3 shows the loading factor no less than 0,6. Figure 1 shows that there is a significant effect on the coping mechanisms of the patient. According to Pinidiyapathirage J., et al., Intention is one of the strong predictors to improve patient coping.[12] Patient participation in the form of patient visits in health care facilities is one of the benchmarks evaluating the increase in patient intention to prevent diabetic foot complications.[13] Obstacles in visiting health facilities, including monitoring are the lack of patient intentions.[13]Some patients report a lack of intention in monitoring foot hygiene and blood sugar monitoring. According to patients, the intention to maintain foot hygiene is already there, but the implementation has not been maximized. This shows the intention to prevent diabetic foot complications has not reached the stage of action. According to Faries DM, many things can be done to realize intentions in action including increasing attitude, perceived norm, personal agency, self-efficacy.[14] According to him in realizing a diabetes prevention behavior is difficult to realize, especially related to diet, physical activity, taking medication and monitoring blood sugar.[14]The intention has a close relationship with improving coping mechanisms. A good coping mechanisms from an individual can control an unpleasant situation and increase the intention to run a diabetes treatment program. With a good coping mechanisms, it will be able to control situations that can cause stress.[15] If individual stress has occurred it can cause a lack of individual intention to prevent diabetic foot ulcers.

4. **Effect of intention on Foot ulcer prevention:** Figure 3 shows the influence of intention on the patient's actions to prevent diabetic foot ulcers. Some patients report having strong intention in woundmonitoring, and blood glucosemonitoring as it is quite high. This is demonstrated by participating in activities related to diabetes in-service facilities. Respondents reported that in addition to being carried out in service facilities once a month, patients also performed physical activities at home once a week. Some respondents reported experiencing obstacles in carrying out routine blood sugar checks as a result of less cost. This reason is one of the causes of the decrease in the intention of some respondents in taking action to prevent diabetic foot complications. The intention to carry out a diet is reportedly done well in the form of maintaining a daily diet with reference to 3J, namely the amount, hours and types of food. Research conducted by Braver D.N.R et al. that a change in a patient diet-related to food intake, fruit fat and fruit intake is strongly influenced by the patient's intention to take precautionary measures. If patient's intentions are good, it will produce a preventative measure for diabetic foot ulcers.[16] This study is strengthened by Lestarina WN which shows there is a significant influence on the intention with adherence and injured preventive in the form of periodic blood sugar control.[10] To produce good intentions, several elements that are very influential are needed, including the main factors are knowledge and skills to conduct a behavior. The second factor is that there are no obstacles to taking action.[17] Barriers can be from around individuals including families, barriers to distant service areas. With these obstacles, family support is needed to increase the patient's intention to prevent diabetic foot ulcers.

5. **Effects of coping mechanisms on diabetic foot complications prevention:** The results of Figure 1 show that there is an effect of coping mechanisms on diabetic foot ulcer prevention. Some respondents pointed out coping mechanisms in adaptive problem management. The adaptive response is indicated by examining a doctor or health care facility when experiencing signs of foot abnormalities. This shows the level of awareness of the complications is quite high. According to Okafor S.E., the importance of coping for individuals can improve behavior more adaptive to stress. The results of his study showed that good coping tended to show fewer depressive symptoms and increase positive behavior.[18] The results revealed that not all patients know the danger of diabetic foot ulcers, which lead to amputation. Some patients do not understand

that diabetic foot ulcers can be prevented by taking care of the feet. According to Pranoto A. Infection of wounds resulting from poor treatment causes gangrene in wounds caused by bacteria and aerobic clostridium. The degree of infection starts from first degree without infection to fourth-degree with severe infection accompanied by sepsis.[19] This is supported by research conducted by Amelia R. that good and correct treatment behavior in the feet can reduce the incidence of diabetic foot ulcers.[20]

Conclusion

Knowledge, stress and attitude variables contributed the most indirectly to diabetes foot injury prevention. Contributions are directly affected by coping mechanisms andintentions.

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Etichal Clearance: This study has been approved by the Ethics Commission of the Faculty of Nursing Airlangga University (number 1173-KEPK) with an explanation of informed consent given to respondents.

References

1. ADA. Standards of Medical Care in Diabetes-2018. Diabetes Care. The Journal Of Clinical And Applied Research And Education2018;41(9):2045–7.
2. Indonesia Demograpic Survey. 2017.
3. Muzaffar H, Chapman-Novakofski K, Castelli DM, Scherer JA. The HOT (Healthy Outcome for Teens) project. Using a web-based medium to influence attitude, subjective norm, perceived behavioral control and intention for obesity and type 2 diabetes prevention. Appetite [Internet]. 2014;72:82–9. Available at: http://dx.doi.org/10.1016/j.appet.2013.09.024
4. Polonsky WH et al. Assessing Psychosocial Distress in. Diabetes Care. 2005;28(3):626–31.
5. Latan H. Structural Equation Modeling Konsep dan Aplikasi Menggunakan Lisrel (Concepts and Applications Using Lisrel) 8.80. 2nd ed. Bandung Indonesia: Alfabeta; 2013.
6. Adam L, Tomayahu MB. Tingkat Stres Dengan Kadar Gula Darah (Stress Levels With Blood Sugar Levels). J Health Sport. 2019;1(1):1–5.
7. Khunkaew S, Fernandez R, Sim J. Linguistic and Psychometric Validation of the Thai Version of Simplified Diabetes Knowledge Scale: A Measure of Knowledge of Diabetes in a Thai Population. SAGE Open Nurs. 2018;4:237796081879184.
8. Abbasi YF, See OG, Ping NY, Balasubramanian GP, Hoon YC, Paruchuri S. Diabetes knowledge, attitude, and practice among type 2 diabetes mellitus patients in Kuala Muda District, Malaysia – A cross-sectional study. Diabetes Metab Syndr Clin Res Rev [Internet]. 2018;12(6):1057–63. Available at: https://doi.org/10.1016/j.dsx.2018.06.025
9. Ajzen I, Fishbein M. Attitudes and normative beliefs as factors influencing behavioral intentions. J Pers Soc Psychol. 1972;21(1):1–9.
10. Lestarina NNW. Theory of Planned Behavior sebagai Upaya Peningkatan Kepatuhan pada Klien Diabetes Melitus (as an Effort to Increase Compliance with Diabetes Mellitus Clients). Media Kesehatan Masyarakat Indonesia. 2018;14(2):201.
11. Putri NA, Pritasari D. The effect of nutrition education on knowledge, attitude, and food pattern of type 2 diabetes patients at Puskesmas Kecamatan Ciracas. 2017;2(2):54–64.
12. Pinidiyapathirage J, Jayasuriya R, Cheung NW, Schwarzer R. Self-efficacy and planning strategies can improve physical activity levels in women with a recent history of gestational diabetes mellitus. Psychology Health [Internet]. 2018;33(8):1062–77. Available at: https://doi.org/10.1080/08870446.2018.1458983
13. Hsieh YL, Lee FH, Chen CL, Chang MF, Han PH. Factors Influencing Intention to Receive Examination of Diabetes Complications. Asian Nurs Res (Korean Social Nursing Science)2016;10(4):289–94. Available at: http://dx.doi.org/10.1016/j.anr.2016.10.004
14. Faries MD. Why We Don't "Just Do It": Understanding the Intention-Behavior Gap in Lifestyle Medicine. Am J Lifestyle Med. 2016;10(5):322–9.
15. Chelse D. Cudmore. Parental Spiritual Coping With A Chronically Ill Child. East Carolina University; 2016.
16. Den Braver NR, de Vet E, Duijzer G, ter Beek J, Jansen SC, Hiddink GJ, et al. Determinants of lifestyle behavior change to prevent type 2 diabetes in high-risk individuals. Int J Behav Nutr Phys Act. 2017;14(1):1–11.

17. Rimer G & . Health behavior and health education, theory, research and practice. four. C. T Orleans; 2008.
18. Ebony S . Okafor A. College Of Human Sciences Influences Of Stressors On Coping Profiles And Depressive Symptoms: A Latent Profile Analysis Of Military Youth. 2014;
19. Pranoto A. Server Expert Day, Management of Diabetes With Hipertension in Elderly Patient. 2018.
20. Amelia R. Hubungan Perilaku Perawatan Kaki dengan Terjadinya Komplikasi Luka Kaki Diabetes pada Pasien Diabetes Melitus Tipe 2 di Puskesmas Tuntungan Kota Medan (The Relationship between Behavior of Foot Care and Diabetes Foot Injury Complications in Type 2 Diabetes Mellitus). Talent Conf Ser Trop Med. 2018;1(1):124–31.

Association of Syphilis and HIV among Indirect Female Sex Worker in Indonesia: Secondary Data Analysis of Integrated Behaviour Biological Survey in 2015

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Abstract

Background: Every day there are more than 1 million new cases of curable sexually transmitted infections (STIs) among people aged 15-49 years. Female sex workers (FSWs) are a key-affected population susceptible to acquiring HIV and sexually transmitted infections (STIs). Syphilis and human immunodeficiency virus (HIV) infections are diseases that can be transmitted through sexual contact, so it is not surprising that a person suffers from both at once. Syphilis was still considered an important cause of relation to the spread of infection HIV and it has been shown to increase HIV sexual transmission. The aim of this study is to determine the association of syphilis and HIV among IFSW in Indonesia in year 2015.

Method: This study was a cross sectional study with multistage random sampling (MRS) as a sampling method from Integrated Behaviour Biological Survey (IBBS) in 2015. The study was conducted 22 districts/ cities in 11 provinces of Indonesia. The respondents were 1,678 IFSWs aged 15-49 years old who were interviewed and willing to blood rapid test to determine the HIV and Syphilis status and never been tested for the HIV.

Results; Study showed prevalence of HIV was 1.9% and prevalence of syphilis was 2.2%. Respondents with positive syphilis were significantly about 8 times more likely to get HIV infection (8.4; 95%CI: 3.2- 21.8; p-value <0.001). Respondents with positive syphilis that inconsistency of condom use were significantly about 13 times more likely to get HIV infection (PR=12.7; 95%CI:3.0-56.7). The combination of syphilis, education, knowledge about HIV and age decreased the risk to 8.2 (3.2 – 21.6) with p-value <0.001.As stratified by age and education, all respondents with positive syphilis that younger less than 30 years were significantly about 15 times more likely to get HIV infection (PR=14.4; 95%CI 5.2 – 46.0).

Conclusions: There was association between syphilis positive and HIV positive. Respondents with positive syphilis that inconsistency in condom use, low education and younger less than 30 years were significantly increased the risk of HIV infection among IFSWs.

Keywords: *HIV AIDS; Syphilis; Condom; IFSW; IBBS.*

Introduction

New HIV infections have been reduced by 40% since the peak in 1997. It has been estimated that there were approximately 37.9 (95% CI 32.7 to 44.0) million people worldwide people living with HIV in 2018; among them, 1.7 (1.4 to 2.3) million were new HIV infections. In Indonesia, HIV prevalence of people living with HIV among adults (15–49 years) was 0.4% and 46.000 people were newly infected with HIV and 38 000 people died from an AIDS-related illness[1,2].

Indonesia's HIV epidemic is still concentrated

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among specific key populations (direct and indirect female sex workers, people who inject drugs, men who have sex with men, transgendered people, and high-risk men. There has been a shift in the proportion of injection through injecting drug users (IDUs) as the primary mode of transmission to sexual transmission in Indonesia. Based on the IBSS 2015 result showed that prevalence of HIV was 60.6% through sexual behaviours[2,3].

According to data released by World Health Organization (WHO), every day there are more than 1 million new cases of curable sexually transmitted infections (STIs) among people aged 15-49 years[4]. STIs spread predominantly through unprotected sexual contact, including vaginal, anal and oral sex. Furthermore, it has been well established that the presence of STI in sex partners increases significantly the rate of HIV transmission among sex partners. Reported cases of syphilis continue to be characterized by a high rate of HIV co-infection. According to the National AIDS Commission (KPAN), STI sufferers have 2-9 times greater risk of contracting HIV compared to non-sufferers.

Female sex workers (FSWs) are a key-affected population susceptible to acquiring HIV and sexually transmitted infections (STIs), as well as transmitting the virus to others. UNAIDS stated that the risk of acquiring HIV is 21 times higher for sex workers worldwide[1]. According to the results of a meta-analysis by Baral et al, 2012, FSWs were 13.5 times more likely to be infected with HIV than women of the same reproductive age in low- and middle-income countries[5]. Syphilis and human immunodeficiency virus (HIV) infections are diseases that can be transmitted through sexual contact, so it is not surprising that a person suffers from both at once. Syphilis was still considered an important cause of relation to the spread of infection HIV and it has been shown to increase HIV sexual transmission[6,7].

Sex work has been defined as the provision of sexual services in exchange for money, goods, or other benefits. Sex work is usually classified as "direct" (open, formal) or "indirect" (hidden, informal). Direct FSW (DFSW) are typically women who do define themselves as sex workers and earn their living by selling sex. Indirect FSW (IFSW) are women for whom sex work is not the first source of income. They may work as waitresses, hairdressers, tailors, massage girls, street vendors, or promotion girls and supplement their income by selling sex on a regular basis or occasionally. They do not consider themselves as sex workers and often work outside of known venues for sex work. Therefore, they are even more difficult to reach than women known as direct sex workers[8,9].

The absence of relevant information association syphilis and HIV infection in IFSW populations in Indonesia makes the author feel the need to conduct this study in order to recommend effective interventions to reduce the prevalence of IFSW infected by HIV in Indonesia. Understanding the real situation and specific characteristics of IFSW, such as its socio-demographic characteristic would help the relevant stakeholder to implement stronger and more specific strategies, policies and programs. The aim of this study is to determine the association of syphilis and HIV infection among IFSW using the IBBS (Integrated Biological and Behavioural Surveillance) data in 2015.

Method

This study is based on retrospective analysis of IBBS among IFSW.IBBS survey was cross-sectional in design with multistage random sampling (MRS) as a sampling method. Conducted in 22 districts/cities in 11 provinces of Indonesia. The study population in this study were female aged 15 years or older who have had commercial sex with at least one customer in the past month and were present at the survey site during the survey team visit at the selected survey area such as (bar, massage parlours, salon, etc.), never been tested for HIV prior to the survey and completeness of serological HIV and syphilis status. Totally there were 3.152 interviewed respondents. However, 1.475 respondent were excluded since they have HIV testing prior to the survey. The total number of respondents following both interview and HIV rapid blood testing were only 1.678 people.

A standardized structured questionnaire was used to collect information. The collection of information about behaviour and socio-demographic were done by interviews while the collection of biological data is done through venous blood collection. The syphilis examination was carried out with RPR and TP rapid while anti-HIV with rapid test. Collecting, editing and analysing data IBBS 2015 using software STATA (v.12, StataCorp). The effect between the independent and dependent variables in this study determined by Prevalence Ratio (PR) with confidence intervals (CI) 95% and estimated using Cox Regression Model in constant time. Final model with variables only showing significant associations with HIV (p-value <0.05).

Ethical Considerations: Ethical clearance for this study was obtained from the Research Ethical Committee Faculty of Public Health Universitas Indonesia (No: 129/H2.F10/PPM.00.02/2014).

Results

Of 3,153 respondents, we excluded 1,475 respondents since they ever been tested for HIV prior to the survey conducted. 1,678 completed HIV rapid serologic test and among those completed the test, 32 respondents (1.9%) were identified as HIV-positive individuals. Among 1,678 respondents who completed blood examination for sexually transmitted infections (STIs),36 individuals (2.2%) were found positive for Syphilis, 397 individuals (31.5%) were found positive for Chlamydia, 147 individuals (11.9%) were found positive for Gonorrhoea. Most of respondents were aged <30 years(61.2%), high education (59.2%), Married/ Divorced/Widowed (72.4%), currently living with friends/family/permanent partner or others (53.4%), have child (63.6%). (Data not shown).

Of the respondents, 88.2% had good essential HIV knowledge; 50.4% have perception of HIV susceptibility; 75.2% never had experienced Condom Breakout within past 3 months; 54.2% had Alcohol consumption within past year; 65.7% of those had sexual contacts with commercial sex partner, did not use condom consistently; 88.3% had Vaginal Douching, 87.4% had Injected drugs within past year;82.3% had never Attended a meeting or discussion related to HIV. (Data not shown)

We conduct stratification analysis of condom use consistency, education and age. As compared to consistency of condom use with commercial sex partner, all respondents with positive syphilis that inconsistency of condom use were significantly about 13 times more likely to get HIV infection (PR=12.7; 95%CI:3.0-53.7). As compared to education, all respondents with positive syphilis that low education were significantly about 15 times more likely to get HIV infection (PR=14.9; 95%CI 3.7 - 60.2). However, all differences of PRs between strata were not significant bot for consistency of condom use and education. As compared to age, respondents with positive syphilis that younger less than 30 years were significantly about 15 times more likely to get HIV infection (PR=15.4; 95%CI 5.2 – 46.0). The differences of PRs between strata were significant for the age stratification result. (Table 1).

Table 1: Stratification Analysis of Syphilis and HIV Status

Variable		PR Strata (95% CI)	PR Crude (95% CI)	Adjusted PR (95% CI)	P-value Test Homogeneity	ΔPR (%)
Consistency condom use with sex commercial	Inconsistent	12.7 (3.01 – 53.7)	8.3 (3.4 - 19.9)	7.8 (2.5 - 24.50	0.379	6
	Consistent	4.4 (0.6 – 30.7)				
Education	Education High	5.9 (1.9 - 18.5)	8.3 (3.4-19.9)	7.9 (3.3-18.9)	0.312	5
	Education Low	14.9 (3.7 - 60.2)				
Age	< 30 years	15.4 (5.2-46.0)	8.3 (3.4-19.9)	7.4 (3.1-17.7)	0.119	12
	≥ 30 years	4.1 (1.002-16.7)				

The two different models of multivariate analysis adjusting for relevant potential confounders showed consistent positive associations between syphilis infection and occurrence of HIV infection. The adjusted PRs of the two models of associations for the syphilis infection were 7.7 (95% CI: 2.1-28.5) and 7.5 (95% CI: 2.5 – 22.9) respectively. **(Table. 2).**

Table 2: Cox model of association between Syphilis and the HIV infection

Model	PR (95% CI)	P-Value
Model 1 (Full/ Initial Model): Syphilis, Gonorrhoea, Age, Education, Marital Status, Knowledge Of HIV, Consistency Condom use With Sex Commercial, Injected Drug, Condom Breakout, Perception of HIV Susceptibility	7.7 (2.1-28.5)	0.035
Model 2 (Reduced/Final Model): Syphilis, Gonorrhoea, Age, Education, Marital Status, Knowledge of HIV, Injected Drug	7.5 (2.5 – 22.9)	0.003

Discussion

From 3,153 respondents, we excluded 1,475 respondents since they had ever been tested for HIV prior to the IBBS survey. This was done to assure temporal sequence between the behaviours as the risk factors and the HIV status as the outcome. In this study we found that the prevalence rate of HIV among eligible participants was 1.9% and prevalence rate of Syphilis among eligible participants was 2.2%.

In this study, we found heterogenous effects of Syphilis towards HIV infection, across strata/ categories of variables of condom use consistency, education and age of respondents, although the heterogenicities across strata were not statistically significant. Respondents with positive syphilis who inconsistently used condom were significantly 13 times more likely to get HIV infection (PR=12.7; 95%CI:3.0-56.7), while respondents with positive syphilis with consistent condom use were significantly 4 times more likely to get HIV infection (PR=4.4; 95%CI: 10.6.0-30.7). Several studies in other countries show similar patterns[10,11,12,13]. Research conducted by Isac et al. India, showed that the prevalence of HIV infection and high-titre syphilis among FSWs have steadily declined with increased condom use[14].

Syphilis is a disease caused by the bacterium Treponema pallidum. Actually, the mechanism of T. pallidum coinfection and HIV cannot be fully understood, but many experts believe that the coinfection begins with T. pallidum infection[15,16]. Syphilis transmission is possible due to inoculation of abrasion due to sexual contact resulting in skin or mucous layer erosion, and then after a period of time it will produce inflammation and genital ulcers which are important factors for HIV transmission. This event is followed further by the spread of treponema through regional lymph nodes and hematogenously through blood stream to other parts of the body[15,16]. Syphilis and HIV infection are both transmitted sexually diseases. Other studies demonstrated that STIs including syphilis was associated with an increased risk of HIV acquisition[17,18].

The reduce models of our multivariate analysis, adjusting for several relevant potential confounders such as Gonorrhoea infection, Age, Education, Marital Status, Knowledge of HIV, Drug injection,showed consistent positive associations between syphilis infection and occurrence of HIV infection. The adjusted PRs of the reduce/ final model of associations between syphilis and HIV infection was 7.5 (95% CI: 2.5 – 22.9) with p-value 0.003.

We found respondents with positive syphilis with age less than 30 years were significantly 15 times more likely to get HIV infection (PR=15.4; 95%CI: 5.2 – 46.0). However, the differences of PRs between strata were not significant. Similar results were reported by other studies conducted by Medhi et al, showing that young age possessed high vulnerability to STIs including to Syphilis[17]. Unlike our results, Halatoko et al. in Togo, found that FSWs aged 30 and over were 5.95 times more likely to be infected with Syphilis[18]. This result could be partly explained due to preventive behaviours practised by the individuals as their age increased. Our study indicated that many infected individuals did not know their infection status, engaged in high-risk behaviours and practices, and perceived themselves as having low risk of HIV infection. They were more likely to spread the virus to their clients and sexual partners. Targeted HIV prevention and treatment programs should be urgently developed and implemented for this IFSW population.

Limitation of the study is self-reported of risk factor may lead respondents to over-reporting the condom use. Self-reported sexual behaviour in the face of social stigmatization and discrimination (toward FSW) might have led to social desirability bias.

Conclusions

There was association between syphilis and HIV infection. Syphilis infection increased the risk of HIV. Respondents with positive syphilis having inconsistency in condom use, low education and younger than 30 years were significantly increased the risk of HIV infection. Integrated prevention program is really needed considering that both Syphilis and HIV could be prevented in almost similar way. The HIV program need to reach IFSW in their earlier age, as they are more vulnerable to HIV infection during that very active sexual period.

Conflict of Interest: The authors declared that no competing interest.

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References

1. UNAIDS. Global HIV & AIDS statistics — 2019 fact sheet [Internet]. UNAIDS; 2019; [cited 2019 Dec 01]. Available from: https://www.unaids.org/en/resources/fact-sheet
2. Ministry of Health RI. Laporan Perkembangan HIV-AIDS dan PIMS di Indonesia Triwulan IV Tahun 2018 [Internet]. Jakarta: Ministry of Health RI; 2018. [cited 2019 November 01]. Available from: https://siha.depkes.go.id/portal/Perkembangan Kasus HIV AIDS dan PIMS#.
3. Ministry of Health RI. Kajian epidemiologi HIV Indonesia [Internet]. Jakarta: Direktorat Jenderal Pencegahan dan Pengendalian Penyakit; 2016. Ministry of Health RI; 2019; [cited 2019 November 01]. Available from: https://www.siha.depkes.go.id/portal/files_upload/KAJIAN_EPIDOMIOLOGY_HIV_INDONESIA_2016.pdf
4. WHO. More than 1 million new curable sexually transmitted infections every day [Internet]. WHO; 2019; [cited 2019 Dec 01]. Available from: https://www.who.int/news-room/detail/06-06-2019-more-than-1-million-new-curable-sexually-transmitted-infections-every-day
5. Baral S, Beyrer C, Muessig K, Poteat T, Wirtz AL, Decker MR, et al. Burden of HIV among female sex workers in low-income and middle-income countries: a systematic review and meta-analysis. Lancet Infect Dis. 2012;12(7):538–49X.
6. Røttingen JA, Cameron DW, Garnett GP. A systematic review of the epidemiologic interactions between classic sexually transmitted diseases and HIV: how much really is known? Sexually transmitted diseases. 2001;28:579–597.
7. Goh BT. Syphilis in adult. Sex Transm Infect 2005; 81: 448-52.
8. The World Bank. 2013. The Global HIV Epidemics among Sex Workers. International Bank for Reconstruction and Development/The World Bank.
9. Harcourt, C. and B. Donovan (2005). "The many faces of sex work." Sexually Transmitted Infections 81(3): 201-206.
10. Adeagbo, O. and E. Tambo (2017). "HIV and Sexually transmitted Infections Co-infections amongst Sex Workers in the Southern African Economic Region." Annals of Tropical Medicine and Public Health.
11. Majid, N., et al. (2010). "Syphilis among female sex workers in Indonesia: need and opportunity for intervention." Sexually Transmitted Infections 86(5): 377-383.
12. Magnani, R., et al. (2010). "Sexual risk behaviours, HIV and other sexually transmitted infections among female sex workers in Indonesia." Sexually Transmitted Infections 86(5): 393-399.
13. Szwarcwald CL, Damacena GN, de Souza-Júnior PRB, et al. Factors associated with HIV infection among female sex workers in Brazil. Medicine (Baltimore). 2018;97(1S Suppl 1):S54–S61.
14. Isac S, Ramesh BM, Rajaram S, et al. Changes in HIV and syphilis prevalence among female sex workers from three serial crosssectional surveys in Karnataka state, South India. BMJ Open 2015;5:e007106. doi:10.1136/bmjopen-2014-007106
15. Greenblatt R. M., Lukehart S. A., Plummer F. A., et al. Genital ulceration as a risk factor for human immunodeficiency virus infection. AIDS. 1988;2(1):47–50.
16. Zetola NM, Klausner JD. Syphilis and HIV infection: an update. Clin Infect Dis. 2007;44(9):1222–1228.
17. Medhi, G. K., Mahanta, J., Hazarika, I., Armstrong, G., Adhikary, R., Mainkar, M., & Paranjape, R. S. (2013). Syphilis infection among female sex workers in Nagaland, Northeast India: Analysing their vulnerability to the infection. International Journal of STD & AIDS, 24(3), 193–199.
18. Halatoko WA, Landoh DE, Saka B, et al. Prevalence of syphilis among female sex workers and their clients in Togo in 2011. BMC Public Health. 2017;17(1):219.

The Knowledge of the Use of the Contraceptive Method among Married Men with Fertility Age 15-54 Years (Analysis of IDHS 2017 Data)

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Abstract

Context: The use of contraceptive is one of programs to suppress birth rate in some countries. To complete the target of Sustainable Development Goals (SDG) in 2030, some programs are launched and one of them is family planning initiated by Indonesian government, namely Keluarga Berencana (KB). The program has been implemented since 1970 until now. The KB program has got changes and innovation. Nowadays, the impact of the KB program has shown the good result where the fertility of Indonesian population is getting decreased to 2.3 based on World Population Data Sheet. However, among the success of the program, the program has many problems in Indonesia. The study aims to know and to determine whether there is an influence of knowledge about contraceptive method with the men's fertility marked by owning some children, based on the result of Indonesia Demographic Health Survey (IDHS) in 2017. The study used secondary data from the result of IDHS 2017 and cross sectional study. The study used secondary data from the result of IDHS 2017 with 9668 samples which are married men. Multivariate analysis of the study was Logistic Regression Analysis. The multivariate analysis shows that the related variable means variableof knowledge about contraception with OR value, 3.90 after getting controlled byvariables of age, education, and wealth. Based on the results of multiple logistic regression analysis, knowledge about contraception method is significantly related to fertility.

Keywords: *Knowledge; Contraception; KB program; IDHS*

Introduction

Nowadays, the growth of population in the globally is getting increased, especially in developing countries where the population growth increasing fast. It is contrast to the mature of the young population as productive age to fulfill the standard living related to the work, income, consumption patterns, and so on. To solve the increase of population rate in the world, whole world has cooperated and established an agreement, namely Sustainable Development Goals (SDG) that launched in 2018 and hopefully realized in 2030. Indonesia has program to suppress the birth rate and it has been implemented since 1970.(1) The government of Indonesia has given reaction to the problem and overcomes it through the planning family program, namely Keluarga Berencana (KB).(2) In implementing the program to the society, there is the concept of Norma Keluarga Kecil Bahagia dan Sejahtera (NKKBS) applied. Based on Law number 52 of 2009 concerning population development and family development states that family development is an effort to create a quality family that lives in a healthy environment; where child birth is regulated, the ideal distance and age for birth, regulating pregnancy, through the process, protection and assistance in accordance with reproductive rights to create quality families. The success of KB program can also be found out from the decrease of Total Fertility Rate (TFR) in Indonesia based on SDKI data in 1991. The TFR of Indonesia in 1991 was decreasing 3 times continuously on subsequent surveys.(3)

Based on the latest data (SDKI 2017 data), TFR of Indonesia in on 2.3. SDKI data in 2012 showed that the trend of the contraceptive prevalence has tended to increase since 1991-2012 (3.0-2.6) while the trend of fertility rate of TFR tends to decrease. The trend indicates that the increasing of national fertility rate did

not fulfill the target of Indonesian TFR. Comparing to the Rencana Pembangunan Jangka Menengah Nasional (RPJMN) target in 2014, contraceptive prevalence rate (CPR) has exceeded the target with the achievement of 61.9%, but the TFR has not reached the target yet.[4][5] In spite of the decreasing target from 2012-2017 (2.6 to 2.3), it has reached yet the target set by the government is 2. The high birth rate in developing countries is enable to be explained by various factors included: the absence and the low of education level, gender inequality, the high mortality rate, child labor, and the ineffective use and awareness of modern contraception.[6][7] The problem related to the knowledge and eastern culture where everything is dealt with by the household is the responsibility of the wife and the husband responsibility is to earn money for living; and whether it is also related to the knowledge and the attitude of husband who does not pay attention about the use of KB contraceptive as the control of birth declared by the government; or there is perception that the problem is the business of the wife.[8][9][10] Therefore, the researcher is interested to conduct the study to find out the relation between the knowledge of contraception method among merried men with fertility at the age of 15-54.[11]

Subjects and Method

The research design was a quantitative study and used secondary data of SDKI 2017 data. The subjects of the study were married men who were 15-54 years old and were samples of SDKI 2017. The recapitulation result of early study were 10.009 men, after getting cleaning data, the samples were 9668 men who got further processing data. The analysis method of the study was multiple logistic regression analysis.[12]

Results

Table 1: The characteristic of respondent

Characteristic	Categories	N	Percentage (%)
Age	15-34	3026	31,3
	35-54	6642	68,7
Education	No education-Secondary	8221	85,0
	Higher	1447	15,0
Residence	Urban	4921	50,9
	Rural	4747	49,1
Wealth	Poorest- poorer	3853	39,9
	Middle - Richest	5815	60,1
Knowledge of contraception	No	112	1,2
	Yes	9556	98,8
Perception of men about contraception	Disagree	6205	64,2
	Agree	3463	35,8
Fertility	< 1	646	6,7
	≥ 1	9022	93,3

The table of characteristic of respondent showed there were 9668 respondents where the most respondent were 6642 respondents of age 35-54 years old (68,7%). Most respondents also have education in elementary school-senior high school, 8221 respondents (85,0%). Besides that, respondents living in the rural place are 4747 (49,1%). Moreover, most respondents have economic status are average-rich, 5815 respondents (60,1%). Most respondents also have knowledge about good contraceptives, 9666 (98,8%). Furthermore, almost respondents do not agree that contraceptives are women business as many as 6205 respondents (64,2%); and fertility marked by owning children and the respondents have ≥ 1 children, 9022 respondents (93,3%).

Table 2: Chi-Square Test (Bivariate selection)

Variables	P-Value	Odds Ratio
Knowledge of KB program	0,001	4,025
Residence	0,264	0,883
Wealth	0,150	1,190
Education	0,000	1,688
Age	0,000	0,180
Perception of KB program	0,318	0,892

Table 3: The model of the early analysis of multiple logistic regression

Variables	Early P-Value	Early Odds Ratio	CI 95 %	
			Lower	Upper
Knowledge of KB program	0,001	4,025	1,745	9,281
Residence	0,264	0,883	0,710	1,098
Wealth	0,150	1,190	0,939	1,508
Education	0,000	1,688	1,298	2,195
Age	0,000	0,180	0,146	0,220
Perception of KB program	0,318	0,892	0,713	1,117

Table 2 showed the result of the bivariate selection on each variable by noticing the result of p-value on each

variable that there were 4 variables which were enable to go to the next step of multivariate with p-value, such as: variables of knowledge of KB program, wealth index, education, and age.

Table 4:The model of the final analysis of multiple logistic regression

Variables	Final P-Value	Final Odds Rasio	CI 95 %	
			Lower	Upper
Knowledge of KB program	0.001	3,900	1,68	9,00
Residence	-	-	-	-
Wealth	0.038	1,262	1,01	1,57
Education	0.000	1,738	1,34	2,25
Age	0.000	0,180	0,14	0,22
Perception of KB program	-	-	-	-

Multivariate analysis used logistic regression analysis. The results of analysis showed that variables related to fertility were the variable of knowledge about contraception method (p-value). Besides that, covariate variables also having impact to fertility were wealth, 0.038 (p-value <0.05); education, 0.000 (p-value <0.05); and age, 0.000 (p-value <0.005). The result of analysis on final Odds Ratio (OR) each variable were the variable of knowledge (3.90), the variable of wealth (1.26), the variable education (1.73), and the variable of age (0.18).

Discussion

Based on the results of multivariate analysis with multiple logistic regression analysis, the knowledge about the contraception method was significantly related to the fertility of men with p-value <0.05 and OR value 3.90. It means that men having low knowledge about the types of KB program method have ratio of 3.90 times to have more children than the men having the knowledge about the types of KB program method. Other controlled variables, they have significantly good value where p-value <0.05 with OR of each controlled variable. The variable of wealth is OR value of 1.26 where men whose high wealth only have ratio of 1.26 than the men whose low wealth. The men whose high education have ration of 1.73 times to have more children than the men not whose high education. The men who are >35 years old have ratio of 0.18 to have high fertility than the men who are <35 years old. Moreover, the variables of perception about KB program and residence do not significantly give the impact because the p-value>0.05.

The high birth rate in developing countries is enable to be explained by various factors included: the absence and the low of education level, gender inequality, the high mortality rate, child labor, and the ineffective use and awareness of modern contraception.[6]The control of high birth rate is not only concerned by health workers, but also all parties involved, a married couples (husband and wife) on how to find out the useful information by participating the programs held by the government through health public, especially to the couples of childbearing age about knowledge and health education related to the use of contraceptives devices and the important method of contraception.[13] Therefore, the main purpose of the research is to find out or to identify whether there is an influence of knowledge about contraceptive method with the men's fertility as preventive service to the society through various health education about KB program as the preventive step on how the couples of childbearing know the important of couples commitment related to the use of KB program in controlling birth. The birth rate is not only the responsibility of health workers but also it is responsibility of couples (husband and wife) as the main actor.[14]If couples and health workers are able to cooperate, it is not impossible that the birth rate in Indonesia can be at a set standard so that it will have a good impact on the quality of human resources in various of life. The knowledge of contraception method is interfered by wealth, education, and age variables with the statistically significant result and the value of OR showed the effects of the variables. The study used secondary data of SDKI 2017 data so that it had several limitations such as the existence of bias (random error and systematical error) and the limitation research variables. Besides that, there were some respondents who did not answer the question, so that researcher excluded them because they were not included to inclusion criteria what the researcher wanted.

Conclusion

The result of study is the data which is useful to describe the characteristic from knowledge level to the perception of KB program. Based on the results of multiple logistic regression analysis, knowledge about contraception method is significantly related to fertility. Suggestions for this problem, the increasing of preventive efforts by cooperating with community leaders or stakeholder in the regions in some activities/ events, even formal activities (school, health service, and so on) and informal activities (social media, influencers, and so on);socialization and education must

be kept doing in the whole region of Indonesia in efforts to promote health and health education about the use of contraception method by providing more concerned counseling to the couples of the childbearing age.

Conflict of Interest: The Authors declare no conflicts of interest

Source of Funding: Self

Ethical Clearance: The use of the IDHS 2017 data has got permission/license from BKKBN (the state institutions BKKBN as a representative of the Indonesia government administering the IDHS 2017) via online/ website of IDHS 2017. It is also approved to get access the data in March 31st 2019.

References

1. Sumini S, Abritaningrum YT. Tren Pemakaian Alat Kontrasepsi Di Indonesia 1991-2012. Populasi. 2015;23(1):36–50.
2. Perilaku P, Pakai P, Sdki AD, Agrianti D, Sutiawan R. Alat / Cara Kontrasepsi Menurut Wilayah di Indonesia Patterns and Differences in Contraceptive Drop Out, Failure, and Switching by Regions in Indonesia (Analysis of Indonesia Demographic Health Survey 2012) Abstract Pendahuluan penduduk setiap tahunny. 2012;
3. Survey H. Demographic and Health Survey 2010-11.PdfIndonesia Central Bureau of Statistics; the National Family Planning Coordinating Board and the Ministry of Health. 1991. Indonesia Demographic and Health Survey 1991. Jakarta; Indonesia: BKKBN; BPS; and Kemenkes; 1991.
4. info datin,(7) Pusat data dan informasi Kementerian Kesehatan Republik Indonesia [Internet]. Indonesia: Situasi Kesehatan Reproduksi Remaja; c2014 [cited 2019 Feb 09]. Available; https://www.kemkes.go.id › download › infodatin reproduksi remaja-ed.
5. Rizkianti A, Amaliah N, Rachmalina R. Penggunaan Kontrasepsi pada Remaja Perempuan Kawin di Indonesia (Analisis Riskesdas 2013). Bul Penelit Kesehat. 2017;45(4):257–66.
6. Juayire CA. Regional Institute For Population Studies Legon Knowledge Of Ovulatory Cycle And Current Fertility Among Women In. 2016;(July).
7. Tang J, Gao X, Yu Y, Ahmed NI, Zhu H, Wang J, et al. Sexual Knowledge, attitudes and behaviors among unmarried migrant female workers in China: a comparative analysis. 2011;
8. Sukeni NN. Keywords : State, Women, and Family Planning Pogram. 1957;1–17.
9. Skirbekk V, Samir KC. Fertility-Reducing Dynamics of Women'S Social Status and Educational Attainment. Asian Popul Stud. 2012;8(3):251–64.
10. Ming M. Status sosial ekonomi dan fertilitas: J Kesehat Nasional\. 2012;12(121):1–12.
11. Kesehatan D. 2017 Survei Demografi, (1) National Population and Family Planning Board - BKKBN, Statistics Indonesia - BPS, Ministry of Health - Kemenkes, and ICF. 2018. Indonesia Demographic and Health Survey 2017. Jakarta, Indonesia: BKKBN, BPS, Kemenkes, and ICF. 2017;
12. Iwan A. Besar dan Metode Sampel ada Penelitian Kesehatan. Jurusan Biostatistik dan Kependudukan, Fakultas Kesehatan Masyarakat, Universitas Indonesia.;
13. Skrzeczkowska A, Heimrath J, Surdyka J, Zalewski J. Knowledge of contraceptive method among adolescents/young adults. Polish J Public Heal. 2018;125(3):144–8.
14. Singh S, Samara R. Early Marriage among Women in Developing Countries. Int Fam Plan Perspect. 1996;22(4):148–157+175.

Preliminary Study: Reliability and Validity of CFM-1 Form as Physical Literacy Assessment Instrument

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Abstract

Context: This study aimed to determine reliability and validity of newly developed physical literacy assessment instrument named CFM-1. For the inter-tester reliability sixty two respondents (37 males, 25 females) aged 21.97 ± 0.54 years old with 2 years basics sports science background voluntarily participated. All respondents were given detailed explanations on CFM-1 instrument, and introductory on physical literacy using the online module developed. Respondents were shown videos of similar action (throwing) but from five different children aged 5-6 years old. Upon completing the viewing, respondents were then asked to rate the performance of the child in the video using CFM-1 instrument. Similar protocol was repeated with all the respondents for the second time. CFM-1 rating given by the respondents were then recorded and analyzed. Validity was determined based on qualitative comparisons with characteristics of physical literacy described in definition of term accepted worldwide.Results showedfor reliability, Cronbach's Alpha α was 0.767 for motivation, 0.524 for knowledge, 5.733E-14 for confidence, 0.475 for understanding and 0.712 for overall physical competence. For physical competence Likert Scale of 1-5, reliability Cronbach's Alpha α was 0.826. The CFM-1 instruments can be said as reliable to be used for physical literacy assessment, with good reliability observed for all psychomotor and affective domain of learning involved, but some modification in term of the method of testing may need to be clarified and adjusted (especially for the cognitive part of the test - knowledge and understanding). Overall CFM-1 is valid and has an acceptable range of reliability level as an instrument for physical literacy.

Keywords: *physical literacy, childhood, adulthood, assessment, reliability*

Introduction

Physical literacy is not a new concept. In fact, physical literacy should be considered as the essence of physical education for all age groups. Widely accepted definition of physical literacy consist the element of motivation, knowledge, confidence, understanding and physical competence when performing any physical activity or exercises[1-6].

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An individual can be said as physically literate when they have the motivation to consistently pursue physical activity. At the same time that motivation is supported by the know how or knowledge, which will ensure the activity perform is safe, correct technique and effective. With the knowledge, then it will contributes towards the confidence in doing the skill and understanding on why it should be done. With all those four elements, then it comes to the psychomotor and physical ability in ensuring the movement can be performed with competence. When an individual possess all of this, the assumption is that they will be able to be active for life. This is physical literacy by definition.

Based on those definition, one can actually start to assess and monitor their physical literacy level. There are several studies that have quantify the reliability

and validity of instruments for physical literacy assessment[7-12]. However, the number of studies currently still limited in numbers, with many more improvements can be done with all the instruments.

One of the limitation of the currently available instruments is that it is limited in term of usage, where it can only be used with specific types of movement and for certain age group only. This limitation may be due to the fact that most of the instruments accept the understanding that physical literacy is only for children, at the beginning phase of their physical growth.

For the purpose of this study, the accepted understanding is that physical literacy is something that should not be limited only to early childhood[13]. Thus the instrument developed and tested is actually to be used from childhood up to adulthood. One part of physical literacy is physical competence, and physical competence in any movement or activity will have their progress or digress period. Can we said that an older adult which used to be competitive athletes but now unable to even perform simple hop as still physically literate?

Physical literacy also should not be limited only to fundamental movement skills (FMS) such as running, jumping, hopping and many more. But it should be dependable on what is the goal or purpose of the movement or activity.

For these reasons, a new instrument has been developed with code named CFM-1. In order to determine it reliability and validity, this study was conducted.

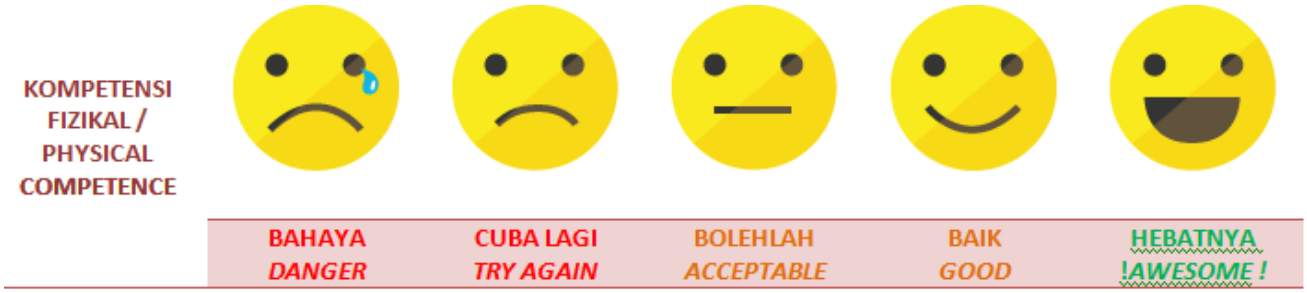
Method

Experimental Approach to the Problem:

Reliability: The test-retest method was used to determine the inter-tester reliability of the CFM-1 instrument.

Validity: Validity was determined based on qualitative comparisons with characteristics of physical literacy described in definition of term accepted worldwide.

Penilaian Celik Fizikal Malaysia (CFM1)



Subjects: Sixty two respondents aged 21.97 ± 0.54 years old with 2 years basics sports science background voluntarily participated. Out of the 62 respondents, 37 were male. All participants were still active in sports participation either recreationally as an athlete or in coaching positions (personal trainer / assistant sports coach etc).

Instrument: The newly developed physical literacy assessment form name CFM-1 (dual English and Malay language) and Malay language physical literacy module[14]were used. Five videos recorded by the researcher's showing actual overhead ball throwing action by children aged 5-6 years old were used together with the CFM-1 form. The video also includes the verbal communication process happening between the children and the instructors (researchers' team).

How to use CFM-1:

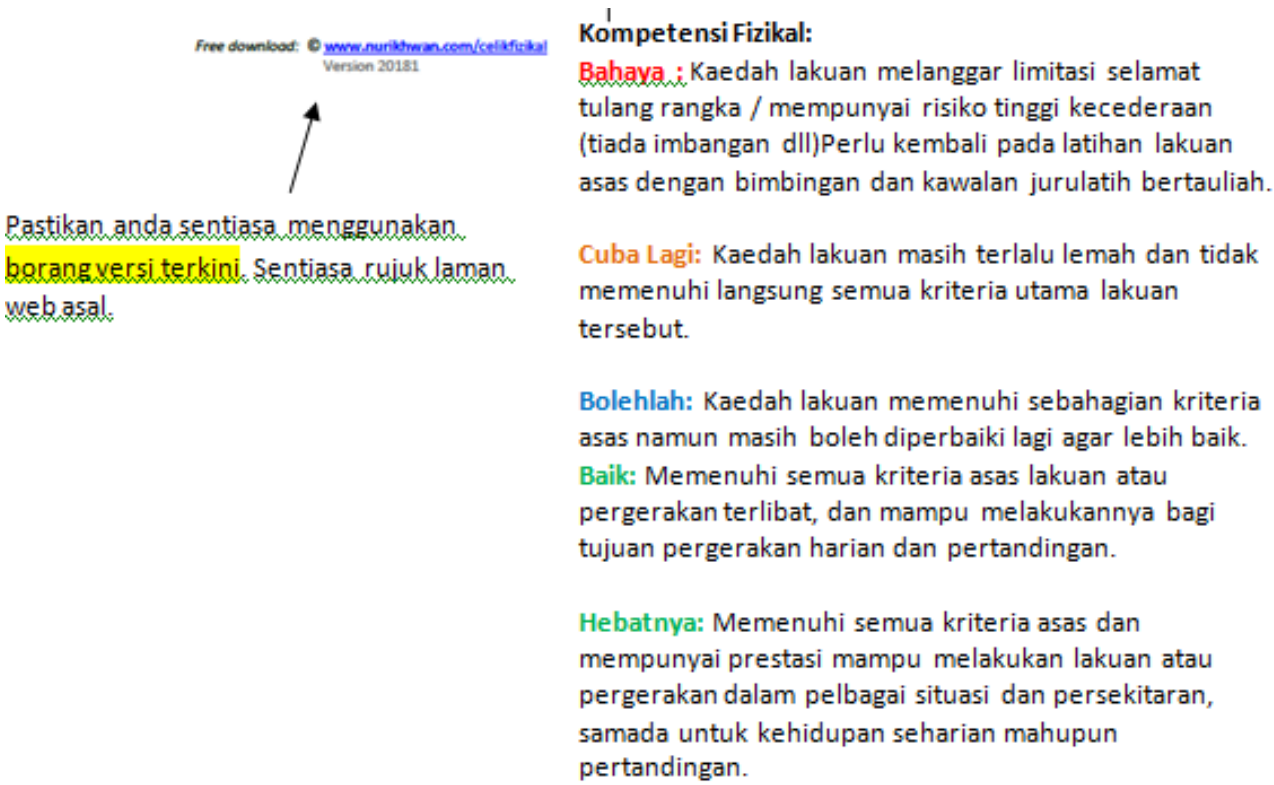


Figure 1: On the left is the original CFM-1 form, and on the right is the CFM-1 form with usage instructions.

Procedures: For the reliability assessment, all respondents were given detailed explanations on CFM-1 instrument, and introductory on physical literacy using the online module developed. The respondents were then given the opportunity to ask any questions pertaining to their understanding on the explanations. After all respondents confirms their understandings, they were then shown videos of similar action (overhead ball throwing) but from five different children aged 5-6 years old. Upon completing the viewing, respondents were then asked to rate the performance of the child in the video using CFM-1 instrument. Similar protocol was repeated with all the respondents for the second time within 15 days time interval. CFM-1 rating given by the respondents in both occasions were then recorded and analyzed.

Ball throwing action: General guidelines given to all respondent is that the rule of thumb for overhead ball throwing is the success of the child to throw the ball towards the next person waiting to catch it in front of them. Second to that, an excellent throw will means the ball reach the intended destination and person with appropriate ball speed and target (within range direct to hand for easy catch). Thirdly, the mechanics of throwing performance should not violate any proper biomechanics of movement in relation to musculoskeletal function and form. And fourthly, the most excellent throw should incorporated whole body motion indication transfer of force direct from the ground (ground reaction force) towards the throwing hand.

Validity was only determined based on qualitative comparisons with characteristics of physical literacy described in definition of term accepted worldwide[1,4,6,8,15].

Data Analysis: The CFM-1 utilized the thumbs-up and thumbs down icon for five overall assessment related to motivation, knowledge, confidence, understanding and physical competence. More comprehensive ratings on physical competence were also asked using five smiley faces depicting five qualitative ratings, which were then assigned into Likert Scale rating system. Figure 2 indicates how the qualitative assessment icons be made into quantitative values. All quantitative values were then recorded in a Microsoft Excel sheet for further statistical analysis.

Qualitative Icon	Quantitative Ratings	Qualitative Respond	
	**2** marks	Yes.	
	**1** marks	No.	
			Likert Scale
	**1** marks	Danger	**Strongly disagree** with the ability to perform the action safely and effectively.
	**2** marks	Try Again	**Disagree** with the ability to perform the action safely and effectively.
	**3** marks	Acceptable	**Slightly Disagree** with the ability to perform the action safely and effectively.
	**4** marks	Good	**Agree** dengan with the ability to perform the action safely and effectively.
	**5** marks	Awesome!	**Strongly agree** with the ability to perform the action safely and effectively.

Figure 2. Marking system for CFM-1 form. Qualitative ratings descriptors with their respective quantitative ratings

Statistical Analysis: Means and standard deviations were used to represent centrality and spread of data for all performance measures. The intra-class correlation (ICC)one-way random analysis was used to determine the inter-rater reliability when performing assessment using CFM-1 form together with Cronbach's Alpha to measure internal consistency between all of respondents.

Results

First time assessment with scale of 1 (YES) or 2 (NO), for throwing action respondents mean ± standard deviation's rating was 1.87 ± 0.34 for motivation, 1.76 ± 0.43 for knowledge, 1.98 ± 0.13 for confidence, 1.94 ± 0.25 for understanding and 1.87 ± 0.34 for overall physical competence. For physical competence Likert Scale of 1-5, with 5 most excellence, the first session's rating was 3.71 ± 0.55.

For the second time assessment,respondents' average rating was 1.89 ± 0.32 for motivation, 1.74 ± 0.44 for knowledge, 2.00 ± 0.00 for confidence, 1.89 ± 0.32 for understanding and 1.76 ± 0.43 for overall physical competence. For physical competence Likert Scale of 1-5, with 5 most excellence, the second session's rating was 3.68 ± 0.59.

For reliability, Cronbach's Alpha α was 0.767 for motivation, 0.524 for knowledge, 5.733E-14 (ICC single and average measures = 0.000) for confidence, 0.475 (ICC = 0.309 single measures, 0.472 average measures) for understanding, 0.712 (ICC = 0.525 single measures, 0.689 average measures) for overall physical competence.

For physical competence Likert Scale of 1-5, reliability Cronbach's Alpha α was 0.826 (ICC = 0.707

single measures, 0.828 average measures). The CFM-1 also has been found valid to be used for physical literacy assessment purposes.

Table 1

Domains	Session 1 Mean ± SD	Session 2 Mean ± SD	Cronbach's Alpha α	ICC	
Motivation	1.87 ± 0.34	1.89 ± 0.32	0.767	S	0.626
				A	0.770
Knowledge	1.76 ± 0.43	1.74 ± 0.44	0.524	S	0.362
				A	0.531
Confidence	1.98 ± 0.13	2.00 ± 0.00	5.733E-14	S	0.000
				A	0.000
Understanding	1.94 ± 0.25	1.89 ± 0.32	0.475	S	0.309
				A	0.472
Physical Competence	1.87 ± 0.34	1.76 ± 0.43	0.712	S	0.525
				A	0.689
Comprehensive Ratings for Physical Competence	3.71 ± 0.55	3.68 ± 0.59	0.826	S	0.707
				A	0.828

* S=ICC single measures; A=ICC average measures

Table 1. Average ratings given by respondents to the overhead ball throwing performance for one single video selected out of five videos for the purpose of this test. For this study α coefficient between 0.65 and 0.8 is considered as "Good", with below 0.5 considered as "Unacceptable". For ICC values: < 0.5 poor reliability, values between 0.5 and 0.75 moderate reliability, values between 0.75 and 0.9 good reliability, and values greater than 0.90 indicate excellent reliability.

Discussion and Conclusion

Out of all six test items listed in Table 1, the "Understanding" item's reliability level based on Cronbach's Alpha is the lowest and below acceptable level. This indicates that current method of use for CFM-1 need to be improved and rectify as it seems not able to determine the understanding domain of physical literacy. Understanding level was determined by asking questions such as "Do you know why we need to do this?" and/or "Do you know how to do this?". However, as it was verbally asked with some on-site modifications by the tester in order to make it understandable to the involved very young kids, it may have been hard to be interpreted (either they understood or not, as not every kids will answer directly yes or no) by respondents that watch the video of the communication happening shortly prior the activity. Due to this, CFM-1 form may not be reliable enough to assess understanding level among 5-6 years old children.

As for the comprehensive physical competence which was based on 5-level Likert scale, the reliability level can be considered as excellent. For other items rated based on thumbs-up (yes = 2-points) or thumbs- down (No = 1-point) icon, the overall physical competence and motivation domains showed good level of reliability. The knowledge domain on the other hand, indicated that it has a very low level of reliability, nearly falls in the same reliability level as "understanding" domain. Again, it may in the end depends on the acceptance or perception of the respondent (tester), on what constitute as knowledgeable. Some may assume that able to perform or able to say yes or nodded their head will simply means they have the knowledge, but others may be looking for more comprehensive assessment of knowledge.

In conclusion, the CFM-1 instruments can be said as reliable to be used for physical literacy assessment, with no problems in term of reliability observed for all psychomotor and affective domain of learning, but some modification in term of the method of the test be conducted may need to be clarified and adjusted (especially for the cognitive part of the test - knowledge and understanding).

Practical Applications: The CFM-1 instruments when used to assess literacy level in any types of physical movement or exercise or activity, should always be accompanied by itemized criteria of what can be said as a excellence performance level for it.

This criteria can either be obtained from any resources related to that particular movement or activity, or can be developed by the assessor based on their own experience and knowledge. Most important to always ensure that the goal of the movement is clearly accepted and understood by the assessor and the participant. The used of quantitative marking system is not compulsory to be used, as if the records are kept based on actual CFM-1 form provided, future quantitative statistical analyses is always possible. Marking system for thumbs up and thumbs down in future will be changed into 1 and 0, instead of 2 and 1 marks. This makes it easier for tester to use as it goes well with qualitative description which said yes or no.

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Conflict of Interest: Nil.

References

1. Edwards LC, Bryant AS, Keegan RJ, Morgan K, Jones AM. Definitions, foundations and associations of physical literacy: a systematic review. Sports Medicine. 2017;47(1):113-26.
2. Longmuir PE, Tremblay MS. Top 10 research questions related to physical literacy. Research quarterly for exercise and sport. 2016;87(1):28-35.
3. Thompson WR. Now trending: worldwide survey of fitness trends for 2014. ACSM's Health & Fitness Journal. 2013;17(6):10-20.
4. Whitehead 1 M. The concept of physical literacy. European Journal of Physical Education. 2001;6(2):127-38.
5. Whitehead M. Physical literacy: Throughout the Lifecourse: Routledge; 2010.
6. Whitehead M. Definition of physical literacy and clarification of related issues. ICSSPE Bulletin. 2013;65:29-34.
7. Almond L. Serious flaws in an FMS interpretation of physical literacy. Science & Sports. 2014;29:S60.
8. Belanger K, Tremblay MS, Longmuir PE, Barnes J, Sheehan D, Copeland JL, et al. Physical literacy domain scores in Canadian children meeting and not meeting Canada's Physical Activity Guidelines: 1322 June 2, 945 AM-1000 AM. Medicine & Science in Sports & Exercise. 2016;48(5S):345.
9. Longmuir PE, Boyer C, Lloyd M, Yang Y, Boiarskaia E, Zhu W, et al. The Canadian Assessment of Physical Literacy: method for children in grades 4 to 6 (8 to 12 years). BMC Public Health. 2015;15(1):767.
10. Longmuir PE, Boyer C, Lloyd M, Borghese MM, Knight E, Saunders TJ, et al. Canadian Agility and Movement Skill Assessment (CAMSA): validity, objectivity, and reliability evidence for children 8–12 years of age. Journal of sport and health science. 2017;6(2):231-40.
11. Sum RKW, Ha ASC, Cheng CF, Chung PK, Yiu KTC, Kuo CC, et al. Construction and validation of a perceived physical literacy instrument for physical education teachers. PloS one. 2016;11(5):e0155610.
12. Uys M, Grobler MN, Naidoo N, Tremblay MS, Lambert E. Validation of key components of the Canadian Assessment of Physical Literacy (CAPL) in 10 year-old South African children. Journal of Physical Activity & Health. 2014;11:S205-S6.
13. Jones G, Stathokostas L, Wister A, Chau S, Young B, Clark P, et al. Physical Activity Literacy: A Model for Older Adults. Journal of Aging and Physical Activity. 2016;24:S19-S.
14. Mohamad NI, Othman N, Hamezah R. Konsep Asas Celik Fizikal. Tg Malim, Perak: Sultan Idris Education University; 2018.
15. Tompsett C, Burkett B, McKean M. Development of physical literacy and movement competency: A literature review. Journal of Fitness Research. 2014;3(2):53-74.

Perceived Dimensions of Service Quality on Patient Satisfaction and Loyalty in Healthcare Context: A Systematic Approach

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Abstract

Context: This research demonstrates a model for conducting an empirical study in the health clinic to enhance the efficiency of service quality. The aim of this research is to systematically identify and review structural effects of service quality on patient satisfaction and loyalty in healthcare context. The method of this research followed the guidelines of the PRISMA statement. The search was conducted in Scopus database between 2010 and 2019. The studies included 27 articles for the synthesis. The results found that several number of service quality dimensions on patient satisfaction and loyalty were investigated. Therefore, this study is focused on four dimensions: infrastructural quality, procedural quality, interactional quality and personnel quality. This research also suggested the structural relationship model between service quality dimensions on patient satisfaction and loyalty in health clinic. The article concludes with suggested future research work.

Keywords: *Conceptual framework, healthcare, patient loyalty, patient satisfaction, service quality.*

Introduction

Improving the quality of healthcare services has become an important and critical issue, many hospital managers are working to improve the quality of healthcare. The 11th Malaysia Plan 2016-2020 states that the standard and the quality of healthcare will be further enhance and improve system delivery for better health results. However, according to study by (1) stated that the healthcare industry continuously faces inefficient management system, administrative inefficiency, inadequate human resources and steep regulatory compliance. When searching for ways to enhance service quality and to select the best choice, it is essential to consider infrastructure, processes, people and policy criteria (2).

In order to look for acute care with high expectations of quality health services, the healthcare industry needs to find ways to ensure excellence in delivering performance and patient satisfaction(3). Therefore, these challenges are necessary to maintain high standards of care and handle services performance. Patient satisfaction is an important element in the healthcare quality and a major indicator of achievement in the medical sector(4).

In the healthcare industry, health clinics in Melaka provide the same kinds of service, but they are distinguished based on the quality of service. Patient loyalty to health clinic is therefore a significant promotional instrument for sharing service quality in Melaka's health clinic with other people. According to (5), the emphasis on loyalty is growing because patient satisfaction leads to an rise in the organizational image. While the connection between the ideas in question, there is a gap in marketing literature linked to the effect of service quality aspects on patient satisfaction, loyalty to health clinics, particularly in the healthcare industry.

The providers of healthcare can be classified in primary, secondary and tertiary care (6). The main health centers, community health centers and district hospitals are typically primary and secondary organizations. Many researchers have studied the healthcare service in hospital. However, not much work has been done to determine the quality of healthcare services in

terms of infrastructure, procedures, international and clinical staff. This service quality is intended to assess the quality of service perceived by the customer. As a results, Melaka's health clinic is considered primary health centers to address this gap.

The purpose of this research is to systematically identify and review the following:

- Structural dimensions of service quality on patient satisfaction and loyalty in healthcare context.
- To develop a future research model of the service quality in healthcare context on patient satisfaction and patient loyalty

Methodology

Reporting Systematic Review: In order to collect significant information for the determination of healthcare service quality dimensions in the literature, this study have developed according to the Preferred Reporting Items for Systematic review and Meta Analyses (PRISMA) guidelines and flow diagram by(7) as shown in Figure 1. The process involved steps such as identification process, screening process, eligibility criteria and the final selection of articles.

Identification Process: This section includes selection of records using various database searched and additional records through other sources. Other resources included relevant studies recommended by experts. A systematic search using database such as Emerald insight, Science Direct, Taylor and Francis, IEEE and Springer that are in Scopus and Web of Science index was carried out. Criterion of time duration was based on the limited knowledge between year 2010 and 2019. The following key terms were used for search purposes: healthcare service quality; health quality; health service; primary healthcare and/or patient loyalty.

Screening Process: For the screening process, PRISMA guidelines were followed which checked the database search outcomes for duplication using Mendeley software. Every duplicate item has been removed. Abstracts have been read, and full- text surveys have been thorough.

Eligibility Criteria: The articles using quantitative, qualitative or mixed method studies were considered for systematic review. However, combined keywords were used to narrow the search which only included English language and peer-review article. Studies were also selected if they complied with each of the following criteria:

1. Focusing on measuring dimensions of service quality of healthcare
2. Tested any theoretical framework related to patient satisfaction and loyalty
3. Assessed any association between health service quality, patient satisfaction and patient loyalty
4. Discussing models or instruments or tools used for measuring service quality in healthcare
5. Addressing development or application of a measurement tool or model or instrument and referring to the primary healthcare.
6. Availability of full access by the researcher

   Studies that were not considered for this review include organizational reports, editorials, book chapters, reviews, comments, conference abstracts or proceedings and letters that can suffer less rigorous review processes. Moreover, excluded studies that did not mention precise sampling technique adequately, studies of patient satisfaction or loyalty with specific health diseases or facilities and studies highlighting hospital performance that did not contain empirical evidence.

Data Analysis: A summary of the included studies' characteristic was described. This study did not attempt to collect the data for a meta-analysis. Data have therefore been narratively synthesized. Therefore, for better comparison of studies, an evidence table was manually generated.

Results and Discussion

Selection of Articles: Studies that did not meet the eligibility criteria or not relevance to the present study were excluded from the next stage of review. Moreover, studies of which full texts were not found were excluded from this stage. Then, detailed information on the service quality dimensions in healthcare context and development of measurement instruments were obtained.

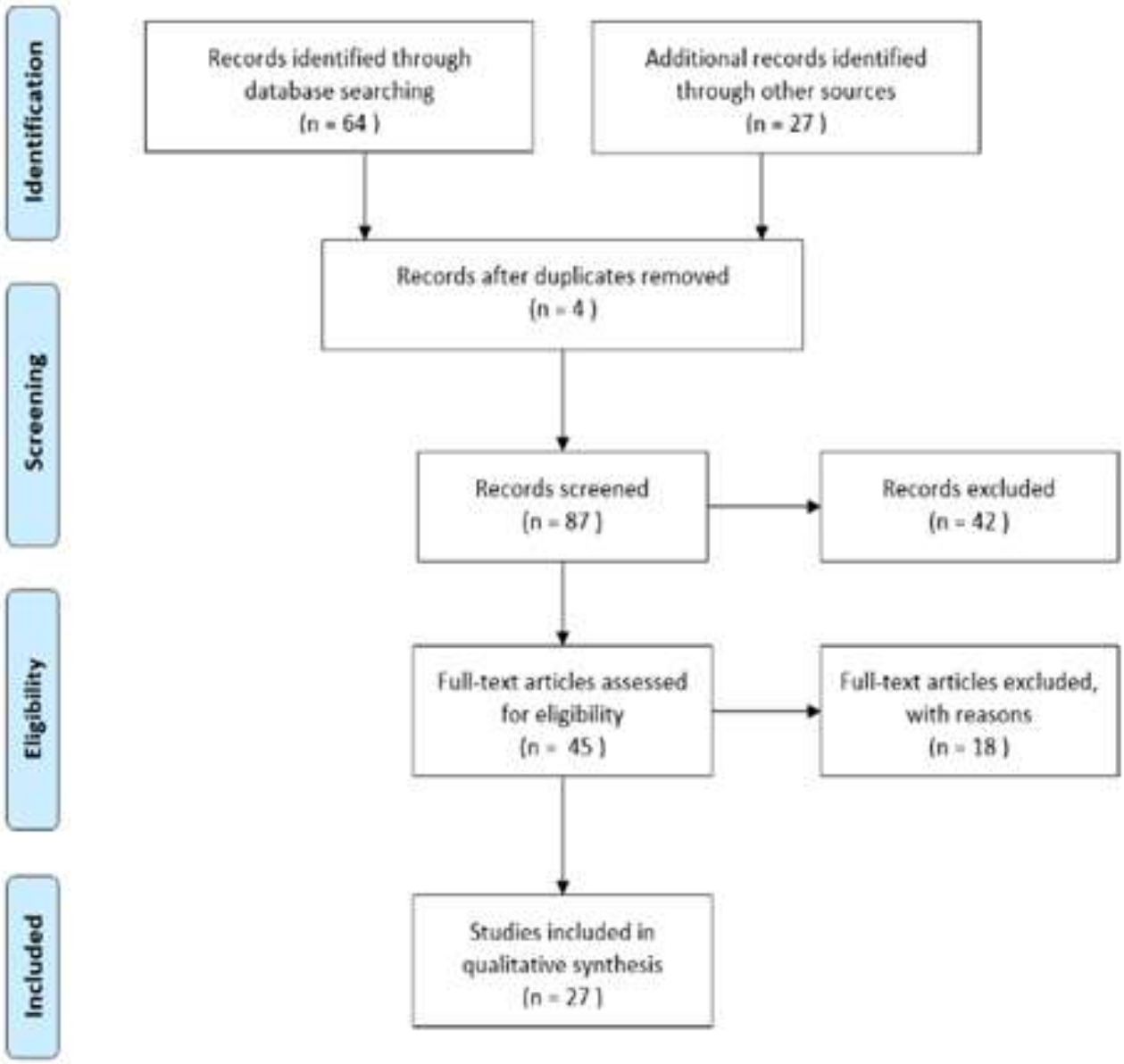

Figure 1: A Flow Diagram of study selection

Findings: The initial searches in this study identified 64 titles and abstracts. Some 4 articles were duplicates owing to the same articles emerged in the selected database. Then, this study had 87 titles and abstracts for the eligibility criteria after elimination of the duplicates. 42 articles were removed from the list of eligible. This study retained 45 potentially eligible full articles and the eligibility criteria were applied. Moreover, the approach to service quality dimensions was applied to all the full articles to check the instruments. This study included 27 articles for the synthesis and the remaining articles (n = 18) were excluded due to did not mention precise sampling technique adequately, studies of patient satisfaction or loyalty with specific health diseases or facilities and studies highlighting hospital performance that did not contain empirical evidence. A flow diagram of study selection is shown in Figure 1.

This review study, four dimensions of the service quality in healthcare have been recognized, which could have played a role on patient satisfaction and patient loyalty including infrastructural quality, procedural quality, interactional quality and personnel quality.

Infrastructural quality: Infrastructural quality relates to the feeling of patients about the physical equipment in the healthcare industry to promote service

delivery (6). Moreover, the infrastructure dimension implies that the facility should have appropriate construction and facilities as indicated by(2). On the other hand, infrastructural dimension in this study is similar to tangibles, healthscape, physical environment, facility quality, and tangibility or image. From the previous studies concluded that physical environment has potential influence on patient satisfaction. Hence, the items under each dimension were grouped.

Healthcare providers therefore need to know the infrastructure characteristics that customers require for their environment, accessibility and resource availability, as well as tangible service facilities such as equipment, appearance, hygiene and other physical facilities.

Procedural Quality: Procedural quality relates to the impression of patients regarding the management of the provision of health care. Moreover, procedural quality is the second major field that the healthcare industry should manage as stated by(8), which address essential administrative functions like admission, waiting time, follow up and patient safety that are associated with medical treatment.

The health industry can never be rated higher for its service delivery without adequate procedural quality management. Therefore, procedural quality dimension evaluates admission, patient safety, waiting time, and follow-up. Health executives must know that procedural quality is the anticipated fundamental level of service for hospitals and clinics.

Interactional Quality: Interaction quality refers to patients' impression about the interaction or communication with clinic staff during the treatment. Moreover, interaction quality represents the dyadic relationship between the client and the staff or service personnel. It is included as the second primary dimensions. In other words, this means that interaction quality is a subjective view of the delivery of the service and represents the perception of the interactions that are performed during the service meeting.(9)model of functional quality is a comparable to that dimension.

Within the literature studies, the important of staff quality is well supported(10). In this dimensions,(8) divided the concept of interactional quality into three sub-dimensions which are staff attitude, personalized attention and information availability. These three sub-dimensions are similarly explained by(2)which include knowledge, manner and skills. The interaction between healthcare personnel like doctors and nurses with patients is best assessed by these dimensions, as they cover the most significant elements of the provision of service.

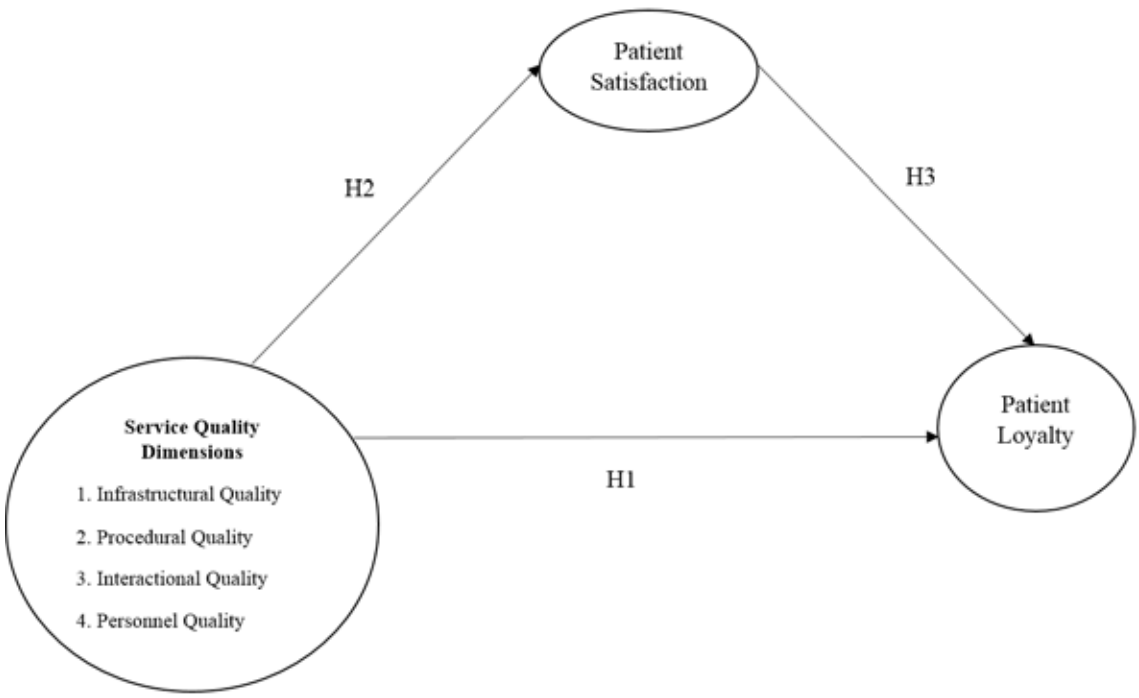

Figure 2: A Proposed Model of Research

Personnel Quality: Personnel quality refers to patients' impression about skills and ability of clinic staff during the interaction. Moreover, the interaction between patient, medical and administrative staff is performed by personnel service. During the service, attitudes and behaviors of the employees can affect patient perceptions (11). Employees should also be pleased with high-contact services to satisfy the client.

Quality of personnel plays a significant role in patient service assessment. Some of the research shows that the quality of personnel substantially affects the general satisfaction of the patient (12–15).

The patient develops favorable emotional reactions that contribute to a favorable word in the mouth as an interaction consists of interpersonal components. So that, the service quality of personnel is directly linked to patient satisfaction. Hence, personnel quality dimension evaluates staff competency, trustworthiness and staff diversity.

Conceptual Framework: On the basis of the literature review, several prior research has been examined on the Service Quality (SQ), Patient Satisfaction (PS) and Patient Loyalty (PL). The researcher aims at analyzing of the relationship between SQ and PL. And mediating role of PS is also assessed between SQand PL. This model is called the suggested research model as shown in Figure 2.

Conclusion

As conclusion, the outcome of this study will provide better understanding of healthcare service quality dimensions. This is because, service quality plays an important role in healthcare industries. Although healthcare providers can make decision that would increase the patient satisfaction of all relevant groups. This paper has made an empirical study to identify the relationship between SQ and PL and mediating role of PS. Thus, the relationship can be seen clearly after the result has been analyzed. Moreover, research hypotheses are being created on the basis of the proposed model and a previous study. Then, develop the questionnaire is the next step of this research to be used to collect the data from pilot study. In short, self-administered questionnaire survey will be used as the quantitative approach to collect data.

Recommendation: The future study is to see which aspects of quality of healthcare facilities influence patient satisfaction and loyalty that can assist government pay more attention to enhancing the quality of service in public clinic or hospital. Furthermore, this study suggested that there is a need to employ experimental study design to detect true causal relationship and more studies on cultural and socio-economic differences affect patient satisfaction and loyalty.

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References

1. Aziati AHN, Hamdan NSB. Application of queuing theory model and simulation to patient flow at the outpatient department. In: Proceedings of the International Conference on Industrial Engineering and Operations Management. 2018.
2. Wuri P, Nizar A, Indahati P. Strategic hospital services quality analysis in Indonesia. Expert Syst Appl. 2015;42:3067–78.
3. Musa H, Li SCH, Abas ZA, Mohamad N. Adoption Factor of Mobile Marketing: The Case of Small Medium Enterprises in Malaysia. Int Rev Manag Mark [Internet]. 2016 Aug 1 [cited 2019 Nov 21];6(7):112–5. Available from: https://dergipark.org.tr/tr/pub/irmm/issue/32101/355627
4. Shabbir A, Malik SA, Malik SA. Measuring patients' healthcare service quality perceptions, satisfaction, and loyalty in public and private sector hospitals in Pakistan. Int J Qual Reliab Manag. 2016 May 3;33(5):538–57.
5. Fatima T, Malik SA, Shabbir A. Hospital healthcare service quality, patient satisfaction and loyalty: An investigation in context of private healthcare systems. Int J Qual Reliab Manag. 2018;35(6):1195–214.
6. Swain S, Kar NC. Hospital service quality as antecedent of patient satisfaction – a conceptual framework. Int J Pharm Healthc Mark. 2018;12(3):251–69.
7. Moher D, Liberati A, Tetzlaff J, Altman DG.

Preferred reporting items for systematic reviews and meta-analyses: the PRISMA Statement [Internet]. Vol. 3, Open Medicine. 2009 [cited 2019 Jul 12]. Available from: https://www.scienceopen.com/document_file/3f7c7c08-5151-4dd4-9ef0-0bdb01ebea7d/PubMedCentral/3f7c7c08-5151-4dd4-9ef0-0bdb01ebea7d.pdf

8. Swain S, Kar NC. Hospital service quality as antecedent of patient satisfaction – a conceptual framework. Int J Pharm Healthc Mark. 2018;12(3):251–69.
9. Grönroos C. A Service Quality Model and its Marketing Implications. Eur J Mark J [Internet]. 1984;18(4):36–44. Available from: https://doi.org/10.1108/EUM0000000004784//doi.org/10.1108/07363769510095270%22%3Ehttps://
10. Abas ZA, Ramli MR, Desa MI, Saleh N, Hanafiah AN, Aziz N, et al. A supply model for nurse workforce projection in Malaysia. Health Care Manag Sci [Internet]. 2018;21(4):573–86. Available from: https://link.springer.com/article/10.1007/s10729-017-9413-7
11. PAI YP, Chary ST. Measuring patient-perceived hospital service quality : a conceptual framework. Int J Health Care Qual Assur. 2016;29(3):300–23.
12. Sumaedi S, Gede Mahatma Yuda Bakti I, Rakhmawati T, Astrini NJ, Widianti T, Yarmen M. Indonesian public healthcare service institution's patient satisfaction barometer (IPHSI-PSB): A new public healthcare patient satisfaction index Article information. Int J Product Perform Manag [Internet]. 2016 [cited 2019 Apr 24];65(1):25–41. Available from: https://doi.org/10.1108/IJPPM-07-2014-0112
13. Altaf M, Tabassum N, Mokhtar SSM. Brand equity and the role of emergency medical care service quality of private cardiac institutes: An empirical investigation. Int J Pharm Healthc Mark. 2018;12(1):44–60.
14. Lupo T. A fuzzy framework to evaluate service quality in the healthcare industry: An empirical case of public hospital service evaluation in Sicily. Appl Soft Comput J [Internet]. 2016;40:468–78. Available from: http://dx.doi.org/10.1016/j.asoc.2015.12.010
15. Shabbir A, Malik SA, Malik SA. Measuring patients' healthcare service quality perceptions, satisfaction, and loyalty in public and private sector hospitals in Pakistan. Int J Qual Reliab Manag. 2016;33(5):538–57.

Caring Behavior Improvement Model on Nursing Students at the Health Polytechnic of Ministry of Health, Pangkalpinang

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Abstract

Context: This study aims to establish models and measures of caring behavior in nursing students at the Health Polytechnic of the Ministry of Health, Pangkalpinang. The research method used is a quantitative method with survey techniques in phase I, and experiments by making a book as an experimental tool with the design of the One Group Pre-test Post-test for stage II. Furthermore, the data analyzed by qualitative method in stage III. The sample consisted of 69 students; asa combination of first-year and second-year students. This study revealed that the Compassion variable influenced the formation of Competence, whereas the Conscience and Commitment variables did not affect the formation of Competency. Meanwhile, overall, the variable Compassion, Conscience,Commitment, and Competence influence the formation of Caring Behavior.

Keywords: *Behavior, caring, health polytechnic, nursing, students*

Introduction

The 2030 Sustainable Development Goals Agenda (SDGs) in the health sector sets some goals to ensure a healthy life and promote prosperity for all people of all ages[1]. This goal causes health efforts need to find techniques in improving health services and make the latest technological discoveries under the development of science[2]. In nursing practice, human or patient is an object of a nursing care service and care is the basis or foundation in providing nursing care.

Nursing is a form of professional service that has a paradigm which includes four components: human, health, environment, and the nurse itself. Nurses are a noble profession because they require patience and calmness in serving patients who are suffering from illness. A nurse must be able to serve patients wholeheartedly, understand the problems faced by clients, and look attractive. For this reason, a nurse needs the ability to pay attention to others, intellectual, technical, and interpersonal skills that reflected in caring behavior[3].

Caring is essential for nursing and is a focus for nursing practice. Caring behavior is also crucial for growth and development, improve, and improve the condition or way of life for humans[3]. Caring is also an attitude of respecting others, paying attention, and learning someone's likes and how someone thinks and acts. Providing caring is simply not just an emotional feeling or behavior since caring behavior aims and functions are to build social structures, outlook on life, and cultural values of each person that is different in one place[3]. Then the performance of nurses, especially in caring behavior, becomes significant in influencing service quality and patient satisfaction, especially in hospitals, where service quality determines the image of service institutions, which in turn can increase patient satisfaction and service quality[3]. In some extent, the effect of nurse services could be directly related to patient satisfaction[4], and recovery[3,5].

Therefore, it is needed not only professional skills that understand all forms of nursing activities, but students are also required to have caring behavior to provide quality nursing services and prevent nurses from misuse of health services[6].Caring behavior in various studies is the essence of nursing and is related

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to the structure of knowledge and theory that nursing students learn during their education and is shaped by the way nurses carry out their practices[7]. The formation of caring behavior in a nurse begins when he decides to become a nurse and is measured in dedication as a nurse in carrying out duties by using all the professional knowledge learned and the number of moral norms and values[8].

Method

This research used quantitative survey techniques and continued with experiments by writing a manual book. Experiments carried out in one group, without a comparison, by holding a pre-test and post-test, to determine the effects of the treatment, so that the magnitude of the effects of the experiment can be certainly known. The testing of caring behavior is monitored by preceptors when students do field practice. Furthermore, interviews were conducted with students, study program managers, and stakeholders. The population and sample in this study were all Pangkalpinang Health Polytechnic students as many as 69 people; 30 of them are first-year students and 39 others are second-year students.

Results

1. **Determining Factor Testing:** The determinant factors are the influence of gender variables, student levels, interests, commitment, curriculum, and initial knowledge of student caring behavior showsin Table 1.

Table 1: Determining Factor Testing

Model	R	R-square	Adjusted R-square	Standard Error of The Estimate
1	0.772	0.596	0.577	5.12121

The coefficient of determination shows that 59.60% of the formation of students caring behavior can be explained using gender variables, student levels, interests, commitment, curriculum, and initial knowledge, while other causative factors can explain the rest of 40.40%. The standard error of estimate (SEE) explains that the existence of gender, student level, interests, commitment, curriculum, and the initial knowledge can be predictors of student caring behavior.

2. **Testing the Caring Behavioral Model:** The caring behavior of students in this study is in a good category. There are differences between caring behavior between first-year students (at intervals of 63.07%) and second-year students (65%). Also, it is known that there are seven aspects of caring behavior that are not optimal based on the list of caring dimensions (Caring Dimensions Inventory; CDI) designed by Watson and Lea[9], shown in Table 2.

Table 2: Student's Caring Behavior

No.	Caring Behavior	%	Category
CDI 1.	Assist clients in ADL	59.06	Not Good
CDI 2.	Make nursing notes about the client	59.78	Not Good
CDI 3.	Feeling guilty/sorry for the client;	63.41	Good
CDI 4.	Providing knowledge to clients as individuals	60.14	Not Good
CDI 5.	Explain clinical procedures	61.59	Not Good
CDI 6.	Dress neatly when working with clients	63.77	Good
CDI 7.	Sit with client	65.58	Good
CDI 8.	Identify the client's lifestyle	61.23	Not Good
CDI 9.	Report the client's condition to a senior nurse	64.86	Good
CDI 10.	With clients during clinical procedures	62.32	Good
CDI 11.	Be nice with clients	65.58	Good
CDI 12.	Organize work with other nurses for clients	73.55	Good
CDI 13.	Listen to client	63.41	Good
CDI 14.	Consultation with doctors about the client	64.49	Good
CDI 15.	Advise clients regarding aspects of self-care	63.04	Good
CDI 16.	Sharing about personal problems with clients	59.78	Not Good
CDI 17.	Provide information about clients	75.72	Good
CDI 18.	Measuring the client's vital signs	63.41	Good
CDI 19.	Placing the client's needs before personal needs	64.13	Good
CDI 20.	Be competent in clinical procedures	65.94	Good
CDI 21.	Involve the client in care	63.04	Good
CDI 22.	Provide guarantees regarding clinical procedures	70.29	Good
CDI 23.	Give privacy to clients	63.77	Good
CDI 24.	Be happy with the client	61.59	Not Good
CDI 25.	Observe the effects of medication on the client	64.49	Good

3. **Building the Model:** The coefficient of determination indicates that 47% of the formation of caring competencies can be explained using the variable compassion, conscience, and commitment, while the remaining 53% can be explained by other causative factors. The standard error of estimate explains that the existence of compassion, conscience, and commitment can be ruled as predictors of student caring competencies. Because the probability of Sig is 0.036 (<0.05), this regression model is feasible to be used in predicting caring behavior.

   The second test uses the behavior variable parameter (Y2) as the dependent variable, while the compassion (X1), conscience (X2), commitment (X3), and (X) competence variables become independent variables. The coefficient of determination of 1 shows that 100% of the formation of caring behavior of students in this study can be explained using the variable compassion, conscience, commitment, and competence. The magnitude of the standard error of estimate (SEE) of 0 explains if the existence of compassion, conscience, commitment, and competence can be ruled as predictors of the competencies of caring students.

Discussion

Stage I Testing: Determinant factors that influence the student's caring behavior consist of (1) gender, (2) student level, (3) student interest in becoming nurses, (4) student commitment in nursing assignments, (5) curriculum used in the formation of caring behavior, and (6) the initial knowledge students have.Caring behavior isbuilt by three essentialperformance components–compassion,confidence, and commitment–which basically formed by competence and moral standards.

Second-year nursing students who have gone through the lecture process seem to have awareness and love of the profession as nursesthan first-year students. Also, service experience and practice in hospitals or health centers have a more significant effect on mastery of nursing competency of the second-year nursing students.Female students tend to have better-caring behavior than male students, but male students show an improvement caring behavior when theyin their second-year.It explains that during the process of good lectures and provide space to conduct real practice in hospitals or health centers, both male and female students perform similar qualified treatment and it redefined the conventional conception[10].

Based on this research, it shows that the variables of interest, commitment, and competence of students significantly influence the caring behavior in their implementation in the hospital or everyday life. This is undoubtedly in accordance with the theory which states that the development of the nursing world that has adopted technology directs the caring behavior of nurses not only to the sincerity of the soul in caring for patients but also is the ability to be dedicated to others, supervise with caution, show concern, feelings empathy for others, and feelings of love or affection[3].

The commitment of nursing students to the profession as nurses has a significant influence on caring behavior. Sincerity in serving and commitment to follow nursing procedures has been implemented well by students. Various assumptions show that the caring conception is subsequently partially learned by students both through experience and in attracting meaning in their lectures, which appears in the significant influence of students' knowledge variables on their caring behavior.

Stage II Testing: The second phase of the research consisted of the preparation of integration material and the integration material trial, which was compiled in a handbook of Caring Behavior Guidelines. After going through the stages of discussion and observation, the following arrangement of the guidebook is determined as follows:

Chapter 1. Introduction; Chapter 2. Definition of Caring; Chapter 3. Caring Behavior; Chapter 4. Caring for Patients; Chapter 5. Communication with Caring;and Chapter 6. Development of Caring.

Next, the Caring Guide is distributed to students to evaluate then give suggestion for adjustments. The results of observations made by preceptors and filling questionnaires show data that caring behavior by students is generally behavior that is following nursing action procedures, namely:

1. Provide information about clients;
2. Organizing work with other nurses for clients;
3. Provide guarantees regarding clinical procedures;
4. Be competent in clinical procedures;
5. Sit with clients;
6. Be nice with clients;
7. Report the client's condition to the senior nurse;

8. Consultation with doctors regarding clients;
9. Observe the effects of medication on the client.
10. Placing the client's needs before personal needs;
11. Dress neatly when working with clients;
12. Providing privacy to clients;
13. Feeling guilty/sorry for the client;
14. Listen to clients;
15. Measuring the client's vital signs;
16. Advise clients regarding aspects of self-care;
17. Involve clients in care;
18. With clients during clinical procedures.

Aspects of caring behaviors that are still weak includes explain clinical procedures,be happy with clients, identifying the client's lifestyle,and providing knowledge to clients as individuals. Other weak aspects of competence are report nursing notes about the client, sharing personal matters with clients,and help clients in ADL.

Stage III Testing: This phase is the guided interview to explore the model development. Testing of the variable compassion–in the form of sensitivity to the difficulties and pain of others can be in the form of helping someone to stay afloat, providing opportunities for sharing, and provide full support–seems to give effect to the formation behavior to do commitment work. However,competence variable and confidence, statistically does not affect student competence directly.

Based on interviews with students (P1: Women), it is known that, in general, sensitivity to the difficulties and pain of patients manifested in the action of helping someone to stay afloat, provide opportunities to share feelings, build by routine practices. Various class discussions provide opportunities for students to express their feelings and empathize. Also, P1 states that practice in hospitals is needed because even though students' knowledge is good, in reality, the practice of caring behavior itself has been carried out according to the indicators studied in the guidebook. Students with good caring behavior still depends on the nature of the patient itself; whether the patient is open or willing to express their feelings while being treated.

According to interviews with students (L1: Men), the confidence of students in taking action grows because they master the memorization of actions contained in the textbook, as well as lecture notes, but only a few lecturers insert material about how a person student foster confidence in carrying out actions. Students still often get a rejection from family and patients because of the low patient's trust to the student as a nurse. Respondent L1 realize that a nurse is required to have moral standards that grow from a humanistic value system that respects and wants to care for the welfare or health of his patients. However, the central aspect that needs to be built is that the student must first make changes to his behavior.

Caring behavior is fully developed together from aspects of compassion, competence, conscience, and commitment. These variables must be owned and operated by a student to be able to have good caring behavior while caring must be defined as an action that aims to provide physical care and pay attention to emotions while increasing patient safety[7]. Therefore,caring attitude must be given through honesty, trustworthiness, and good intentions at the same time.

Another student's interview (P2: Women) state that lectures should include caring material that following the guideline developed by researchers, but at an early stage, it should be inserted or integrated in each course. Respondents (P3: meeting) stated that the approach in conducting nursing care must be purely carried out sincerely to help the patient's healing process, not only to make a report on nursing care.

Interviews with students (L2: Men) revealed that students expect more examples in the guidebook, although they expect more detailed understanding in aspects of courage and verbal communication. Respondents (L3: Men) stated that self-confidence needs to be built by knowing good nursing knowledge and being skilled at doing it so that the confidence of the family and the patient itself will grow. Discussion with the lecturer team emphasized the importance of the caring guidebook to be immediately presented as a complement to lectures, in addition to be a guide for students as well as supporting references for lecturers in providing courses so that it can be used optimally.

Conclusion

1. The determinant factors that significantly influence the formation of caring behavior in students are the commitment of students as prospective student nurses, nursing knowledge, student interest as

nurses, and student levels, as well as the indirect influence of gender variables and lecture curriculum.

2. The Caring manual book is structured as follows; Chapter 1. Introduction; Chapter 2. Definition of Caring; Chapter 3. Caring Behavior; Chapter 4. Caring of Patients; Chapter 5. Communication with Caring; and Chapter 6. Caring Development.
3. Compassion variable influences the formation of competency, whereas conscience and commitment variables do not affect the competence formation, while overall compassion, conscience, commitment and competence affect the formation of caring behavior.

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References

1. un.org. Transforming our world: the 2030 Agenda for Sustainable Development. https://sustainabledevelopment.un.org/post2015/. Accessed on March 10, 2016.
2. Purnama, A. Lima Ekspektasi Besar terhadap Dunia Keperawatan pada Tahun 2016. Accessed on January 8, 2016. http://creativeat21.com/2016/01/08/5-ekspektasi-besar-terhadap-dunia-keperawatan-pada-tahun-2016/ Diakses 10 Maret 2016.
3. Strout, K. Wellness promotion and the Institute of Medicine's Future of Nursing Report: are nurses ready? Holistic Nursing Practice. 2012; 26 (3):129-36.
4. Suaib, I, Nurhaedar J. Pengaruh Kualitas Pelayanan terhadap Pasien di Ruang Rawat Inap RSUD Syech Yusuf Kabupaten Gowa. Makassar. Fakultas Kesehatan Masyarakat Universitas Hasanuddin. 2014.
5. Brilowski, GA, Wendler, MC. An evolutionary concept analysis of caring. Journal of Advanced Nursing. 2005; 50(6):641-50.
6. Brüggemann, AJ, Wijma, B, Swahnberg, K. Abuse in health care: a concept analysis. Scandinavian Journal of Caring Sciences, 2012; 26(1): 123-132.
7. Favero, Luciane, Pagluca, MMF, Lacerda, MI. Transpersonal Caring in Nursing: An Analysis Grounded in a Conceptual Model. May 8, 2012. www.scielo.br. Accessed onMarch 10, 2016.
8. Krepia, Sapountzi, D, Lavdaniti, M, Psychogiou, M, Tsiligiri, M, Karassavidis, S, Sarpeta, S. The Concept of Care as Perceived by Greek Nursing Student: A Focus Group Approach. International Journal of Caring Sciences. 2013; 6(3).
9. Watson, R, Lea, A. The caring dimensions inventory (CDI): content validity, reliability, and scaling. Journal of Advanced Nursing. 1997; 25:87–94
10. Sukesi, N. Upaya Peningkatan Caring Perawat Terhadap Kepuasan Pasien di Ruang Rawat Inap RS Permata Medika Semarang. Jurnal Manajemen Keperawatan. 2013; 1(1).
11. Swanson, KM. Nursing as Informed Caring for the Well-Being of Others. Journal of Nursing Scholarship. 1993; 25(3).

Coping Strategies Used By Mothers in Children with Autism

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Abstract

Context: Stress caring for children with autism contributes to weak emotional stability, decreased psychological and physiological functions for mothers. Previous research suggests several method that mothers use to overcome various problems. The purpose of this study was to determine the coping strategies of mothers in children with autism as well as to find out the source of stress and see the response to mothers at Sunter children's growth and development clinic. This study uses a qualitative approach to data collection through in-depth interviews. The sample selection technique uses a purposive sampling technique. The main informants in the study consisted of 8 mothers and the supporting informants were 2 child caregivers and 2 therapists. Triangulation used is source triangulation. Data analysis technique is done by content analysis. The results of this study found that there are two stressors faced by the mother, namely internal (concerns of child growth and development, the future of the child and the lack of knowledge about autism) and external (lack of family support, economic and environmental) and there are 3 responses to stress shown, namely the response cognitive (dizziness and lack of concentration), emotional responses (disappointed and sad) and behavioral responses (shock, surrender and crying). Mothers use both types of coping strategies, namely problem focused coping and emotional focused coping in several different ways.

Keywords: *Strategy: coping: mother: children: autism.*

Introduction

The prevalence of autism continues to increase in the world[(1)].WHO in 2013 estimated the global prevalence of ASD to be 1 in 160 children. According to UNESCO data, the prevalence of autism sufferers worldwide in 2011 was 6 out of 1000 children with autism. This prevalence is estimated to represent the average number and reported prevalence varies substantially throughout the study[(2)].In 2012 there were 1:88 children those with autism and in 2014 an increase of 30% namely as much as 1.5% or 1:68 children in the USA have autism[(3)]. In Indonesia, the number of autistic sufferers every year is estimated to have increased by around 500 people each year, and autistic sufferers are more male than female with ratio of 4: 1[(4)].

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Many researchers do not yet understand about the exact cause of autism but they suspect genetic and environmental links that affect autism in children[(5)]. Autism is the inability to interact with others and language disorders [(6)].Autistic children need greater consideration and care compared to children without these conditions, thus it is common for parents to be stressed in dealing with this[(7)]. According to several studies, mothers who have autistic children report emotional condition that include mistrust, deep sadness, depression and self-blame[(8–10)]. These stressors often result in higher levels of depression for parents of children with ASD[(11)].

Several studies have shown coping strategies to fortify parents in order to avoid the negative effects caused. Lazarus and Folkman (1984) says it is divided into two main functions, namely problem focused coping which is an individual effort by dealing directly with the source of the cause of the problem and emotional focused coping which is the behavior in an effort to deal with emotional pressures or stress caused by the problem at hand[(12)]. Families and parents in these conditions desperately need motivation, socio-economic

support and abilities[13]. Some of the strategies used one of them is his own initiative where parents are involved in activities that make them happy. Parents usually use one or more coping strategies such as active avoidance, active rejection, positive thinking and religion[11].

Sunter children's growth and development clinic is one private clinic located in Sunter, North Jakarta. Based on the results of a preliminary study, autistic children who are currently undergoing therapy at the clinic there are still many children who are hyperactive, out of focus and tantrums. Every mother shows different responses. Such conditions and other conditions may be able to suppress the mother that will cause stress and also affect the child. Therefore an appropriate coping strategy is needed. Based on this, it is important to know the causes of stress experienced by the mother and how coping strategies carried out by mothers who have autistic children.

Method

This research was conducted to understand how mothers of children with autism addressing the problems that occur in their children at Sunter children's growth and development clinic using a qualitative approach. The study was conducted at Sunter children's growth and development clinic in November 2019. The sample in this study was between 26 to 35 years and has undergone therapy at Sunter children's growth and development clinic for more than 6 months. The informants in this study consisted of 8 mothers of autistic children who had received therapy for at least 6 months, 2 caregivers and 2 therapists. Data collection method is in-depth interviews. The sample selection technique uses purposive sampling. Triangulation conducted was triangulation of sources that cross-check the answer of infoman mothers of children with autism through their caregiver and therapist. Furthermore, the data were analyzed using content analysis.

Result

Based on the results of the study found that most children are the first children with maternal age ranging from 26 to 35 years. Mother's educational background is mostly undergraduate. Almost all mothers work as housewives. The last education therapist who worked at Sunter children's growth and development clinic was Diploma III and undergraduate in the health sector and on average had worked for about 2 years.

Based on the results of interviews conducted, there are 2 sources of stressors experienced by mothers with autistic children, namely internal stressors and external stressors. Besides that, there are 3 responses shown by the mother, namely emotional response, behavioral response and cognitive response, such as the following quotes:

"Because initially the family did not accept ya, I'm afraid of my child, how is this child going forward, because I still didn't understand the autisms"
(Informant 1)

Identified external stressor conditions namely families have not received yet and financial problems. As stated by the following informant:

"It turns out that the costs are also not a little because many things must be done, certain foods, picky and choose ya ma'am" *(Informant 1)*

In addition, 4 out of 8 mothers also said that the stress was due to community views such as being ostracized and underestimated. Like the following quote:

"I also moved his church ma'am, because at his church before I felt he was underestimated, the neighbors also thought differently from him, sorry for that" *(Informant 7)*

Meanwhile, there are emotional responses that are shown by expressions by some mothers namely disappointed and sad. The quote is as follows:

"At that moment it was sad (eyes filled with tears)"
(Informant 4)

The behavioral response expressed by the mother is in the form of a response of shock, resignation and crying as a result of the stressor she feels. The following quote from one mother:

"Sometimes I even cry and continue pray"
(Informant 4)

Some mothers also feel dizzy and lack concentration which is a cognitive reaction. The following quote from one mother:

"When I found out he was autistic, I came to my mind and didn't focus on doing anything, just in a stunned home, thinking "why is it my child? how come ya? "I got dizzy" *(Informant 8).*

All mothers use coping strategies in the form of problem focus coping nd emotional focus coping in dealing with some stressors that occur in the mother, namely seeking social support, planful problem solving, and confrontative coping.

Some mothers seek social support to find comfort to calm situations that can make it no longer bother what is happening. Like the following quote:

"If there is anything, I often share stories with my husband, thankfully my husband supports and helps what is assigned by the therapist to do at home"

(Informant 8)

In addition, mothers also carry out planning for their children in the future. 3 of the mothers put their children into special schools while 5 of the mothers put their children into public schools but some used accompanying teachers:

"Now he has school, he can already understand a little if told, there are teachers who can also accompany in the school" *(Caregiver 2)*

All mothers deal with problems that occur in children by making direct. The effort done is to bring the child to the doctor directly and go on a Gluten Free Casein Free (GFCF) diet on children. Like the following quote:

"Children who are dieted and not yet dieted are clearly visible change, have started to be able to focus and listen to instructions, most parents here already understand and go on the GFCF diet." *(Therapist 1)*

Meanwhile, for emotional focus coping, there are also two ways that are done by the mother, namely self control and accepting responsibility.

Based on the results of the interview, the average result of mothers doing self-control with gratitude and pray. Like the following quote:

"Every night I pray and make sure he prays too, so that he is immediately given the will to talk"

(Informant 6)

Mothers who have children with autism, 5 mothers mentioned that they tried to be patient, sincere and aware of their responsibilities. One of the quotes from the mother and the therapist's expression are:

"The average mother here has accepted her child, if given the task to train their children at home they also want to do." *(Therapist 2)*

Discussion

The number of mothers giving birth to children with autism is increasing worldwide[14]. This study was conducted to identify the stress that occurs in mothers with autistic children and their coping strategies in overcoming problems that occur by collecting data from 12 informants. This research found that the mothers of autistic children experience almost the same challenges.

The most common concern is that mothers are more worried about the future of their children and their children's dependence[10,15]. Some things experienced by mothers are stigma in society and financial problems. Many mothers with autism children will face stigma and discrimination in their environment and this stigma will have an impact on their well-being[16]. Stigma is one of the most difficult aspects faced by mothers with autistic children[17]. Stigma experienced by mothers and prolonged occurrence will lead to serious problems in mental health[18].Apart from the problem of stigma and the influence of the mind due to circumstances experienced by children, namely the existence of stressful life events from other factors (related to career or related to finance)[19].

There are 3 responses to stress in this study which were shown by mother namely cognitive response, emotional response and behavioral response. In cognitive responses, mothers tend to lack concentration and dizziness and the response to maternal behavior shows responses in the form of shock, resignation and indeedis. This is consistent with what was revealed in Nasir (2011) which stated that the stress response seen from cognitive responses can be seen through chaotic thoughts and decreased concentration, as well as the behavioral responses shown with patterns of behavior such as fear, anxiety, anger, shock and crying[20].

Some research results show that in terms of problem solving in parents who have autistic children, most parents use two ways, namely problem focus coping and emotional focus coping[10,17,21]. Coping strategies can affect the level of stress experienced by parents and also the level of their resilience[22]. The results of this study indicate that all mothers in dealing with problems that occur using both coping strategies,namely problem focused coping and emotional focused coping.

Mothers use three strategies to overcome problems that occur namely planning problem solving, seeking social support and direct effort. Mothers choose problem-

solving planning by planning the child's future because by doing so the stress level can be less[23]. One study found that to overcome the pressure of having an autistic child, mothers more often sought social support in the form of information support and real support (with the help of a husband or family)[24]. Research that presents about one of problem focused coping about direct effort is Magnawiyah's research (2014) which shows that parents will bring their children directly to the doctor for medical treatment by following routine therapy for their children. Other direct efforts undertaken by the mother is to adopt a diet [17].

In addition to problem focused coping, mothers also use emotional focused coping in handling problems[21]. Dina et al in 2017 describes aspects of self control done by mothers in various ways, mothers recognizes that the pressure caused by children makes them have to control themselves, the behaviors that arise are patience and restraint, meditating or praying and sleeping a little[25]. Another emotional coping strategy is related to accepting responsibility. The strategy is able to reduce self-threatening situations and more easily adapt to stress[26].

Conclusions

Mothers at Sunter's child growth and development clinic use both types of coping strategies in different ways namely problem focused coping in the form of seeking social support, planful problem solving and confrontative coping and emotional focused coping in the form of self control and accepting responsibility. There are 2 stressors faced by mothers, namely internal stressors in the form of children's growth and development concerns, the child's future and the lack of knowledge about autism and external stressors in the form of lack of family support, economic and environmental. In addition, there are 3 responses to stress namely cognitive responses (dizziness and lack of concentration), emotional responses (disappointed and sad) and behavioral responses(shock, surrender and crying).

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References

1. Lestari TD. Hubungan Pengetahuan dengan Perilaku Orang Tua dalam Pemberian Diet Sehat Casein Free Gluten Free (CFGF) Anak Berkebutuhan Khusus Attention Deficit Hyperactivity Disorder (ADHD, Hiperaktif dan Autis) [Skripsi]. Universitas Muhammadiyah Ponorogo; 2017.
2. World Health Organization. World report on disability 2013 [Internet]. Switzerland; 2013. Available from: http//:www.who.int/disabilities/world_report/2013/report.
3. Autism Society of America. Autism Info [Internet]. USA; 2018. Available from: https://www.autism-society.org/what-is/
4. Badan Pusat Statistik. Statistik Indonesia Tahun 2010. Jakarta Pusat; 2010.
5. Manalu, Alman. P., Indri R. KHMA. Laporan Kasus : Faktor-Faktor Kejadian Penyakit Autisme Anak di Bina Autis Mandiri Palembang Pendahuluan Autisme anak adalah gangguan Faktor-faktor prenatal atau kehamilan adalah usia orang menyebabkan terjadinya autisme dibanding ayah dengan usia yang ku. Syifa' Med J Kedokt dan Kesehat [Internet]. 2013;4(1):2–7. Available from: journal.fkumpalembang.ac.id%0A
6. Wahyuni S. Penyesuaian Diri Orang Tua terhadap Perilaku Anak Autisme di Dusun Samirono Catur Tunggal Depok Sleman Yogyakarta [Skripsi]. Universitas Negeri Yogyakarta; 2011.
7. Balubaid R, Sahab L. The Coping Strategies Used by Parents of Children with Autism in Saudi Arabia. J Educ Pract. 2017;8(35):141-151–151.
8. Kandolkar MA, Kenchappanavar DR. Burden of Care and Parent-Child Relationship of Parents of Autistic Children. J Psychosoc Res. 2014;9(2):309.
9. Weiss JA, Cappadocia MC, MacMullin JA, Viecili M, Lunsky Y. The impact of child problem behaviors of children with ASD on parent mental health: The mediating role of acceptance and empowerment. Autism [Internet]. 2012 May;16(3):261–74. Available from: http://journals.sagepub.com/doi/10.1177/1362361311422708
10. Zaidman-Zait A, Mirenda P, Duku E, Vaillancourt

T, Smith IM, Szatmari P, et al. Impact of personal and social resources on parenting stress in mothers of children with autism spectrum disorder. Autism [Internet]. 2017 Feb 9;21(2):155–66. Available from: http://journals.sagepub.com/doi/10.1177/1362361316633033

11. Thomas TL. ADDRESSING STRESS COPING STRATEGIES IN MOTHERS OF CHILDREN WITH AUTISM SPECTRUM DISORDER (ASD). Capella University; 2017.
12. Marshall V, Long BC. Coping Processes as Revealed in the Stories of Mothers of Children With Autism. Qual Health Res [Internet]. 2010 Jan 17;20(1):105–16. Available from: http://journals.sagepub.com/doi/10.1177/1049732309348367
13. Magnawiyah MS. Strategi Koping Orang Tua pada Anak yang Menderita Sindrom Down Di Sekolah Luar Biasa Negeri 1 Jakarta Lebak Bulus Jakarta. Universitas Islam Negeri (UIN) Syarif Hidayatullah Jakarta; 2014.
14. HA A. Challenges and Coping Strategies for Parents with Autistic Children. J Ment Disord Treat [Internet]. 2018;04(03). Available from: https://www.omicsonline.org/open-access/challenges-and-coping-strategies-for-parents-with-autistic-children-2471-271X-1000166-104405.html
15. Ludlow A, Skelly C, Rohleder P. CHALLENGES FACED BY PARENTS OF CHILDREN DIAGNOSED WITH AUTISM SPECTRUM DISORDER Amanda Ludlow, Charlotte Skelly, Poul Rohleder. Dep Psychol Angl Rus Univ. 2006;6(1999):1–7.
16. Ilias K, Cornish K, Kummar AS, Park MSA, Golden KJ. Parenting stress and resilience in parents of children with autism spectrum disorder (ASD) in Southeast Asia: A systematic review. Front Psychol. 2018;9(APR).
17. Gona JK, Newton CR, Rimba KK, Mapenzi R, Kihara M, Vijver F V., et al. Challenges and coping strategies of parents of children with autism on the Kenyan coast. Rural Remote Health. 2016;16(2).
18. Alshaigi K, Albraheem R, Alsaleem K, Zakaria M, Jobeir A, Aldhalaan H. Stigmatisation among Parents of Autism Spectrum Disorder Children in Riyadh, Saudi Arabia. Int J Pediatr Adolesc Med. 2019;(June).
19. Pisula E. Parenting Stress in Mothers and Fathers of Children with Autism Spectrum Disorders. A Compr B Autism Spectr Disord. 2011;(September 2011).
20. Nasir, Mudith. Dasar-dasar Keperawatan Jiwa. Jakarta: Salemba Medika; 2011.
21. Benson PR. Coping, distress, and well-being in mothers of children with autism. Res Autism Spectr Disord. 2010;4(2):217–28.
22. Shepherd D, Landon J, Taylor S, Goedeke S. Coping and care-related stress in parents of a child with autism spectrum disorder. Anxiety, Stress Coping. 2018;31(3):277–90.
23. Mekki K. Stress and Coping in Mothers of Children with Autism Spectrum Disorders [Dissertation]. University of Ottawa Canada; 2012.
24. Vidyasagar N, Koshy S. Stress and Coping in Mothers of Autistic Children. J Indian Acad Appl Psychol. 2010;36(2):245–8.
25. Dina EF, Hermawan F. Emotion-Focused Coping in Single Mother who has Adolescence with Autism. 2017;9623:158–63.
26. Pourmohamadreza-Tajrishi M, Azadfallah P, Hemmati Garakani S, Bakhshi E. The effect of problem-focused coping strategy training on psychological symptoms of mothers of children with down syndrome. Iran J Public Health. 2015;44(2):254–62.

Dental Status and Characteristics of Oral Fluid in Patients with Juvenile Rheumatoid Arthritis

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Abstract

Changes and disturbances in any human system can be a trigger for the emergence, exacerbation or progression of diseases of other organs and systems. This is confirmed by modern scientific works that demonstrate the dependence of dental status on background pathology. Considering the fact that biofilm of the oral cavity can be a risk factor in maintaining a high degree of activity of the underlying disease, as well as the informativeness of oral fluid indices, studies in this direction seems relevant. Aim of the research is to study the physical and immunohormonal characteristics of oral fluid in patients with juvenile rheumatoid arthritis depending on the duration of arthritis.

Materials and Method: A dental examination was conducted on 65 patients with JRA aged 12-16 years (average age 13.55 ± 0.21 years), among whom the debut of arthritis less than 6 years was observed in 32 patients (49.23%) and more than 6 years in 33 patients (50.77%). Comparison control group (CG) was 15 almost healthy patients. Dental status was assessed by the intensity of the carious process (DMF-index) and the severity of gingivitis (PMA-index). The productive activity of the OF was characterized by the basic speed of salivation and saliva viscosity (according to the method of Redinova-Pozdeeva, 1994). The oral fluid was analyzed according to the content of hormones (cortisol, ACTH) and interleukins (IL-1β, IL-6, TNFα, IL-4, IL-10) in accordance with the duration of arthritis.

Results and Conclusion: It was found that in patients with juvenile rheumatoid arthritis there is a "high" degree of caries activity, a "mild" degree of gum inflammation, an imbalance in the pituitary-adrenal axis hormones and a state of immunosuppression at the local level. At the peripheral level, marked violations are observed in the principle of regulation of feedback "cortisol-ACTH" and signs of immunodeficiency according to the levels of interleukins were observed. Identified disorders tend to progress with increasing duration of arthritis. These results can be used in the practice of dentists, rheumatologists and pediatricians.

Keywords: *Caries, gingivitis, oral fluid, juvenile rheumatoid arthritis.*

Introduction

In recent years, the diagnosis and treatment of pathological conditions of the human body acquires a scientifically significant approach from the standpoint of comorbidity (pathogenetic interconnection of diseases) and multimorbidity (a combination of diseases of various origins). As a result of this, in clinical and experimental studies, a vector is formed to create models of total risk that determine the development of combined pathologies of an individual. Such models are based on ideas about the risk factors, the etiology and pathogenesis of diseases, which are modifiable and amenable for correction.

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Today, data on association between risk factors and major chronic diseases are partially systematized; a comorbidity index calculator for general practitioners (family doctors) has been developed. The proposed models takes into account already diagnosed diseases, blood counts, safe norms of consumed products, bad habits, physical activity. Unfortunately, these schemes lack indicators of dental health, such as the level of oral hygiene, the presence of caries and its intensity, the pathology of periodontal tissues, and the characteristics of the oral fluid. The influence of somatic pathology on the state of the dentition is undoubted [1, 2, 3]. At the same time, the significance of orofacial diseases in the initiation and progression of background pathology is less recognized and insufficiently studied. Works in this direction is single, however, the presented results allows us to consider dental pathology as comorbid [4] and as an indicator of the general condition of the body [5].

Oral homeostasis is determined by the characteristics of the oral fluid (OF), which, in a certain extent, depends on the conditions of the large salivary glands. Considering the fact that in some cases indicators of OF can be claimed as diagnostic markers, it is of much interest to study about the structural changes in the salivary glands and their secretion in patients with somatic pathology. This is evidenced by the work of researchers in which a decrease in the metabolic activity of the large salivary glands and the functional ability of the hematosalivation barrier against diabetes mellitus[6], bronchial asthma[7], and digestive tract pathology[8] and a number of other diseases were established. In previous experimental studies, we established structural changes in the tissues of the parotid salivary glands in laboratory rats with adjuvant arthritis[9], as well as during methotrexate therapy[10]. In this regard, the clinical and laboratory study of the characteristics of OF in patients with juvenile rheumatoid arthritis (JRA) is becoming relevant. This pathology has an autoimmune character, the etiology and pathogenesis are not fully studied and it has an aggressive basic therapy (cytostatic drugs throughout life) with increased prevalence of major dental diseases[11] and the probability of combined damage to the salivary glands (Schegren's syndrome) is seen. This disease can progress over the years and lead to disability.

Purpose of the study: Aim of the research is to study the physical and immunohormonal characteristics of oral fluid in patients with juvenile rheumatoid arthritis depending on the duration of arthritis.

Material and Method

A dental examination was conducted on 65 patients with JRA aged 12-16 years (average age 13.55 ± 0.21 years), among whom the debut of arthritis less than 6 years was observed in 32 patients (49.23%) and more than 6 years in 33 patients (50.77%). Depending on the duration of arthritis, the children represented two observation groups. The distribution of the contingent by gender was representative. Comparison control group (CG) was 15 almost healthy patients.

Dental status was assessed by the intensity of the carious process (DMF-index) and the severity of gingivitis (PMA-index in modifying,Parma, 1960). The productive activity of the OF was characterized by the basic speed of salivation and saliva viscosity (according to the method of Redinova-Pozdeeva, 1994).

The neurohumoral phase of regulation of the activity of large salivary glands was studied in the OF by levels of adrenocorticotropic hormone (ACTH) (reagent kit "EIA-3647, ACTH" "DRG", USA) and cortisol (reagent kit "Cortisol-IFA-BEST", CJSC "Vector- Best", Russia).

The mechanisms of regulation of protective reactions at the local level were evaluated by the content of pro-inflammatory and anti-inflammatory interleukins (IL-1β, IL-6, TNFα, IL-4, IL-10) (reagent kits CJSC "Vector- Best ", Russia).

Statistical analysis was performed by using of the statistical program "Statistica 6.0®" (Statsoft®, USA).

Results and Discussion

Studies have shown that the studied parameters in patients with JRA had significant differences compared with similar ones in healthy children ($p < 0.001$) (Table 1).

It was established that in children with JRA the intensity of caries corresponded to a "high" indicator and an increase in the duration of arthritis progression ($p < 0.001$).

Table 1: Dental status and characteristics of the oral fluid in patients with juvenile rheumatoid arthritis (M ± m)

Indicator, Groups	CG	Patients with JRA (n=65)	Debut JRA less than 6 years (n=32)	Debut JRA more than 6 years (n=33)
Caries intensity DMF-index)	–	4,87 ± 0,26	3,5± 0,32	5,94± 0,35 p < 0,001
Gingivitis (PMA-index,%)	–	8,51±0,87	10,78±1,23	6,72±1,18 p < 0,001
Salivation speed (ml/min)	0,46±0,011	0,21±0,005	0,24±0,008	0,19±0,005 p < 0,001
Oral fluid viscosity (relative units)	2,85±0,08	5,18±0,1	4,6±0,13	5,64±0,13 p < 0,01
Cortisol (ng/ml)	2,81±0,22	8,03±0,61	8,51±0,78	7,56±0,94 p < 0,05
ACTH (ng/ml)	16,91±1,44	10,42±0,76	12,64±1,06	8,27±0,97 p < 0,05
IL-1β (pg/ml)	26,86±0,79	12,97±0,68	16,58±0,73	9,46±0,75 p < 0,001
IL-6 (pg/ml)	14,21±0,27	7,78±0,38	9,31±0,4	6,29±0,51 p < 0,001
TNF-α (pg/ml)	16,93±0,82	8,13±0,52	10,15±0,62	6,17±0,67 p < 0,01
IL-4(pg/ml)	2,31±0,06	1,34±0,07	1,5±0,09	1,18±0,11
IL-10 (pg/ml)	23,43±1,2	5,5±0,29	6,79±0,35	4,24±0,33

p - credibility of differences with an indicator at the debut of arthritis less than 6 years.

The severity of gingivitis by the value of the PMA index was noted at the level of "mild degree". With the development of arthritis, the index increased slightly, then showed a decrease. This trend is probably associated with prolonged anti-inflammatory and immunosuppressive basic therapy, which, of course, was reflected in the periodontal status. In our case, the effect of dental hygiene measures on the possibility of inflammation in the gums was minimal, because the examined contingent did not have a course on teaching the rules for oral care and controlled brushing of teeth.

In patients with juvenile arthritis as a whole, there was a decrease in the speed of salivation to the level of "hyposialia" and an increase in the viscosity of the oral fluid to the level of "adverse". Changes in indicators were more significant with an increase in the duration of arthritis, indicating a progressive dysfunction of a qualitative nature of the salivary glands.

The increased role of humoral factors in the development of dental pathology in patients with JRA demonstrated the state of the pituitary-adrenal axis in terms of the levels of ACTH pituitary hormones and adrenal cortex cortisol. The study of these hormones was informative, since the level of cortisol in the oral fluid as a whole reflects its content in the blood serum. Unlike the indicator in the blood, oral cortisol is considered biologically active, since it does not have transport proteins [12, 13] and is averaged over a longer period [14].

Analyzing the obtained data on hormone concentrations and their ratio, it can be assumed that when the time period of the incidence of arthritis is less than 6 years, in principle, the regulation of feedback "cortisol-ACTH" has less profound changes. With a duration of JRA of more than 6 years, the changes were more pronounced, which reflected the development of impaired functional activity of the endocrine system with significant in the occurrence of a pathology of a dental nature. Our results were consistent with published data on the violation of all forms of metabolism in patients with JRA and the difference in the adaptive mechanisms of the endocrine glands depending on the duration of rheumatoid arthritis [15].

A comprehensive assessment of the cytokine profile made it possible to establish that the levels of

pro-inflammatory cytokines in patients with JRA at the local level were significantly different from the same in the control group ($p < 0.001$). Children with arthritis debut more than 6 years, the IL levels were significantly lower in comparison with arthritis patients less than 6 years. This indicated about progressive mucosal immunodeficiency as a result of depletion of the functional activity of immunocompetent cells, including salivary gland cells, with an increase in the duration of the rheumatoid process.

Conclusion

Studies have shown that patients with juvenile rheumatoid arthritis suffer from caries of a «high» degree of activity and gingivitis of mild severity. At the peripheral level, marked violations are observed in the principle of regulation of feedback "cortisol-ACTH" and signs of immunodeficiency according to the levels of interleukins were observed. Identified disorders tend to progress with increasing duration of arthritis. These results can be used in the practice of dentists, rheumatologists and pediatricians.

Conflict of Interests: None declared.

Source of Funding: Self funding by authors

Ethical Clearance: In our study involving all human participants were in accordance with ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration of 1964 and later amendments.

References

1. Galkina O.P., Zhadko S.I., Kushnir K.G. The role of Streptococcus mutans in the development of rheumatoid arthritis and its abarticular manifestations. Sovremennayastomatologiya. 2018; 4 (73): 3-8.
2. Galkina O.P. Level of markers of bone metabolism of juveniles with generalized parodontitis, having deformation of spine. Visnyk Stomatologiy. 2013; 3 (84): 30-33.
3. Kolesnik K.A., Kolesnik D.K., Velikanova E. I. State of maxillodental system in children with thyroid gland diseases. Tavricheskiy Medico-BiologicheskiyVestnik. 2018; 4 (21): 36-41
4. Galkina O.P. Peculiarities of caries process development in patients with juvenile rheumatoid arthritis. Crimean Journal of Internal Diseases. 2018; 2: 44-49.
5. Galkina O.P., Bezrukov S.G., Kaladze N.N. Dental caries as indicator of condition of bone tissue in patients with juvenile rheumatoid arthritis. The Dental Institute. 2015; 2 (67): 64-67.
6. Kolesnik K.A., Romanenko I.G., Dudar D.V. Recurrent aphthous stomatitis as a manifestation of celiac disease: review. Bulletin of the medical institute «REAVIZ»: rehabilitation, doctor, health. 2018; 6 (36): 55-64.
7. Myachina O. V., Zuykova A. A., Pashkov A. N., Pichuzhkina N. M. Features of Major Salivary Glands' Secretion Crystallization in Patients with Diabetes Mellitus Type 2. Journal of Anatomy and Histopathology. 2016; 5 (2): 66-69.
8. PoleschukO.Yu., Romanenko I.G., Kaladze K.N. The level of ionized calcium in the oral fluid of children with chronic generalized catarrhal gingivitis and bronchial asthma. Bulletin of the medical institute «REAVIZ»: rehabilitation, doctor, health. 2017; 4 (28): 48-52.
9. Kalinichenko Yu.A., Kolesnik K.A., Lugansky D.A. The state of local resistance and adaptive response in adolescents with pathology of the gastrointestinal tract during orthodontic treatment. Crimean Journal of Internal Diseases. 2016; 3 (30): 25-29.
10. Galkina O.P., Bezrukov S.G., Filonenko T.G. Morphological aspects of structural and functional changes in the parotid glands in experimental models of juvenile rheumatoid arthritis. Tavricheskiy Medico-Biologicheskiy Vestnik. 2014; Vol. 17, 4 (68): 13-16.
11. Galkina O.P., Bezrukov S.G., Kaladze N.N., Filonenko T.G. Structural and functional changes in the parotid gland under the influence of therapy of the methotrexate in an experimental model of juvenile rheumatoid arthritis. Tavricheskiy Medico-BiologicheskiyVestnik. 2016; Vol. 19, 4: 13-17.
12. Galkina O.P. Status of dental patients with juvenile rheumatoid arthritis. Scientific Bulletin of Crimea. 2016; 2 (2): 9.
13. Aardal E., Holm A. C. Cortisol in saliva – reference ranges and relation to cortisol in serum. European Journal of Clinical Chemistry and Clinical Biochemistry. 1995; 33: 927-932.

14. Kirschbaum, C., Hell hammer D. H. Salivary cortisol in psych on euro endocrine research: recent developments and applications. Psychoneuroendocrinology. 1994; 4 (19): 313-333.
15. Gehris, T.L., Kathol R.G. Comparison of time-integrated measurement of salivary corticosteroids by oral diffusion sink technology to plasma cortisol Journal Endocrine Research. 1992; 1 (18): 77-89.
16. Melikhova N.I., Koreshkov G.G. Long follow-up observations of the functional state of the endocrine glands of patients with juvenile rheumatoid arthritis. Pediatrics. 2005; 4: 42-47.

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School Based Screening for Idiopathic Scoliosis in Premenarcheal Girls: A Pilot Study

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Abstract

Objective: Idiopathic scoliosis is defined as a lateral curvature of the spine present in the adolescent age group with a higher incidence in females. There is a close relationship between curve progression and rapid (spinal) growth during puberty. The goal of this study was to determine the predictive value of Axial Trunk Rotation (ATR) less than 15° in pre-menarche girls and prevention of curve progression before the skeletal maturity.

Method: A total of 100 premenarcheal girls aged 6 to 13 years were screened using Adams forward bending test (FBT) and their ATR was assessed by scoliometer and pain was recorded by numeric pain scale. Scientific Exercise Approach to Scoliosis (SEAS) was administered to cases with high risk for scoliosis which were followed for 3 months.

Results: 6 girls in the age range of 10 to 12 years found at high risk for scoliosis with thoracic scoliotic curve ranging from 5° to 7°. 3 girls out of 6 reported pain. There was a statistically significant difference between pre and post SEAS ATR with a p value of <0.001,but scores for numeric pain scale showed insignificant results with a p value of 0.175.

Conclusion: The study raised awareness about scoliosis among parents, students and teachers.

Keywords: *Idiopathic scoliosis, pre-pubertal girls, scoliometer, radiography, SEAS.*

Introduction

Idiopathic scoliosis (IS) isa three-dimensional abnormality or lateral curvature of the spine and trunk with a multitude of underlying factors.[1] The factors concerned in the progression of the curve are gender, growth potential and degree of curvature when scoliosis is first identified.[2,3] In Asian countries the prevalence rate of idiopathic scoliosis is about 0.4% to 7% among adolescents.[4-12] The epidemiology of scoliosis has geographical disparity and hereditary dissimilarities that may add differences in prevalence rate of scoliosis. Scoliosis screening is presently carried out in 15 states in the United States and in the South Africa, Middle East, Sweden and some parts of Japan.[13-17] Many studies have indicated the lower axial trunk rotation in boys than in girls.[18-20] The decades of research show that detection of IS in early stages favours its effective treatment and arrests its progression further and therefore it is advocated to carry School Scoliosis Screening (SSS), using FBT and scoliometer as an effective means for early recognition when conservative treatment is more productive and successful.[21] If left untreated during active and rapid growth period, IS may worsen and can lead to massive spinal deformity.[22-24] Scientific exercise scoliosis approach (SEAS) is a customized scoliosis

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exercise programme for all conservative conditions; stand independent in low medium degree curves in growth to decrease the risk of bracing.[25]

Materials and Method

A Prospective clinical study was conducted through SSS in four regions of Dakshina Kannada-Karnataka, India. The five primary schools (PS) were randomly selected and invited to participate in this study. Five PS had 1140 girls in the age group of 6 to 13 years. A total of 100 pre menarche girls were randomly selected and 20 girls were selected randomly from each school by chit system for pilot study (Phase I).Informed consent and accent were obtained from the parents and students respectively.

Study Procedure:

Phase II: The participants were screened in secured classrooms. Physical examination was carried out and students with altered gait pattern and other deformity were excluded from the screening. The Body Mass Index (BMI) of each participant was measured. Each participant was assessed by using the Adam's Forward Bending Test (FBT) and a scoliometer, and the spine was observed in the anterior, posterior and lateral view to measure any hump. The Scoliometer wasused to measure the ATR at thoracic, thoracolumbar and lumbar region. The girls with ATR of 5° or more were considered a high risk group and were called for radiographic evaluation.

Phase II: SEAS a specific active self-correction technique was administered on individual basis to the 6 high risk girls and incorporated into functional exercises to improve the stability of the spine in active self-correction technique and to train the neuromotor function to stimulate the reflex of self-corrected posture during daily activities. The procedure was performed for 20 minutes/day for 3 months.

Results

11 girls out of 100 were found high risk and referred for further radiographic evaluation (Figure 1a). 6 were found positive with thoracic scoliotic curve of 5° in four girls and 7° in two girls (Table 1). All the 6 high risk girls were in the age range of 10 to 12 years (Table 2). One girl among 5° degree thoracic scoliotic curve and both the girls with 7° degree of thoracic curve reported pain (Table 3). The mean BMI of positive cases was less than that of negative cases (Figure 1b). The SEAS effect showed a significant reduction at the end of 3 months of intervention but there was no significant reduction in the numerical pain scale in the positive cases (Table 4).

Table 1: Frequency of scoliotic curve.

	Frequency	Percentage
5 Degree	4	4.0
7 Degree	2	2.0
Nil	89	89.0
Suspected	5	5.0
Total	**100**	**100.0**

Table 2: Age wise distribution of scoliotic curve.

		Scoliotic Curve		Total
		Negative	Positive	
Age	6	4	0	4
	7	12	0	12
	8	23	0	23
	9	9	0	9
	10	13	1	14
	11	17	2	19
	12	7	3	10
	13	9	0	9
Total	**94**	**6**		**100**

Table 3: Distribution of pain among high risk cases.

	Frequency	Percentage
Back Pain while bending down Prolonged sitting and while carrying School bag pack.	3	3.0
No pain	97	97.0
Total	**100**	**100.0**

Table 4: Effect of SEAS on ATR and Numeric pain scale

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	baseline ATR in degree - post intervention ATR	1.3333	1.0328	.4216	.2495	2.4172	3.162	5	.025*
Pair 2	Pre intervention pain (Numeric Pain scale) - post intervention pain(Numeric Pain scale)	1.3333	2.0656	.8433	-.8344	3.5010	1.581	5	.175

*p value<0.05 in ATR is statistically significant.

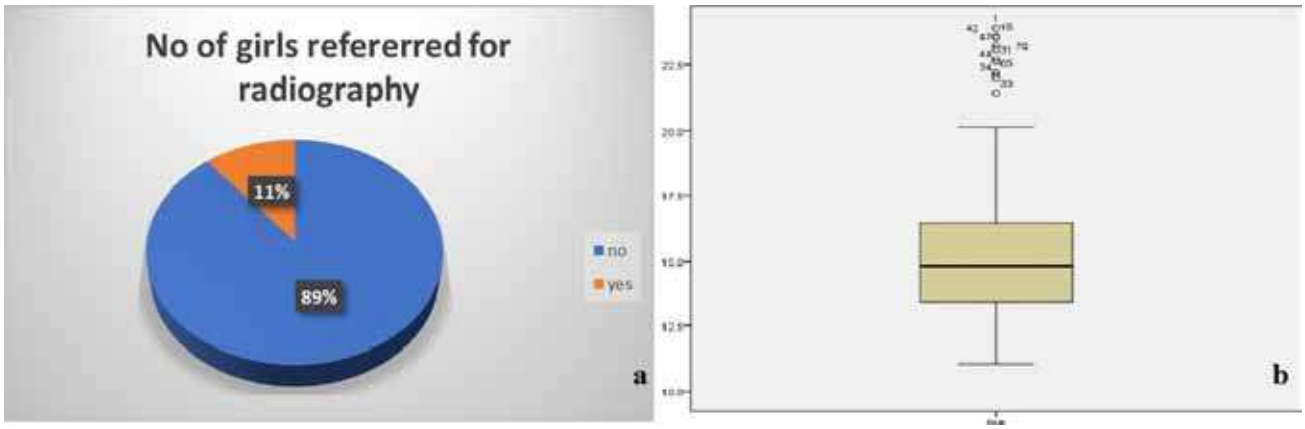

Figure 1a: Number of girls referred for radiographs out of 100 screened, Figure 1b:The normal cases had higher Body Mass Index (BMI) than cases with high risk scoliotic curve.

Discussion

Idiopathic scoliosis can develop before skeletal maturation and failed early detection or treatment can worsen the deformity in later life. Hence, an approach to early detection, SSS is considereda favourable in terms of the cost-effectiveness.[26,27] Europe has different kinds of legislations and policies for SSS. The united kingdom and Poland does not have SSS under the gambit of their national policies, while SSS is provided on voluntary basis in Spain, Israel, Turkey, Greece, Bulgaria and the Netherlands.[28,29] The purpose of SSS is to discover scoliosis at an early degree such that potential cases could be intervened managed conservatively.[30-33] 25% of girls (aged <13 years old) with an ATR ≥ 7° were found to have spinal curve below 10°or spine in a straight line.[34] Recent study conducted in Malaysia on female population proved remarkable results on screening programme to detect the early positive predictive value of scoliosis using scoliometer.[35] Screening programme with FBT techniques are associated with higher referral rate and lower precision values in identifying the scoliotic curve,[36] therefore the addition of advanced tool, such as scoliometer is recommended. The students suspected to have scoliosis on screening are to be ruled out clinically by further diagnostic assessment.[28] The measurement of scoliosis proved to be 100% sensitive and 47% specific for 5° curve whereas 7° curve shows 83% sensitivity and 86% increased specificity.[37]

In the current study, the overall prevalence rate in pre menarche girls in school screening was 6%.This study showed potential scoliosis cases in the age group of 10 to 12 years with ATR less than 10°. The prevalence rates for 10, 11 and 12 years old were 1%, 2 %,3% respectively. Wong et al., 2005 reported the prevalence rate in girls increased progressively from 0.24% between the ages of 9 to 10 years, 1.37% and 2.22% between the ages of 11 to 12 years and 13 to 14 years, respectively.[5] The prevalence rate for 10, 11, 12 year old girls with 5° curve was (8.33%, 12.5%,16.6%) respectively and 7° curve for 10,11,12 year old girls were (33.33%). In our study prevalence rate was increasing with the age group. Yong et al., 2009 found prevalence rates for the 10, 11 and 12 year old girls as(1.37%, 0.58% and 0.21%)for ATR>10°.[6] All the curves seen in the present study were

small curves and at right thoracic level. These findings are in consistent with the study from chongming island (china), with thoracic curves towards right side in 60.3% cases.[12] 75.5 %of thoracic curves were towards right side in a study in Greece.[38] In Finland, Nissinen et al., 1993, showed that the most common curves were at the thoracic area.[39] The body mass index (BMI) in scoliotic children was lower than in the normal children in several studies[40-42] and similar trend in BMI was seen in the present study. The ATR had a significant improvement after SEAS intervention in this study and the results were similar to Negrini et al., who showed a decrease of 0.67º in ATR in SEAS group as compared to an increase of 1.38° in non-specific physiotherapy alone group.[43] There was no improvement in the pain scale, pre and post SEAS at 3 months in the current study. The participants and their parents however have been briefed about home continuation SEAS programme with 3 monthly assessment. Based on the results from phase I, we calculated a sample size of 600 pre menarche girl students for next phase of study. The study is under progress currently and shall be made public as soon as it completes.

Conclusion

This study raises awareness among parents, teachers and students about the early detection and management of idiopathic scoliosis. We recommend SSC for early detection of such cases for timely conservative management.

Conflicts of Interest: Nil

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Ethical Clearance: Yenepoya University Ethical Committee number: YUEC/2018/037.

References

1. Rigo MD, Villagrasa M, Gallo D. A specific scoliosis classification correlating with brace treatment: description and reliability. Scoliosis. 2010; 5:1.
2. Lenhert-Schroth C: The Schroth Scoliosis Three-Dimensional Treatment. Norderstedt: Books on Demand GmbH, 2007.
3. Rowe DE, Bernstein SM, Riddick MF, Adler F, Emans JB, Gardner-Bonneau D. A meta-analysis of the efficacy of non-operative treatments for idiopathic scoliosis. J Bone Joint Surg Am.1997;79: 664-74.
4. Machida M: Cause of idiopathic scoliosis. Spine (Phila Pa 1976). 1999;24: 2576-83.
5. Wong HK, Hui JH, Rajan U, Chia HP. Idiopathic scoliosis in Singapore schoolchildren: a prevalence study 15 years into the screening program. Spine (Phila Pa 1976). 2005; 30: 1188-96.
6. Yong F, Wong HK, Chow KY. Prevalence of adolescent idiopathic scoliosis among female school children in Singapore. AnnAcad Med Singapore. 2009; 38:1056-63.
7. Luk KD, Lee CF, Cheung KM, Cheng JC, Ng BK, Lam TP, et al. Clinical effectiveness of school screening for adolescent idiopathic scoliosis: a large population-based retrospective cohort study. Spine (Phila Pa 1976). 2010; 35: 1607-14.
8. Htwe K, Abdullah AT, Amat A, Jalaluddin A, Aung MMT, Zaw MS. Prevalence of Scoliosis in Standard 6 Female Primary School Students in Marang District, Terengganu. Int J Med Sci. 2013; 46: 1299-1303.
9. Lee JY, Moon SH, Kim HJ, Park MS, Suh BK, Nam JH, et al. The prevalence of idiopathic scoliosis in eleven-year-old Korean adolescents: a 3-year epidemiological study. Yonsei Med J. 2014; 55:773-8.
10. Fong DY, Cheung KM, Wong YW, Wan YY, Lee CF, Lam TP, et al. A population-based cohort study of 394,401 children followed for 10 years exhibits sustained effectiveness of scoliosis screening. Spine J. 2015; 15:825-33.
11. Yamamoto S, Shigematsu H, Kadono F, Tanaka Y, Tatematsu M, Okuda A, et al. Adolescent Scoliosis Screening in Nara City Schools: A 23-Year Retrospective Cross-Sectional Study. Asian Spine J. 2015;9: 407-15.
12. Du Q, Zhou X, Negrini S, Chen N, Yang X, Liang J, et al. Scoliosis epidemiology is not similar all over the world: a study from a scoliosis school screening on Chongming Island (China). BMC Musculoskelet Disord. 2016; 17:303.
13. Dommisse G. The management of scoliosis.S Afr

Med J.1970; 44:1331-35.

14. Lonstein JE, Bjorklund S, Wanninger MH, Nelson RP.Voluntary school screening for scoliosis in Minnesota. J Bone Joint Surg Am.1982; 64:481-88.
15. Ohtsuka Y, Yamagata M, Arai S, Kitahara H, Minami S. School screening for scoliosis by the Chiba University Medical School screening program. Results of 1.24 million students over an 8-year period. Spine (Phila Pa 1976).1988; 13:1251-57.
16. Span Y, Robin G, Makin M. Incidence of scoliosis in schoolchildren in Jerusalem: proceedings of the Israeli Orthopaedic Society. J Bone Joint Surg Br.1976; 58:379
17. Willner S, Uden A. A prospective prevalence study of scoliosis in Southern Sweden. Acta Orthop Scand. 1982; 53:233-37.
18. Daruwalla JS, Balasubramaniam P, Chay SO, Rajan U, Lee HP. Idiopathic scoliosis. Prevalence and ethnic distribution in Singapore schoolchildren. J Bone Joint Surg Br.1985; 67:182-184
19. Rogala EJ, Drummond DS, Gurr J.Scoliosis: incidence and natural history. A prospective epidemiological study. J Bone Joint Surg Am.1978; 60:173-176.
20. Asher M, Green P, Orrick J. A six-year report: spinal deformity screening in Kansas school children. J Kans Med Soc.1980; 81:568-71.
21. Grivas TB, Vasiliadis ES, Rodopoulos G, Kovanis I. School screening as a research tool in epidemiology, natural history and aetiology of idiopathic scoliosis. Stud Health Technol Inform. 2008; 135:84-93.
22. Asher MA, Burton DC. Adolescent idiopathic scoliosis: natural history and long-term treatment effects. Scoliosis. 2006; 1:2
23. Koumbourlis AC. Scoliosis and the respiratory system. Paediatr Respir Rev.2006; 7:152-60.
24. McCarthy RE. Prevention of the complications of scoliosis by early detection. Clin OrthopRelat Res. 1987; 222:73-8.
25. RomanoM, Negrini A, Parzini S, Tavernaro M, Zaina F, Donzelli S, et al. SEAS (Scientific Exercises Approach to Scoliosis): a modern and effective evidence-based approach to physiotherapic specific scoliosis exercises. Scoliosis.2015;10:3.
26. Lee CF, Fong DY, Cheung KM, Cheng JC, Ng BK, Lam TP,et al. Referral criteria for school scoliosis screening: assessment and recommendations based on a large longitudinally followed cohort.Spine (Phila Pa 1976). 2010;35: E1492-8.
27. U.S. Preventive Services Task Force. Screening for idiopathic scoliosis in adolescents: recommendation statement. Am Fam Physician 2005; 71:1975-6.
28. Labelle H, Richards SB, De Kleuver M, Grivas TB, Luk KDK, Wong HK, et al. Screening for adolescent idiopathic scoliosis: an information statement by the scoliosis Research Society International Task Force. Scoliosis 2013; 8:17.
29. Labelle H, Richards BS, De Kleuver M, Grivas TB, Luk KDK, Wong HK, et al. SRS School Screening Task Force Report. France: Half-Day Course: Non-Operative Spinal Deformity Treatment Techniques, 48th Scoliosis Research Society Annual Meeting & Course September 18–21, 2013, Cité Centre de Congrès Lyon;2013:52.
30. Torell G, Nordwall A, Nachemson A. The changing pattern of scoliosistreatment due to effective screening. J Bone Joint Surg Am 1981,63:337-41.
31. Daruwalla JS, Balasubramaniam P: Moiré topography in scoliosis. Its accuracy in detecting the site and size of the curve. J Bone Joint Surg Br 1985, 67:211-13.
32. Lonstein JE, Winter RB, Moe JH, Bianco AJ, Campbell RG, Norval MA.Schoolscreening for the early detection of spine deformities. Progress and pitfalls. Minn Med 1976, 59:51–57.
33. Montgomery F, Persson U, Benoni G, Willner S, Lindgren B. Screening for scoliosis. A cost-effectiveness analysis. Spine 1990, 15:67-70.
34. Grivas TB, Vasiliadis ES, Mihas C, Savvidou O: The effect of growth on the correlation between the spinal and rib cage deformity: implications on idiopathic scoliosis pathogenesis. Scoliosis 2007, 2:11.
35. Deepak AS, Ong JY, Choon DS, Lee CK, Chiu CK, Chan CY, et al. The Clinical Effectiveness of School Screening Programme for Idiopathic Scoliosis in Malaysia. Malays Orthop J. 2017; 11: 41-6.
36. Fong DY, Lee CF, Cheung KM, Cheng JC, Ng BK, Lam TP, et al.A meta-analysis of the clinical effectiveness of school scoliosis screening. Spine (Phila Pa 1976). 2010; 35:1061-71
37. Ashworth MA, Hancock JA, Ashworth L, Tessier

KA.Scoliosis screening. Anapproach to cost/benefit analysis. Spine, 1988, 13: 1187-88.

38. Koukourakis I, Giaourakis G, Kouvidis G, Kivernitakis E, Blazos J, Koukourakis M. Screening school children for scoliosis on the island of Crete, Greece. J Spinal Disord 1997; 10:527-31.
39. Nissinen M, Heliovaara M, Seitsamo J, Poussa M. Trunk assymmetry, posture, growth and risk of scoliosis. Spine 1993; 18:8-13.
40. Wang W, Sun X, Wang Z, Qiu X, Liu Z, Qiu Y.Abnormal anthropometric measurements and growth pattern in male adolescent idiopathic scoliosis. Eur. Spine J. 2012; 21:77-83.
41. Davey RC, Cochrane T, Dangerfield PH, Chockalingam N, Dorgan JC. Anthropometry and body composition in females with adolescent idiopathic scoliosis. In: Sawatzky B.J., editor. Proceedings of the International Research Society of Spinal Deformities Symposium; Vancouver, BC, Canada. 10–12 June 2004; Vancouver, BC, Canada: University of British Columbia; 2004. pp. 323-26.
42. Dangerfield PH, Davey RC, Chockalingam N, Cochrane T, Dorgan JC. Body composition in females with adolescent idiopathic scoliosis (AIS) J. Bone Joint Surg. Br. 2006;88-B :230-31.
43. Negrini S, Zaina F, Romano M, Negrini A, Parzini S. Specific exercises reduce brace prescription in adolescent idiopathic scoliosis: a prospective controlled cohort study with worst-case analysis. J Rehabil Med. 2008; 40:451-55.

HIV Infection, Religion and Spirituality in Nigerian Community Settings

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Abstract

This article focuses on religion and spirituality regarding People Living with Human Immunodeficiency Virus (PLWH) in Nigeria. Specifically, the paper x-rayed the situation of HIV epidemic in Nigeria, followed by the impact of religion and spirituality on PLWH and finally the possible solution that can help to reduce the prevalence of the disease, as well as improve care and support of PLWH in Nigerian community settings.

Keywords: *HIV infections, Religion, Spirituality, Nigeria, Community Settings.*

Introduction

HIV epidemic is still a serious health challenge that demands serious attention. Presently, Sub-Saharan Africa accounts for 66% of all people with HIV infection[1] while 9% of PLWH globally are from Nigeria.[2] Moreover, about 3.3 million people live with HIV with a 3.6% adult HIV prevalence rate.[3] However, the Nigerian, Government is making tremendous effort to avert this epidemic through Anti-Retroviral (ARV) drug treatment. Nonetheless, less than 50% of PLWH in Nigeria are being diagnosed and treated to enhance their quality of life, reduce opportunistic infections and impact of HIV transmission in the community.[4] Studies have shown that the causes of stigmatization from members of the society that results to serious depression and anxiety among HIV-infected persons.[5] In addition, studies have also demonstrated that religious and spiritual care, coping skills and social support can be used as a mediator of perceived symptoms of stigmatization effects and improve health among those infected with HIV.[6]

Religion and spirituality reflects social support and thus can be employed as alternative and holistic treatment for PLWH.[5] Religion and spirituality can be a key role in both HIV infection prevention and care of PLWH within their community and congregation. Religion has been defined as the formal, institutional and outward expression of the sacred and has been measured by importance of religion, belief in God, religious attendance and prayer/meditation.[7,8] On the other hand, spirituality includes the internal, personal and emotional expression of the sacred and is often assessed by spiritual well-being, peace/comfort derived from faith and spiritual coping.[9] Previous studies revealed that an intensified religious and spiritual action is associated with less psychological distress, social functioning, greater energy and will to live, better cognitive functioning and feeling that life has improved since HIV diagnosis.[10,11] Nevertheless, religion and spirituality can also worsen outcomes because of likely belief on their religion faith and rejection of antiretroviral therapy and because of views of HIV as punishment from God for sinful lives. This paper tries to point out the existing knowledge regarding on religion and spirituality as it related to the roles religiosity and spirituality play in PLWH in Nigeria. Furthermore, the paper reviewed the negative impact religion and spirituality has on PLWH and finally the possible solution that can help to reduce the prevalence of the disease, care and support of PLWH in Nigerian Community settings.

The Bane of Religion and Spirituality among PLWH: The religion of a patient can affect the way he/she perceive health and disease and association with others.[12,13] Many spiritual patients strive to meet some religious needs related to their disease and failure to meet these needs may influence the type of life they live.[14] In addition, the form of spirituality (negative or positive) embraced by a patient may have a precarious

influence on the condition of the disease as revealed in earlier research.[15,16] Moreso, when a patient feels punished and abandoned by a higher power is termed negative spirituality and the feeling and believe that God loves and forgives them despite their shortcomings is positive spirituality.[17] Patients may embrace negative spiritual/religious beliefs in preference to conventional treatment that may be detrimental to health-seeking behaviors, treatment adherence, survival and quality of life.[18] Previous researches have also showed that religion and spirituality may have a hurtful effects on HIV patients banished from their religious organizations because of the humiliation/misjudgment connected with being HIV-positive.[19,20] Some religious leaders and organizations have reacted with upright judgments and disapproval for people with HIV that have self-conscious behavior change.[21] Messages from the pulpit about sin and a 'bad death' due to AIDS have been common.[22,23] In an investigation of religious leaders in Nigeria.[24] establish that 54% of Christian leaders assumed that AIDS had been sent by God as a specific punishment for sexual license; a further 20% thought that it was a divine punishment covering other transgressions. Among the Muslim leaders, 68% claimed that it was wholly a divine punishment.[24] Despite these inadequacies, religion and spirituality has been characterized to promote acceptance and support for greater well-being of people living with HIV.

The Place of Religion and Spirituality in the Lives of PLWH: In Nigeria, religion and spirituality connects people of different races, class and nationality together, including PLWH. In addition, religious principles and exercises are entangled in the activities of the people and the leaders of churches, mosques and other religious communi ties play influential roles in determining the attitudes, opinions and behaviors. Researchers have shown that a religion/spirituality can assist PLWH in adoption of protective health behaviors.[10,25-34]

In Nigeria, religious institutions are spread throughout the country and have the capacity to reach a large number of people. The perception of HIV patients about their health, disease and interaction with relative, friends and neighbours can be determined by the way their religious and spiritual belief influences them.[35,12] Inspite of the hilarious effect of religion and spirituality on PLWH, some scholars have suggested that religious and spiritual influences can contribute immensely to high level of satisfaction with life in PLWHA.[34] Even more,[36] investigated the views and live experiences of men living with HIV/AIDS and suggested that religions such as Catholicism can promote acceptance and support for greater well-being of men living with HIV/AIDS. In addition, religiosity may become noticeable in the patients attitudes, religious services participation, improved religious beliefs which will show in the patients personal actions such as prayer. Positive relationship between religiosity and well-being in PLWHA is based on religion providing the basis of social support, recovery of meaning in life and a coping mechanism.[37,38] Therefore, since religion and spirituality could improve the adoption and practice of protective health behaviors[39], religious and spiritual-based HIV/AIDS prevention programs are assumed to be an effective way to decrease the prevalence of HIV/AIDS by encouraging harmless and less HIV risky behaviors. With this in mind, many religious organizations are getting involved in HIV/AIDS prevention education programs and are likely to be more effective in preventing the spread of HIV/AIDS.[40]

Conclusion

This paper presents a perspective on the state of knowledge on religion and spirituality regarding People Living with Human Immunodeficiency Virus (PLWH) in Nigeria. In Nigeria, religious institutions are spread throughout the country and have the capacity to reach a large number of people. The perception of HIV patients about their health, disease and interaction with relative, friends and neighbours can be determined by the way their religious and spiritual belief influences them.

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References

1. Joint United Nations Programme on HIV and AIDS, (UNAIDS). The Gap Report: Children and Pregnant Women Living with HIV, Geneva. 2014
2. Global AIDS. Update. 2016. Retrieved 28th of June 2018 from http://www.unaids.org/sites/default/files/media_asset/global-AIDS-update-2016_en.pdf.
3. Sardari, A. M. United Nations Fund for Population Activities (UNFPA) strategies to reduce pregnancy risks. United Nations Population Fund; 1987.
4. Health 24. Antiretroviral treatment. Retrieved 28th

of June 2018 from https://www.health24.com/Medical/HIV-AIDS/Management-of-HIV-AIDS/Antiretroviral-treatment-20120721, 2018.

5. Wardojo SSI, Rosadi R. The Effectiveness of Religion as Therapy for People Living with HIV (PLHIV) in Malang Indonesia, 2018.
6. Hickman EE, Glass CR, Arnkoff DB, Fallot RD. Religious coping, stigma and psychological functioning among HIV-positive African American women. Ment. Health Religion Cult. 2013; 16(8), 832-851.
7. Koenig HG. Medicine, religion and health: Where science & ., spirituality meet. West Conshohocken, Pa: Templeton Foundation Press, 2008.
8. Miller WR, Thoresen CE. Spirituality, religion and health. An emerging research field. Am Psychol. 2003; 58(1):24–35.
9. Szaflarski M, Kudel I, Cotton S, et al. Multidimensional assessment of spirituality/religion in patients with HIV: conceptual framework and empirical refinement. J Relig Health. 2012; 51(4):1239–1260.
10. Trevino KM, Pargament KI, Cotton S, et al. Religious coping and physiological, psychological, social and spiritual outcomes in patients with HIV/AIDS: Cross-sectional and longitudinal findings. AIDS Behav. 2010; 14(2):379–389.
11. Tsevat J, Leonard AC, Szaflarski M, et al. Change in quality of life after being diagnosed with HIV: A multicenter longitudinal study. AIDS Patient Care STDs. 2009; 23(11):931–937.
12. Szaflarski M. Spirituality and religion among HIV-infected individuals. Curr HIV/AIDS Rep 2013; 10: 324–332. doi: 10.1007/s11904-013-0175-7
13. Tuck I. A critical review of a spirituality intervention. West J Nurs Res 2013; 34: 712–735. 0193945911433891; doi: 10.1177/0193945911433891
14. Koenig HG. Research on religion, spirituality and mental health: a review. Can J Psychiatry 2009; 54: 283–291.
15. Parsons SK, Cruise PL, Davenport WM, Jones V. Religious beliefs, practices and treatment adherence among individuals with HIV in the southern United States. AIDS Patient Care & STDs, 2006; 20(2), 97-111.
16. Trevino KM, et al. Religious coping and physiological, psychological, social and spiritual outcomes in patients with HIV/AIDS: Cross-sectional and longitudinal findings. AIDS Behav 2010;14(2):379-389.
17. Jones A, Cohen D, Johnstone B, Yoon DP, Schopp LH, McCormacke G, et al. Relationships Between Negative Spiritual Beliefs and Health Outcomes for Individuals With Heterogeneous Medical Conditions. Journal of Spirituality in Mental Health 2015; 7: 135–152.
18. Kremer, H, Ironson, G, Porr M. Spiritual and mind-body beliefs as barriers and motivators to HIV treatment decision-making and medication adherence? A qualitative study. AIDS Patient Care STDS 2009; 23: 127–134. doi: 10.1089/apc.2008.0131; 10.1089/apc.2008.0131.
19. Sovran S. Understanding culture and HIV/AIDS in sub-Saharan Africa. Sahara J 2013; 10: 32–41. doi: 10.1080/17290376.2013.807071
20. Bussing A, Baumann K, Hvidt NC, Koenig HG, Puchalski CM, Swinton J. Spirituality and health. Evid Based Complement Alternat Med 2014: 682817. doi: 10.1155/2014/682817
21. Hartwig KA, Kissioki S, Hartwig CD. Church leaders confront HIV/AIDS and stigma: a case study from Tanzania. Journal of Community & Applied Social Psychology, 2006; 16(6), 492-497.
22. Nzioka C. The social meanings of death from HIV/AIDS: An African interpretative view. Culture, Health & Sexuality, 2000; 2(1), 1-14.
23. Ucheaga DN, Hartwig KA. Religious leaders' response to AIDS in Nigeria. Global public health, 2010; 5(6), 611-625.
24. Orubuloye IO, Caldwell JC, Caldwell P. The cultural, social and attitudinal context of male sexual behaviour in urban south-west Nigeria. 1995.
25. Gerbi GB, Habtemariam T, Robnett V, Nganwa D, Tameru B. The association between religious affiliation and frequency of attendance at religious services on HIV risky behaviors among people living with HIV/AIDS. J AIDS HIV Res.; 2014; 4(5): 136–143. doi:10.5897/JAHR11.054.
26. Prado G, et al. Religious involvement, coping, social support and psychological distress in HIV-seropositive African American mothers. AIDS and Behavior 2004;8(3):221-235.Vy
27. Medved KH. Are religion and spirituality barriers or facilitators to treatment for HIV: A systematic

review of the literature. AIDS Care, 2017; 29(1), 1-13.

28. Dalmida SG, Koenig HG, Holstad MM, Wirani MM. The psychological well-being of people living with HIV/AIDS and the role of religious coping and social support. Int J. Psychiatry Med, 2013; 46(1) 57-83.
29. Hansen NB, et al. Longitudinal effects of coping on outcome in a randomized controlled trial of a group intervention for HIV-positive adults with AIDS-related bereavement. Death Studies 2006;30(7):609-636.
30. Ironson G, Kremer H. Coping, spirituality and health in HIV. The Oxford Handbook of Stress, Health and Coping, 2011:289-318.
31. Simoni JM, Martone MG, Kerwin JF. Spirituality and psychological adaptation among women with HIV/AIDS: Implications for counseling. J Couns Psychol. I 2002;49(2):139.
32. Dalmida SG, et al. The meaning and use of spirituality among African American women with HIV/AIDS. West J Nurs Res. 2012;34(6): 736-764.
33. Coleman CL. Spirituality and sexual orientation: Relationship to mental wellbeing and functional health status. J Adv Nurs 2003;43(5): 457-464.
34. Cotton S, et al. Changes in religiousness and spirituality attributed to HIV/AIDS: Are there sex and race differences? J Gen Intern Med 2006; 21(5):S14-S20.
35. Arrey AE, Bilsen J, Lacor P, Deschepper R. Spirituality/Religiosity: A Cultural and Psychological Resource among Sub-Saharan African Migrant Women with HIV/AIDS in Belgium. PLoS ONE 2016; 11(7): e0159488. doi:10.1371/journal.
36. Liboro RM, Walsh RT. Understanding the irony: Canadian gay men living with HIV/AIDS, their Catholic devotion and greater well-being. J. Religion Health, 2016; 55(2), 650-670.
37. Siegel K, Schrimshaw EW. The perceived benefits of religious and spiritual coping among older adults living with HIV/AIDS. J Sci Study Relig. 2002; 41(1), 91-102.
38. Steglitz J, Ng R, Mosha JS, Kershaw T. Divinity and distress: the impact of religion and spirituality on the mental health of HIV-positive adults in Tanzania. AIDS Behav 2012; 16(8), 2392-2398.
39. Dalmida SG, Holstad MM, Diiorio C, Laderman G. Spiritual well-being, depressive symptoms and immune status among women living with HIV/ AIDS. Women Health, 2009; 49(2-3), 119-143.
40. Green, EC. The impact of religious organizations in promoting HIV/AIDS prevention. Paper presented at the conference Challenges for the Church: AIDS, Malaria and TB; McLean, VA. May 25–26, 2001.

Public Health Relevance of Sparganosis in Javan Spitting Cobra Snakes (*Naja sputatrix*): A Neglected Zoonotic Disease In Indonesia

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Abstract

Sparganosis is a zoonotic disease caused by the spargana (larvae) of *Spirometra* sp. (Diphyllobothriidae). Snakeare particularly important intermediate hosts for the transmission of this parasite in Asia especially Indonesia. However, their role for sparganosis in javan spitting cobra (*Najasputatrix*) is unrecognized. This study aimsto investigate the infection of cobra snakes with *Spirometra* tapeworm in Banyuwangi, Indonesia where several local sellers have been identified recently sold snakes meat for culinary purposes. A total of 37 cobra samples were bought from a localseller and euthanized. Then, continued with necropsy and parasitological examination. The result founds 71 plerocercoids within muscular and subcutaneous tissues and the prevalence were recorded at 56,7%.Our finding is the first identification confirmed record of *Spirometra* tape worm in javan spitting cobra in Indonesia. Since snakes are often a component of mammalian diet, they can be a source of *Spirometra* tapeworm infection in human and Indonesian wildlife. However, further studies are needed to investigate the prevalence ofinfection in other reptiles and amphibian hosts.

Keywords: *Javan Spitting Cobra, Najasputatrix, Sparganosis, Spirometra, Zoonotic.*

Introduction

Sparganosis is a food and water-borne zoonotic disease caused by spargana (the infective stadium) of the *Spirometra* sp. tapeworm (Diphyllobothriidae). Most research regarding sparganosis has been conducted in Asia, especially in mainland China where sparganosis is a serious threat for public health.[1,2] However, sparganosis reports are still little known in Indonesia. This tapeworm is transmitted to humans in the following ways such as swallowing an infected copepod in natural water, consumption of insufficiently cooked amphibians (frogs or tadpoles), snakes, birds, or even mammals such as rodents and pigs and by poulticing the skin or eyes with a split frog. The clinical manifestation of sparganosis includes ocular, subcutaneous, oral and maxillofacial syndromes and it may sometimes be fatal not only in humans but also animals.[3]

Intermediate hosts for *Spirometra* tapeworm such as amphibians and reptiles, are already considered important wildlife for parasite transmission in Asia.[2,3]In Indonesia, the only two cases of infected reptiles, in oriental rat snakes (*Ptyasmucosus*) and Indonesian bronzeback snakes (*Dendrelaphispictus*), have been recorded in Sidoarjo City and Mojokerto City with high prevalence.[4,5] The parasite first intermediate hosts are copepods (*Cyclops* sp.), planktonic crustaceans in which procercoids (the first larval stadium) develop. The second intermediate or paratenic hosts can be vertebrates, such

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as amphibians, reptiles, birds, or mammals (including rodents and human).[3] Procercoids then develop into plerocercoids (the larval infective stadium) which settle in organs and tissues of intermediate hosts.

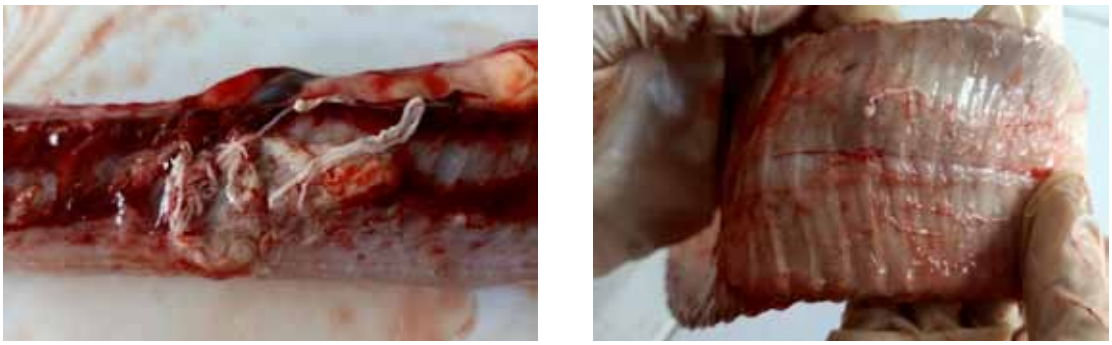
The life cycle of *Spirometra* sp. may also include paratenic hosts, in which plerocercoid or commonly known as spargana once more settle in the tissues after passing through the intestinal wall.[6] However, these hosts are not necessary for the completion of *Spirometra* tapeworm life cycle. Therefore, knowledge of the *Spirometra* sp. life cycle is stilllimited. Adult *Spirometra* sp. reproduces mainly in the intestinesof felids and canids such as the Eurasian lynx (*Lynx lynx*) and wolf (*Canis lupus*) which parasite eggs are shed with animal feces.[7] The high prevalence of sparganosis in Asia may be related to the local dietary habit, where snake is regarded as popular and nutritious culinary.[8] In Indonesia, about half of the local restaurants provide wild-caught snakes which used for culinary purposes. Moreover, the worse matters, many people enjoy eating half cooked or even completely raw meat, skin and gall bladder of snakes, without considering the high risk of infection by parasites.[4,5] Based on the high prevalence of sparganosis and the unhealthy habit of eating snakes in Indonesia, we conducted this study to further understand the prevalence of saprganosis occurrence in *Najasputatrix* snakes which commonly sold in local restaurants. The aim of our study were to assess the risks of human spargana infection caused by the consumption of wild-caught snakes and provide scientific foundation for preventing sparganosis transmission from animals to humans.

Materials and Method

A total of 37 living *Najasputatrix* snakes were collected from local seller in Banyuwangi City, East Java Province, Indonesia (114.369227 Longitude and -8.219233 Latitude) then euthanized and necropsied. The presence of spargana in snakes was examined according to the following method.[9] Briefly, the snakes were euthanized using ethyl-ether anesthesia, weighed and skinned. The muscles and subcutaneous tissues were carefully observed for the presence of spargana by eyes. Then, the spargana were removed from the muscles or subcutaneous tissues and put in a Petri dish containing physiological saline to observe their movement. The number of spargana collected from each infected snake were counted to estimate the intensity of sparganum infection. Identification of the larval infective stadium (plerocercoids) in wet preparation using carmine staining and clearing with glycerin then examine using a light microscope with a magnification of 40x and 100x.

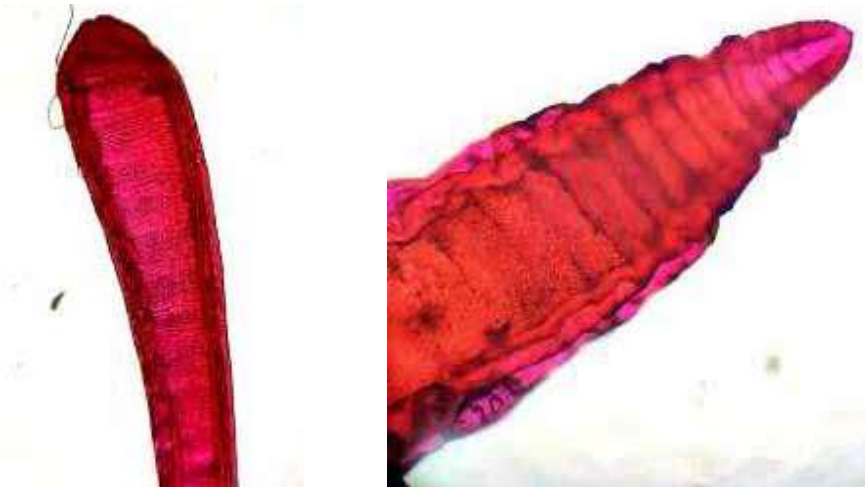
Results

Based on examination results, 21 snakes were positive infected with larvae of *Spirometra* tapeworm or called spargana with the total prevalence of 56.7%. Moreover, a total of 71 spargana were collected in this study which divided into 47 (66.1%) sparganain muscular and 24 (33.8%) spargana were found in subcutaneous tissues of *Najasputatrix* snakes. Spargana were macroscopically identified as flat, thin and white colored with ribbon-like structure. Those spargana frequently founds in groups in almost all parts of muscular and subcutaneous tissues (Figure 1). The spargana average length is +12cm, with +0,3cm body width. Microscopy examination using carmine staining method shows segmented body and mouth-like shape at the top of anterior side (Figure 2). Therefore, the results of microscopic observation were confirmed plerocercoid larvae of *Spirometrasp.* or spargana.



A **B**

Figure 1. Spargana (plerocercoids) of Spirometra tapeworm located in (A) muscular and (B) subcutaneous tissue of Najasputatrix. Arrows point to spargana



A B

Figure 2. Photomicrograph of spargana from Najasputatrix. (A) anterior side and (B) posterior side using carmine staining (100x magnification).

Discussion

Najasputatrix or commonly known as javan spitting cobra snake was strongly associated with wetlands, where they can most likely become infected with procercoids by swallowing water copepods or consuming amphibians such as wild frogs.[10]Moreover, they can be hunting living prey upon by several species of mammals and birds that are known to occasionally eaten by reptiles.[11] This report also confirms the role of reptiles as parasite transmitters in Asia and reveals additional routes of sparganosis transmission in Indonesian wildlife. Further studies are recommended to provide a deeper explanation of the role of non-mammalian hosts in the spread of *Spirometra* sp. in the natural environment. Spargana of *Spirometra* tapeworm can parasitize humans and result in sparganosis, which is an important zoonotic disease. Sparganosis mainly occurs in east and south Asia, but has been reported in several countries worldwide,[12] including Europe, America, Africa and Australia.[13] In Indonesia and China, there are similar cases of human sparganosis which caused by eating rawmeat of snakes and frogs, drinking snake blood and swallowing snake gall bladder.[14] In addition, the risk of *Spirometra* transmission may contaminate food in the process of cooking snake meat through improper cooking method.

Consuming the meat, viscera, or blood of animals (e.g., frogs, snakes, pigs, mice and birds) in an improper way may be an important means of acquiring sparganosis. In addition, ingesting copepods in natural water could also cause human infection. Therefore, attention should be given to sparganosis transmission caused by drinking unboiled water from the fields or other unhealthy water sources.[15] Moreover, it is necessary to strengthen food safety inspections of restaurants which provides snake meat. It should be emphasized that all restaurants provide only the meat of farmed snakes or frozen snake meat to the customer, in order to reduce the risk of human sparganosis.

When humans are infected by plerocercoid, commonly known as spargana, the larvae can perform visceral migration, infect many tissues and shows several clinical signs. Spargana has been reported to migrate into subcutaneous tissues and peripheral muscles such as abdominal walls, lower extremities, scrotums and chest walls. Subcutaneous sparga nosis is the most common form among type of sparganosis in humans.[16] Under the skin, the lesions look like rubbery and irregular lumps or nodules of 1-2 cm long that resemble a lipoma or fibroma, while causing itchiness, inflammation and pain. Some infected patients have had chronic forms and sometimes, the nodules can switch from one tissue to another.[17] The larvae of *Spirometra* tapeworms are very soft and thin, therefore, if people who process snake meat do not closely examine them, they will conclude that snake meat is in a condition of proper hygiene and is safe to serve as culinary products. Our study also

shows that javan spitting cobra snake meat is confirmed to be having a role in sparganosis transmission, which is related to human sparganosis.

Conclusion

Sparganosis has become one of the important human food and water-borne parasitic diseases in Indonesia. In this study, it was found that the spargana infection rate in wild javan spitting cobra snakes sold in agricultural product markets in Banyuwangi City, East Java Province was high and that the sparganainfection originating from other snake species is considerable. Lifestyle and eating habits that may result in a sparganosis were identified in Banyuwangi City. Therefore, it is necessary to strengthen food market management, to ban the sale of wild snakes and to promote public health education in order to prevent the transmission of this parasitic disease.

Conflict of Interest: The authors declare no conflict of interest in this study.

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References

1. Wang F, Zhou L, Gong S, Deng Y, Zou J, Wu J, Liu W, Hou F.Severe infection of wild-caught snakes with Spirometraerinaceieuropaei from food markets in Guangzhou, China involves a risk for zoonotic sparganosis. J. Parasitol. 2011; 97:170-171.
2. Wang F, Li W, Hua L, Gong S, Xiao J, Hou F, Ge Y, Yang G.Spirometra (Pseudophyllidea, Diphyllobothriidae) severely infecting wild-caught snakes from food markets in Guangzhou and Shenzhen, Guangdong, China: implications for public health. Sci. World J. 2014; 1:1–5.
3. Hong Q, Feng JP, Liu HJ, Li XM, Gong LR, Yang Z, Yang WM, Liang XF, Zheng RJ, Cui ZC, Wang WL, Chen DX.Prevalence of Spirometramansoniin dogs, cats and frogs and its medical relevancein Guangzhou, China. Int. J. Infect. Dis. 2016; 53:41-45.
4. Pranashinta GT, Suwanti LT, Koesdarto S, Poetranto ED. Spirometra in Ptyasmucosus Snake in Sidoarjo, Indonesia. Vet. Med. Int. Conf. 2017; 1:1-7.
5. Yudhana A, Praja RN, Supriyatno A. The medical relevance of Spirometratapeworm infection in Indonesian bronzebacksnakes (Dendrelaphispictus):A neglected zoonotic disease. Vet. World. 2019; 12:845-848.
6. Wongkulab P, Sukontason K, Chaiwarith R. Sparganosis: a brief review. J. Infect. Dis. Antimicrob. Agents. 2011; 28:77–80.
7. Kołodziej-Sobocińska M, MiniukM. Sparganosis–neglected zoonosis and its reservoir in wildlife. Med.Weter. 2018; 74:224–227.
8. Liu DZ, Tian H and Song ZM. Report on a trade survey of the snakes in some Chinese key cities, in Proceedings of theSnake Resource Protecting Seminar, Beijing, China. 2007; pp. 12-33.
9. Ooi HK, Chang SL, Huang CC, Kawakami Y and Uchida A. Survey of Spirometraerinaceieuropaeiin frogs in Taiwan and its experimental infection in cats. J. Helminthol. 2000;74:173–176.
10. Luiselli L, Capula M, Shine R.Food habits, growth rates and reproductive biology of grass snakes, Natrixnatrix(Colubridae) in the Italian. Alps. J. Zool. 1997; 241:371–380.
11. Jędrzejewska B, Jędrzejewski W.Predation in vertebrate communities. The Białowieża Primeval Forest as a case study. Springer-Verlag, Berlin. 1998.
12. Li MW, Song HQ, Li C, Lin HY,Xie WT, Lin RQ, Zhu XQ. Sparganosis in mainland China. Int. J. Infect. Dis. 2011; 15(3):154-156.
13. Wu GL. Human Parasitology, People's Medical Publishing House, Beijing, China. 2005; 3rd edition.
14. Wu ZJ, Chen Y and Qiu XL. An investigation of plerocercoid infection of frogs in Guiyang city and analy sis of clinical characteristics of 104 cases. J. Guiyang Med. Coll. 2007; 32(1): 140-141.

15. Mo ZS, Li XH, Lei ZY, Xie DY. Clinical analysis of 25 sparganosis cases. Chinese J. Parasitol. & Parasitic Dis. 2013;31:218–220.
16. Lin XM, Wang ZQ. Overview of clinical features of sparganosis mansoni in China. J. Pathog. Bio. 2011;6:467–468.
17. Xie XB, Peng LK, Peng FH, Wang Y, Lan GB and Yu SJ. Sparganosis mansoni in adipose capsule of the living related donor in one case. J. Clin. Rehabil. Tissue Eng. Res. 2010; 14(5):906-908.

Strength Improvement in Adults Healthy Men

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Abstract

Increased strength in adult men is very important. It is critical to optimizing physical fitness and avoiding injury. Strength is a fundamental ability that must be trained along with other abilities so as not to become counterproductive. This report informs that strength training is very influential to the physique, especially in the musculoskeletal functioning for adults healthy men. Strength training also has an impact on physical activities that are good for the soul and helps fight disorders such as anxiety and depression for adults men. Increased strength in adult men is very important. It is critical to optimizing physical fitness and avoiding injury. Strength is a fundamental ability that must be trained along with other abilities so as not to become counterproductive. This report informs that strength training is very influential to the physique, especially in the musculoskeletal functioning for adults healthy men. Strength training also has an impact on physical activities that are good for the soul and helps fight disorders such as anxiety and depression for adults men. Dominant capacity is the conditional capacity where motor performance requires a higher contribution. Most of motor activities require optimal performance of at least two qualities of the three listed. The development of one of the three conditional capacities must take place in a methodical way since it directly or indirectly affects the others. Thus, the key to increasing strength in adult men is routine motor training in a structured and methodically educated routine.

Keywords: *Strength, adults, men, physical fitness, healthy.*

Introduction

We will highlight a broader picture of strength expressed by the skeletal muscle system in fit and healthy human beings[1]. Later we will also see how mechanical forces are necessary for men to perform their everyday functions, from the simplest to the most complex and deepen the role of the strength to better understand the reasons for and causes of our movements[2]. There are three conditional abilities of a person, namely resistance, strength and speed. The development of this ability counteracts the decline in muscle mass, otherwise often called sarcopenia and prev ents muscle injuries in adult men. Intramuscular coordination is useful for athletes who have high endurance and who benefit from alternating recruitment or even desynchronization, allowing greater recovery for muscles that do not contract. Research also shows that intensification techniques are the best practice. There are divisions in the context of strength. The first is maximum strength, that is the highest strength that can be expressed by the nervous-muscle system voluntarily with contraction. The second is fast strength, that is the capacity of the nervous-muscle system to overcome resistance with a high level of contraction[3].

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Material and Method

An important factor to consider is the possible presence of hypertension that can seriously present an impediment to such training since loads very close to the ceilings determine an increase in blood pressure due to the Valsalva maneuver (exhalation to closed glottis), which inevitably occurs when almost maximal loads with low repetitions are applied; this leads to an increase in chest pressure and a reduction in the flow of venous blood to the heart[4]. This condition is established especially during exercises involving large muscle masses such as squat. This happens because it tends to unconsciously increase the intra-abdominal pressure in order to protect the vertebral column from the stress[5].

For athletes who are periodically subjected to medical checks or to those who are constantly monitored, it is of crucial importance to cycle and periodize their workouts and to always introduce a less long rest period before the maximum strength cycle[6]. A question too often brought up concerns the optimal number of series and repetitions in the cycle dedicated to maximum force. Several studies agree that there is no substantial difference between the 3- and 5-series-per-exercise cycles. As such, it is important to perform a low number of repetitions strictly within the 4-to-7-stroke range with doubles and singles.

Predominantly eccentric trainings, like those of the negative ones, represent a very powerful means of development of maximum force. With this training it is possible to brake loads of even 120–130% of 1RM. It should not, however, be carried on for more than 2 or 3 weeks so as not to overload the connective structures excessively[7]. Plyometric trainings can also be useful for increasing maximum strength, provided that the same rules are observed for negative repetitions. Both of these method overload both the musculoskeletal system and the central nervous system[8].

Finding and Results

There are studies showing that the findings of this topic are very familiar and it is not surprising that these athletes always represent the "strongest" sports class with greater abilities. Maximum strength is one of the biggest mistakes an athlete can make[9]. If you want to achieve a high level of clear muscle growth and create an impressive physical structure, then you need to push hard and lift weights to strengthen your muscles and joints. In this way, improvements to posture and endurance can be achieved and the risk of spinal column pathology such as hernia in the abdominal and back muscles can be avoided[10]. This also has an impact on increasing heart contractile capacity and coronary spraying at rest. Sportsmen have not only lower heart rates than people who do not move but also lower susceptibility to sudden changes in pressure; in addition, the circulatory system becomes more elastic and has better venous return because of greater efficiencies of the muscles.

Physical activity is also good for the soul and useful for fighting disorders such as anxiety and depression. In fact, it contributes to the release of two important types of neuromediators, namely acetylcholine and endorphins. These are molecules that produce sensations of analgesia and well-being as well as properties that lead to the definition of the happiness hormone[11]. The results of research conducted on breathing exercises prove that a number of trainings given to clients are able to increase the strength of breathing muscles[3].

The increase in strength is not exponential; its growth is therefore not always linear over time. If this were not the case, in a few years any power athlete would be able to practice biceps curls with 200 kg dumbbells. Unfortunately, it does not go that way. In strength training we must intervene gradually and, in any case, within human limits, set realistic long-term goals that are achievable[13].

Discussion

The various kinds of strength mentioned above include maximum force, explosive power, resistance to explosive power and muscle endurance, which can be classified according to biological principles[4]. This power can be classified by considering both neuromuscular aspects, which function to modulate tension and metabolic aspects, which determine its duration. Therefore, maximum strength and explosive strength are characterized by neurogenic factors, while resistance to explosive forces and muscle resistance are characterized by metabolic factors[5]. Strength, speed and endurance are the main requirements for successful performance[6]. Dominant capacity is the conditional capacity where motor performance requires a higher contribution. Most motor activities require optimal performance of at least two qualities from the three listed. The development of one of the three conditional capacities must be carried out methodically because it directly or indirectly influences the other[7],[8].

Cyclists cannot think of winning the final sprint if they are not trained, volleyball players cannot think of jumping higher if they have not increased their strength and body builders cannot think of developing further hypertrophy if they have not been through power training[8]. Among the three types of strength, maximum strength is the first to be trained. After having this quality increased, one can start working on another type of power with adequate training. Maximum strength can then become explosive strength and endurance or turn into hypertrophy[19]. Maximum strength increase occurs first with adaptation and modification at the nerve system level and morphological transformation and eventually reaches hypertrophy. Most likely, neural adaptation acts at both the central and peripheral levels; this is determined as a final result. This modification will provide possibilities to immediately recruit a very high number of muscle fibers and trigger all the blasting processes by force[9].

Changes in nervous system level will ensure increases in intramuscular and intermuscular coordination with energy savings as the result as well as increases in the speed of the implementation of a movement[21]. Small loads can produce high outcomes through speed, but using low loads and high repetitions is sub-optimal because in such a training situation, the alternation of the recruitment of motor units comes into play, in which case it does not lead to the improvement of strength[1]. Higher loads, on the other hand, will provide greater supercompensation. If optimal muscle tension is not achieved, there may be no increase in the strength produced. Training method to increase maximum strength vary and include repeated effort method: series method, pyramidal method, dynamic method, maximal effort method, static or isometric stress method and contrasting method[10]. The latest findings reviewing articles that show that exercises that are carried out slowly and gently can reduce the risk of even simple exercises if done incorrectly can cause joint pain and muscle tension aimed at improving male posture[17].

The method above are the result of a study which combines well with performance sports[2]. Strength training for advanced bodybuilders or fitness practitioners aims to increase the reception capacity of motor units, thereby usable in mesocycles for hypertrophic purposes. This is principally the characteristic to building strength[7].

Conclusions

Dominant capacity is the conditional capacity where motor performance requires a higher contribution. Most of motor activities require optimal performance of at least two qualities of the three listed. The development of one of the three conditional capacities must take place in a methodical way since it directly or indirectly affects the others. Strength is a fundamental ability that must be trained along with other abilities so as not to become counterproductive. It serves as a starting point. A cyclist cannot think of winning a final sprint if he has not trained his strength, a volleyball player cannot think of jumping higher if he has not trained his strength and a bodybuilder cannot think of developing further hypertrophy if he has not trained his strength. Thus, the key to increasing strength in adult men is routine motor training in a structured and methodically educated routine.

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References

1. Granacher U, Hortobágyi T. Exercise to Improve Mobility in Healthy Aging. Sport Med. 2015;45(12):1625–6.
2. Gebel A, Lesinski M, Behm DG, Granacher U. Effects and Dose–Response Relationship of Balance Training on Balance Performance in Youth: A Systematic Review and Meta-Analysis. Sport Med [Internet]. 2018;48(9):2067–89. Available from: https://doi.org/10.1007/s40279-018-0926-0
3. Yamamoto S, Hotta K, Ota E, Mori R, Matsunaga A. Effects of resistance training on muscle strength, exercise capacity and mobility in middle-aged and elderly patients with coronary artery disease: A meta-analysis. J Cardiol [Internet]. 2016;68(2):125–34. Available from: http://dx.doi.org/10.1016/j.jjcc.2015.09.005
4. Mählmann L, Gerber M, Furlano RI, Legeret C, Kalak N, Holsboer-Trachsler E, et al. Aerobic exercise training in children and adolescents with inflammatory bowel disease: Influence on

psychological functioning, sleep and physical performance – An exploratory trial. Ment Health Phys Act. 2017;13:30–9.

5. Montero D, Vinet A, Roberts CK. Effect of combined aerobic and resistance training versus aerobic training on arterial stiffness. Int J Cardiol [Internet]. 2015;178:69–76. Available from: http://dx.doi.org/10.1016/j.ijcard.2014.10.147
6. Schepers P, Fishman E, Beelen R, Heinen E, Wijnen W, Parkin J. The mortality impact of bicycle paths and lanes related to physical activity, air pollution exposure and road safety. J Transp Heal [Internet]. 2015;2(4):460–73. Available from: http://dx.doi.org/10.1016/j.jth.2015.09.004
7. Romero-arenas S, Blazevich AJ, Martínez-pascual M, Pérez-gómez J, Luque AJ, López-román FJ, et al. Effects of high-resistance circuit training in an elderly population. EXG [Internet]. 2013;48(3):334–40. Available from: http://dx.doi.org/10.1016/j.exger.2013.01.007
8. Berner Y, Barer Y, Shefer G, Stern N. Circuit resistance training is an effective means to enhance muscle strength in older adults A Systematic Review and Meta-analysis. Ageing Res Rev [Internet]. 2017; Available from: http://dx.doi.org/10.1016/j.arr.2017.04.003
9. Fernhall B, Borghi-Silva A, Babu AS. The Future of Physical Activity Research: Funding, Opportunities and Challenges. Prog Cardiovasc Dis [Internet]. 2015;57(4):299–305. Available from: http://dx.doi.org/10.1016/j.pcad.2014.09.003
10. Myers J, McAuley P, Lavie CJ, Despres JP, Arena R, Kokkinos P. Physical Activity and Cardiorespiratory Fitness as Major Markers of Cardiovascular Risk: Their Independent and Interwoven Importance to Health Status. Prog Cardiovasc Dis [Internet]. 2015;57(4):306–14. Available from: http://dx.doi.org/10.1016/j.pcad.2014.09.011
11. Getty AK, Wisdo TR, Chavis LN, Derella CC, Mclaughlin KC, Perez AN, et al. Effects of circuit exercise training on vascular health and blood pressure. Prev Med Reports [Internet]. 2018;10(February):106–12. Available from: https://doi.org/10.1016/j.pmedr.2018.02.010
12. Permadi AW, Putra IMWA. Comparison of respiratory training method for chest wall expansion in patients with chronic obstructive pulmonary disease. J Phys Educ Sport. 2018;18(4).
13. Sousa M De, Zouita A, Abderrahmane A Ben. Progressive circuit resistance training improves inflammatory biomarkers and insulin resistance in obese men. Physiol Behav [Internet]. 2018;#pagerange#. Available from: https://doi.org/10.1016/j.physbeh.2018.11.033
14. Borde R, Hortobágyi T, Granacher U. Dose–Response Relationships of Resistance Training in Healthy Old Adults: A Systematic Review and Meta-Analysis. Sport Med. 2015;45(12):1693–720.
15. Con H. Balance ability and athletic performance. Sport Med. 2011;41(3):221–32.
16. Behm DG, Drinkwater EJ, Willardson JM, Cowley PM. Canadian Society for Exercise Physiology position stand: The use of instability to train the core in athletic and nonathletic conditioning. Appl Physiol Nutr Metab. 2010;35(1):109–12.
17. Kibele A, Granacher U, Muehlbauer T, Behm DG. Stable, unstable and metastable states of equilibrium: Definitions and appli-cations to human movement. J Sport Sci Med. 2015;14(4):885–7.
18. Zhang Z, Chen W. A Systematic Review of the Relationship Between Physical Activity and Happiness. J Happiness Stud [Internet]. 2019;20(4):1305–22. Available from: https://doi.org/10.1007/s10902-018-9976-0
19. Walterspacher S, Pietsch F, Walker DJ, Röcker K, Kabitz HJ. Activation of respiratory muscles during respiratory muscle training. Respir Physiol Neurobiol [Internet]. 2018;247(August 2017):126–32. Available from: http://dx.doi.org/10.1016/j.resp.2017.10.004
20. Coetsee C, Terblanche E. The effect of three different exercise training modalities on cognitive and physical function in a healthy older population. Eur Rev Aging Phys Act. 2017;14(1):1–10.
21. Bandera F, Generati G, Pellegrino M, Labate V, Donghi V, Alfonzetti E, et al. Cardiac Determinants of Functional Capacity: Cardiopulmonary Exercise Testing Combined With Exercise-Echocardiography. J Am Coll Cardiol [Internet]. 2015;65(10):A1198. Available from: http://linkinghub.elsevier.com/retrieve/pii/S0735109715611986
22. Permadi AW. The benefits of aerobic activitiy to impact on improving quality of life : A Critical Riview of Study. 2019;4(7):7–10.

An Analysis of ROSIER Method on Handling Acutee Stroke in Emergency Room of PKU Muhammadiyah Gamping Hospital

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Abstract

The predominance of intense stroke consistently increments from year to year. Ideal taking care of the executives was required to upgrade the standard of taking care of. ROSIER (Recognition of Stroke Inside the Emergency Room), this strategy is an evaluation that is utilized to distinguish and intercede quickly in patients with acutee stroke. The motivation behind this investigation was to break down the ROSIER method in overseeing acutee stroke in the Emergency Room(ER). The examination configuration was an observational investigation. Right now an example of nurses, doctors and patients in the ER PKU Muhammadiyah Gamping Hospital. The instrument utilizes surveys and perception sheets. Engaging investigation and connection utilizing the rank spearmen test. The outcomes show that age, instruction and length of work are not identified with the kowledge acutee stroke on nurses and doctors about stroke and its care management. Plus, it was found in the treatment of acutee stroke utilizing the ROSIER method, the underlying evaluation was as yet not maximally did. The outcomes demonstrated that the underlying asesment of stroke patients was beneath 80%. While the supporting assessmen, the underlying analysis, the exchange framework and the commencement of the exchange procedure have been completed with a rate above 80%. The ROSIER method comprises of evaluation and treatment appraisals, which deliberately whenever actualized appropriately will incredibly help with accomplishing treatment targets, is dodging even incapacity and demise because of deferrals or wrong method in the asesment and taking care of treatment stroke acutee.

Keywords: *Acute Stroke, Emergency, ROSIER Method.*

Introduction

Stroke is one the main cause death in the world or globaly the leading cause of mortality. In Indonesia turned into the No. 1 most noteworthy in Southeast Asia and stroke is additionally alluded to as the Silent Killer``, which is an instance of the reason for death subtly and keeps on tending to build[1]. RISKESDAS information for 2018 expressed that the commonness of stroke in Indonesia at the time of ≥ 15 years was 10.9% every moment, while in 2013 this pervasiveness was at 7% so that there was an expansion of 3.9% over a time of 5 years. Uncommon Region of Yogyakarta (DIY) as the region that has the most elevated predominance in 2018 is 14.7% which is equivalent to the territory of East Kalimantan[2].

Treatment of Strokes in ER by and large isn't ideal, it is demonstrated that the triage framework is as yet not ready to run appropriately, exceptional revival, particularly advance life bolster that supports hemodynamic framework disappointments because of neurological issue, at that point not promptly get an uncommon examination in particular brain CT Scan for decide if this acutee stroke is a kind of hemorrhagic or localized necrosis and there is no particular perception

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framework in the crisis space for stroke patients. Another factor that turns into a test in the treatment of intense ischemic stroke is the best possible and well-overseen treatment in the ER for instance of the low accessibility of thrombolysis treatment and supporting foundation for thrombolysis treatment in creating nations[3].

The board of intense stroke in the beginning times requires a decent technique and framework, quick and proper intercessions, particularly in the crisis room will have a noteworthy effect to lessen the danger of death and incapacity of patients. A few things can be kept from creating relentless manifestations of TIA (Transient Ischemic Attack), diminished cognizance, loss of motion of furthest points, discourse issue and different indications of neurological issue. The board of intense stroke in the ER turns into a significant piece of coordinated treatment running from treatment at home or prehospital to rehabilitation care after this patient is hospitalized. One successful strategy that can be utilized in the ER is the ROSIER (Recognition of Stroke in the Emergency Room) method, this technique is an evaluation scale that is utilized to recognize and intercede quickly in patients with acutee stroke[4]. ROSIER is a piece of Stroke acutee Management with Urgent Risk-factor Assessment and Improvement (SAMURAI), which contains compelling method for overseeing acutee stroke sufferers by limiting sequelae or inability and inconveniences of acutee stroke[13].

Method

The examination configuration utilizes observational scientific research that intends to dissect stroke the board with the ROSIER strategy. This exploration was directed at the ER Rooof PKU Muhammadiyah Gamping Hospital Yogyakarta.

The example right now:

1. Patients entering June - September 2019
2. Nurses and Doctors in ER of PKU Muhammadiyah Gamping Hospital numbered 27 individuals.

Testing was finished by purposive sampling. Criteria inclusi of patients will be patients with an acutee stroke class and not the Do Not Resuscitation (DNR) classification. The exploration instrument utilized a poll to quantify the information knowledge on nurses and doctors about overseeing acutee stroke with the ROSIER method. The following instrument is perception sheet to survey: triage framework for acutee stroke patients, initial asesment, resuscitation, openness support for brain CT examines, access to thrombolytic treatment in stroke infark category, Observation and transfer system acutee stroke patients. Data Analisis was performed of desciptif analitic and with rank spearmen test to break down the corelation between variable.

Result

The consequences of the examination clarified the recurrence conveyance of respondents' attributes, to be specific nurses and doctors in the ER of PKU Muhammadiyah Gamping Hospital and broke down the connection between age, training and length of work with the knowledge on nurses and doctors about stroke and its taking care of (table 1 and table 2). Other than that, it was additionally indicated the treatment of acutee stroke by the ROSIER method by showing eight treatment segments.

Table 1. Frequency Distribution of General Data and Knowledge of Health Officers (Nurses and Doctors)

Variable	n (%)
A. General Data	
Age (Years)	
• 25-35	22 (81.5)
• 36-45	4 (14.8)
• > 45	1 (3.7)
Education	
• Diploma III in Nursing	10 (37.0)
• Ners	7 (25.9)
• Doctor	10 (37.0)
Years of Work (Years)	
• <1	6 (22.2)
• 1-3	6 (22.2)
• > 3	15 (55.6)
B. Knowledge	
• Good Knowledge	18 (66.7)
• Medium Knowledge	9 (33.3)
• Lack of knowledge	0 (00.0)

Table 2. Spearmen Rank Test Results

Variable	p-value
Age with Knowledge	0.967
Education with Knowledge	0.934
Long Working with Knowledge	0.625

Table 1 above shows that most of nurses and doctors are matured 25-35 years (81.5%) with 37% segments having a Diploma III in Nursing, 25.9% nurses and 37%

doctors. The greater part of respondents (55.6%) have work experience > 3 years.

While Knowledge about acutee stroke care management shows that as much as 66.7% of good category and 33.3% of medium category. The examination indicated that age, training and length of work were not identified with nurses and doctors knowledge about stroke and its care management (table 2).

Treatment of acutee stroke utilizing the ROSIER method appeared in the greater part of the respondents (53.7%) fall into the need triage classification priority 2. The aftereffects of the underlying evaluation of acutee stroke patients outline that the appraisal procedure or introductory evaluation of patients for all segments of the appraisal is as yet not done to the most extreme. It is apparent from the outcomes that the evaluations that have been done in every appraisal are in the rate beneath 80%. The most noteworthy appraisal score was done on the evaluation of past stroke history (78.0%), evaluation of stroke beginning (70.7%) and evaluation of circulatory strain esteems (70.7%). While the most reduced score was gotten from the National Institute of Health Stroke Scale (NIHSS) score appraisal with an aftereffect of 46.3%. Revival of stroke patients is done if there are signs. The outcomes demonstrated that the most revival measures were IVline establishment (65.9%) and breathing instrument establishment(36.6%). While the least done is the arrangement of Cardiac Pulmonary Resuscitation (CPR) of 2.4%. Supporting assessment get to was done by practically all respondents (90.2%). Different examinations were completed, for example, routine blood, liver capacity and kidney fuction. Though 78% of respondents brain a CT Scan examine.

The underlying finding was made of 87.8% of respondents. Access to thrombolytic treatment was done in 9.8% of respondents. The perception framework was completed on 87.8% of respondents. The transfer system is completed at 73.2% of respondents. While the best possible commencement of the transfer procedure practically all respondents (90.2%) were completed.

Discussion

The consequences of this examination demonstrate most of nurses and doctors knowledge about the appraisal and treatment of acutee stroke in ER the great class, this shows the ROSIER method has been comprehended and applied in the treatment of acutee stroke patients in the ER. A few components could be the reason for their great degree of information, could be because of the propensity transmitted among seniors and youngsters, likewise could be because of the standard Operational Procedure(SOP) for taking care of acutee stroke in the ER and obviously, there is an update to know by every person from different approaches to get data on taking care of acutee stroke in the ER[14].

Nurses in ER work crisis officials, particularly those working in crises with an assortment of associations and patient classes that must be unraveled, unpredictable and multidimensional issues, this requires a medical caretaker to function admirably in groups and ready to work under huge tension from different gatherings, the quality nurses keep on being improved remembering for this case the underlying evaluation procedure and activities[5]. This is identified with patients with stroke crisis conditions requesting the capacity to triage, quick evaluation, assurance of determinations and proper measures to forestall postpones that outcome in incapacity and passing in patients who experience an acutee stroke in the ER[12].

The procedure of initial asesment of acutee stroke patients in the crisis office utilizing the ROSIER method comprises of asesment and treatment appraisals, which deliberately when applied appropriately will be exceptionally useful in accomplishing treatment targets, is keeping away from inability and not even demise because of postponements or wrong strategies in the asesment and treatment[13]. The consequences of this investigation are the underlying evaluation process in acutee stroke patients who go to the ER has not been done ideally all in all, the normal surveyed esteem is underneath 80%, this will influence the appraisal or move to be made straightaway. As per the National Confidential Inquiry into Patient Outcome and Death(NCEPOD), fast and precise appraisals in Emergency Services will affect late basic leadership and poor dealing with[6].

The assesment of the ROSIER technique that should be done is the appraisal of diminished cognizance and seizures, facial and appendage neurological issue, visual hindrance, appraisal of past stroke history, beginning of the assault is to what extent the patient was distinguished to have a stroke[7]. Hazard factors for stroke patients should be surveyed to decide the ideal anticipation and treatment bolstered when a quick evaluation of circulatory strain, glucose esteems (GDS) and a NIHSS score appraisal comprising of 1. (a) evaluation of level

of awareness, (b) reactions to questions, (c) LOC directions, 2. Turn around look, 3. Field of vision, 4. Facial loss of motion, 5. (a) right arm engine, (b) left arm engine, 6. (a) right leg engine, (b) left appendage engine, 7. Appendage ataxia, 8. Tangible, 9. Language, 10, dystraasia, 11. Consideration, with a range from 0 to the heaviest 42 scores. NIHSS can decide the examination estimation of hemorrhagic stroke (SH) if its score> 20 and NIHSS <20 is a non-hemorrhagic stroke (SNH)[8]. NIHSS can likewise lessen the danger of confusions in stroke patients because of desire by evaluating the degree of patient mindfulness[9].

The utilization of ROSIER in the ER will be a guide in setting up standard working method or medicinal assistance approaches for the treatment of acutee stroke patients, beginning with a fast appraisal in order to decide the correct triage and resuscitation, availability of the fundamental CTScan examine is performed with a holding up time of <45 minutes from confirmation ER, introductory analysis <3 hours, assurance of treatment as indicated by finding including quick access to thrombolytic stroke infark. The advantages of intravenous (IV) Plasminogen Activator (tPA) tissue are time-subordinate, that is, the reaction time of the entryway to needle is 3 hours from the beginning of the assault[16]. The patient's necessities are as per ECASS III rejection criteria. acutee stroke localized necrosis that doesn't meet the necessities of both must be finished by mechanical thrombectomy[10]. Right now, aftereffects of access to thrombolytic treatment with IV tPA in PKU Muhammadiyah Gamping IGD are still minimal done (9.8%), different reasons for time components and criteria and clinic strategies in regards to these treatments have not been solid.

The correct observation system in the ER so it will help the possibility of moving or transfer acutee stroke patients from the crisis space to the stroke unit or intensive care unit (ICU) or the standard inpatient room is likewise a manual for the qualification of the referral framework between medical clinics with different signs. The Rapid Assessment in the proper ER can help further administration so it can lessen the quantity of Leng of Stay (LOS) patients[11]. Detainment of patients in the (ED LOS) including stroke patients, there are a few components, in particular the patient's inner variables, outer elements and different factors outside them two, for instance, patients in the ER will be moved to hospitalization subsequent to getting an expert specialist's conference, while the pro specialists are not beginning at the Emergency Departement.

Different contemplations in the rapid asesment process in acutee stroke patients despite everything focus on the vital Sign identified with the triage condition, if in an actual existence sparing resuscitation life saving condition some optional scondary asesment might be deferred or may not be finished. On the off chance that a stroke quiet lands at the crisis office with need triage one priority and requires CPR, establishment of endotracheal intubation, utilization of a ventilator and other advanced life support, at that point some optional evaluation will be deferred until the patient's condition is steady, for instance, a CTScan check, thrombolytic treatment and assessment other help[15].

Conclusion

The finishes of this investigation are:

1. Emergency Departement officials right now and specialists in the PKU Muhammadiyah Gamping IGD show a large portion of the kwoledge about taking care of acutee stroke in the ER with the ROSIER method in the great class.
2. Aftereffects of investigation Age, instruction and length of work of nurses and doctors are not identified with knowledge about stroke and its care management.
3. The triage of patients who go to the ER is for the most part in the need priority 2 which requires a non-resuscitation adjustment evaluation.
4. The use of the ROSIER method in the treatment of acutee stroke comprises of introductory asesment, resuscitation, availability of supporting assesment, starting conclusion, access to thrombolytic treatment, observation and transfer for acutee stroke patient. The underlying asesment part of acutee stroke has not been done ideally

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References

1. Katarzyna Sawicka, Michał Szczyrek, Iwona

Jastrzębska, Marek Prasał, Agnieszka Zwolak, Jadwiga Daniluk, Hypertension – The Silent Killer Journal of Pre-Clinical and Clinical Research, Vol 5, No 2, 43-46, 2011.

2. Hasil Utama RISKESDAS 2018, https://labdata. litbang.depkes.go.id/riset-badan-litbangkes/menu-riskesnas/menu-riskesdas/426-rkd-2018.
3. Durai Padian J, Stroke and thrombolysis in developing, International Journal of Stroke. Vol.2 (1),17-26.2007.
4. Nor, Azlisham Mohd, et al, The Recognition of Stroke in the Emergency Room (ROSIER) scale: development and validation of a stroke recognition instrument 2005 The Lancet Neurologi, DOI:10.1016/S1474-4422(05)70201-5.
5. Athlin A.M, To Receive or Not to Receive Analgesics in the Emergency Department: The Importance of the Pain Intensity Assessment and Initial Nursing Assessment. The American Society for Pain Management Nursing. 2015.
6. Lake Caroline, Assessment of the emergency surgical patient, Anesthesia and Intensive Care Medicine, Elsevier Ltd;2018,19(9) 2018.
7. American Heart Association. About STROKE. 2018, http://www.strokeassociation.org/ STROKEORG/AboutStroke/TypesofStroke/TIA/ Transient-Ischemic-AttackTIA_UCM_492003_ SubHomePage.jsp
8. Saudin D & Pramono. Nursing Care for Thalassemia Children Comparative Study of Emergency Neurology Using Siriraj Score (Ss) with the National Institute of Health Stroke Scale (NIHSS) Method in Stroke Patients at Jombang Islamic Hospital, Edu Nursing Journal. 2018: 2 (1)
9. Okubo P.C.M.I, Using the National Institute of Health Stroke Scale to Predict Dysphagia in, Acuteee Ischemic Stroke, Cerebrovasc Dis. 2012; 33: 501–507.
10. Powers WJ. AHA/ASA Stroke Early Management Guidelines, http://stroke.ahajournals.org/ content/49/3/e46.2018.
11. Anderson, MD Jared S., The Effect of a Rapid Assessment Zone on Emergency Department Operations and Throughput. The American College of Emergency Physicians, 2019.
12. Kusumawati H.I, Analysis of factors influencing length of stay in the Emergency Department in public hospitals, Yogyakarta, Indonesia, Australian emergency, 2019 Care; 22(3):174179.
13. Al Afik, SAMURAI ROSIER Method for the treatment of acuteee stroke in the Emergency Department, Journal of Sain Med; 6 (2)2014.
14. Edward C Jauch., Acutee Management of Stroke. The medical resource for physicians, 2012
15. Jauch, AHA/ASA Guidelines: Guidelines for the Early Managementnof Patients with Acuteee Ischemic Stroke, 2013.
16. How come M, et al. Low-dose intravenous recombinant tissue-type plasminogen activator therapy for patients with stroke outside European indications, 2012.

Features of Determining the Condition of the Thyroid Gland in Young People Residing in Regions with Partially Expressed Iodine Deficiency

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Abstract

Anthropometric and sonographic studies of 92 school children of younger and older age groups were carried out. It has been proven that the transverse size of the thyroid gland is larger in boys than in girls in both age groups. However, in a sonographic assessment of thyroid volume, opposite trends were obtained. To assess thyromegaly, a sonographic assessment of thyroid volume is necessary, since the determination of the volume of the thyroid gland by ultrasound is deprived of the subjectivity inherent in different doctors on palpation. However, an assessment of the size of the thyroid gland must be carried out in accordance with the body (area) of the child, calculated on the basis of height and weight.

Keywords: *Anthropometry, sonography, thyroid gland, students, prevention.*

Introduction

Iodine deficient diseases are one of the most common non-infectious human pathologies. In 1988, 7 million people (about 35.2% of the population) experience iodine deficiency in the world. An increase in thyroid gland was found in about 700 million people and severe mental retardation due to iodine deficiency was found in 45 million[1]. According to WHO, in the world there are more than 200 million patients with endemic goiter. Iodine deficiency resulting in goiter occurs in 187 million people globally as of 2010 (2.7% of the population). It resulted in 2700 deaths in 2013 compared to 2100 deaths in 1990. The area is considered endemic if the frequency of goiter according to ultrasound exceeds 5% and the **median concentration of iodine in the urine in children of prepubertal age (6-12 years) is less than 100 μg/l**[7]. Especially dangerous is the decrease in intellectual performance and hence the ability to learn, among schoolchildren and adolescents, since it is at this age that a person receives the necessary amount of basic knowledge, largely determines the intellectual possibilities in later life[2].

The proportion of the population and the number of individuals (school-age children and general population) with insufficient iodine intake (defined as proportion of population with UI below 100 μg/l) by WHO region[9] is presented in Table 1.

Table 1: Insufficient iodine intake in school-age children (6 to 12 years) and in the general population (all age groups) by WHO

WHO	School-Age Children		General Population	
	Proportion (a) (%)	Total number (Millions)	Proportion (b) (%)	Total Number (Millions)
Africa	42.3	49.5	42.6	260.3
Americas	10.1	10.0	9.8	75.1
South-East Asia	39.9	95.6	39.8	624.0
Europe	59.9	42.2	56.9	435.5
Eastern Mediterranean	55.4	40.2	54.1	228.5
Western Pacific	26.2	48.0	24.0	365.3

a 192 WHO Member States, b Based on population estimates in the year 2002, **Source:** WHO

Iodine prophylaxis is a priority in the elimination of goiter endemic. The most vulnerable part of the population are children, including those of school age. Indeed, the anatomical and functional state of the thyroid gland in school children of this age clearly reflects the current state of iodine supply and is less variable than in adolescents during the puberty period [2].

A number of authors recommend to use the following method to assess the severity of iodine deficiency diseases: anthropometric (height, weight), physical (palpation, measurement of gland size), ultrasound examination with determination of gland volume, determination of iodine content in urine and determination of TSH, T3, T4 concentrations[3]. However, not every medical institution possess laboratory and instrumental method of research which can be performed with best accuracy. Despite the fact that ultrasound examination of the thyroid gland has been used for more than 25 years, there has not yet been a generally accepted idea of what should be considered the norm in sonographic studies in school children of different ages [5,8]. In addition, today in the world there is no acceptable for clinical practice and adequate for endocrinologists unified classification of degrees of increase in thyroid volume (in contrast to the palpator-visual scale of the WHO, in 1994) [4]. *Therefore, the search for simple and cheap criteria in determining iodine deficiency in school-age people continues* [6].

The aim of the study was to assess the diagnostic value of anthropometry and its correlation with the data of thyroid sonography in schoolchildren of different age groups for the timely detection of thyroid pathology in persons living in iodine - deficiency endemic regions during the full-time medical examination.

Material and Method

Two age groups of school children were selected for the study: the youngest, which consisted of students of two-three grades aged 8-9 years and older, which consisted of students of three-ten grades aged 15-16 years. The distribution of children by age and sex is presented in Table 2.

Table 2: Distribution of children by age and sex

Gender/Age	Female		Male	
	Number	%	Number	%
8-9 yrs	25	54	21	46
15-16 yrs	32	70	14	30
Total	57	62	35	38

Measurement of the transverse size of the thyroid gland and neck circumference in schoolchildren was carried out using a centimeter tape. When measuring the circumference of the neck, the end of the tape was fixed on the spinous process of the VII-cervical vertebra and the tape is passed over the most protruding part of the anterior surface of the neck. Height and weight of students were measured traditionally, in the medical office of the school. Sonography of the thyroid gland was performed using the SONOLINE SL-1 device manufactured by Siemens (Germany) using a linear sensor with a vibration frequency of 7.5 MHz operating in real time. Thyroid sonography took into account the shape and echo-structure, the presence of nodes, linear dimensions (length, width, thickness) and determined the volume of each part. It should be noted that the technique of measuring the size of the thyroid gland in schoolchildren provided the following minimum of important elements. The position of the sensor on the child's neck was accompanied by minimal pressure on the skin to prevent flattening of the gland. Measurements of linear dimensions were carried out only on such transverse and longitudinal sections of both lobes, which reflect their maximum value. Choosing a cross-section, focus on the true (anatomical) cross-sectional plane (horizontally - not at an angle), while the longitudinal size (length or height of the shares) is actually determined by the axis deviates from the vertical. The optimal is an obliquely vertical position of the sensor, when it is oriented parallel to the outer edge of the sternocleidomastoid muscle. To determine the volume of the thyroid gland used the formula:

V (lobe) = length * width * height * 0,479 where 0,479 - factor ellipsoidal.

The volume of one lobe of the gland is measured in cubic centimeters or milliliters. The volume of the second part is calculated in the same way. Accordingly, these volumes are added and the total volume of the thyroid gland according to the formula:

Thyroid V = V the right lobe of the + V of the left lobe. The calculation of the volume of the thyroid gland does not include the volume of the isthmus, it is not taken into account at all.

The **Results** were statistically analyzed using Wilcoxon's nonparametric statistical paired T-test. Results and discussion. Anthropometric data of students are presented in Table 2.

Table 3: Anthropometric data of the group of schoolchildren who were studied

Indicators and units	Number of observations	Girls		Boys	
		Younger age group	Oldest age group	Younger age group	Oldest age group
Height, cm	92	132,2±0,02%	166,7±0,01%	133,5±0,02%	175,75±0,01%
Weight, kg	92	28,3±0,02%	54,55±0,01%	31,9±0,02%	62,57±0,01%
Neck circumference, cm	92	28±0,02%	32,4±0,01%	29,96±0,02%	35,57±0,01%
Transverse size of the thyroid gland, cm	92	2,75±0,02%	3,59±0,01%	2,91±0,02%	3,76±0,01%

Anthropometric studies of 92 schoolchildren showed that there are certain age and sex differences in schoolchildren of different age groups. However, with the same trends in changes in the transverse size of the thyroid gland, there are significant differences in other anthropometric data. Thus, in the younger age group, the difference in height between boys and girls is only **1.3 cm** (132.2 + 0.02% vs. 133.5 + 0.02%), in the older age group, this difference is significant - **9.05 cm** (166.7 + 0.01% vs. 175.75 + 0.01%).

Similar trends are observed when measuring the weight(difference), which is **3.6 kg** in the younger age group (28.3 + 0.02% vs. 31.9 + 0.02%) and **8.02 kg** in the older age group (54.55 + 0, 01% vs. 62.57 + 0.01%). The same trends persist in the measurement of neck circumference: the difference was **1.96 cm** (28 + 0.02% vs. 39.96 + 0.02%) and **3.17 cm** in high school students (32.4 + 0, 01% vs. 35.57 + 0.01%). Quite the opposite trends are observed when measuring the transverse size of the thyroid gland. As in the younger and older age groups, the transverse size of the thyroid gland in girls is less than in boys. In the younger age group, the transverse size of the thyroid gland in girls was 2.75 + 0.02% cm versus 2.91 + 0.02% cm in boys. The difference was **0.16.** The same trends are observed in the oldest age group: the transverse size of the thyroid gland in girls was of 3.59 + 0.01% of cm vs. 3,76 + 0,01% in boys and the difference between them was almost the same as in the younger age group - **0,17 cm.**

Findings: In contrast to the adult population, where according to the literature the thyroid gland is larger in women, schoolchildren have the opposite dependence. These differences in the measurement of transverse thyroid size are NOT fully correlated with sonographic data. Thus, in the younger age group, the volume of the thyroid gland ranged from 6.1-6.8 ml in boys (Fig.1) and 6,7-8,0 ml in girls. Moreover, if in 8-year-old girls this difference was 0.7 ml, in 9-year-olds it already reached 1.2 ml. In the older age group, thyroid volume ranged from 13.9-16 ml in boys (Fig.3), while 14.9-15.6 ml in girls (Fig.2). And if in 14-year-old girls the same tendency was traced, as in younger age group-the volume of their thyroid gland is more on 1,0 ml than at representatives of opposite sex, while in 15-year-old schoolboys the opposite tendency took place. Thus, the volume of the thyroid gland of the boys exceeded by 0.4 ml the same indicators of the girls.

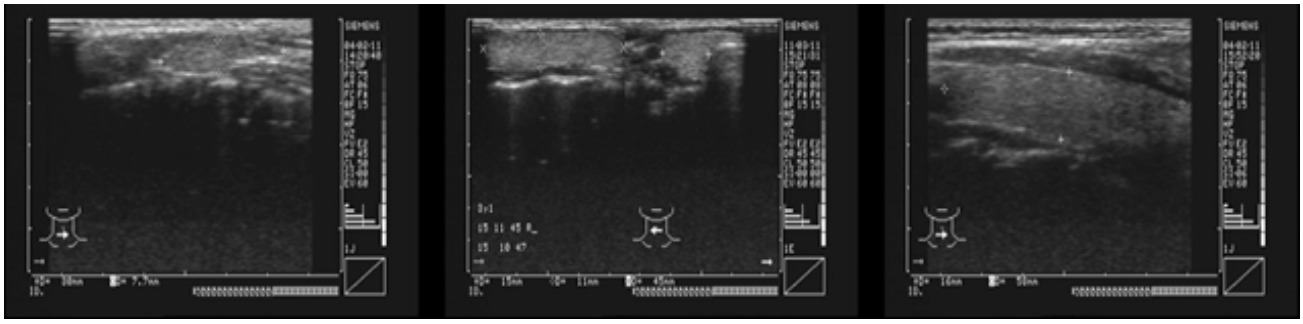

Fig. 1. Sonogram boy D., 8 years. Fig. 2. Sonogram girl L., 15 years. Fig.3. Sonogram boy A., 15 years old.

Discussion

Thus, in children's and adolescents practice, the "isolated" interpretation of the volume of the thyroid gland is **uninformative**, as well as the" isolated " interpretation of anthropometric data. Therefore, to assess the sonographic size of the gland in schoolchildren of different age groups, it is necessary to take into account their **anthropometric data**. The most accurate is the assessment of the size of the thyroid gland in accordance with the area of the student's body, calculated on the basis of height and weight. This calculation of the area of the student's body should always be based on" fresh " information about his height and body weight.

Conclusion/Summary

Anthropometry is a simple and affordable method, but its use to assess the extent of thyroid enlargement in individuals undergoing face-to-face medical examination is not reliable. To assess thyromegaly, a sonographic assessment of thyroid volume is necessary, since the determination of thyroid volume by ultrasound is devoid of the subjectivity inherent in different doctors with palpation.

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References

1. Pankiv V.I. Iodomarin in the prevention and treatment of endemic goiter in areas with iodine deficiency/V.I. Pankiv//Health of the child. 2006. - No. 2. - S. 104-106.
2. Pinsky S. B. Diagnosis of thyroid diseases/S. B. Pinsky, A. P. Kalinin, V. A. Beloborodov. —M .: Medicine, 2005. - 192 p.
3. Ryumin G.A., Shilin D.E., Kasatkina E.P., Pykov M.I. New approaches in the differential diagnosis of diffuse non-toxic goiter in children and adolescents//Sonoace International (Russian version). - 2000. - Issue. 7. - S. 65-69.
4. Shilin D.E., Tsvetkova N.I., Gorokhova N.A. et al. Antithyroid autoimmune reactions and hyperprolactinemia in allergic diseases of children and adolescents//Problems of Endocrinology. - 2002. - T. 48. - No. 3. - S. 13-17.
5. Assessment of the Iodine definition Disorders and monitoring their elemination: a guide for programmer managers. - 3rd ed. - Geneva, WHO/ Euro/NUT/2007. - p. 1-98.
6. A. Benninghoff, D. Drenckhahn (Ed.): Anatomy. 16. Edition. Urban & Fischer, Elsevier, München 2004. Band 2
7. J. Siewert, M. Rothmund, V. Schumpelick (Ed.): Practice of visceral surgery. Endocrine Surgery. 2. Edition. Springer, Heidelberg 2007.
8. Iodine Status Worldwide. WHO global database of iodine deficiency/editors: Bruno de Benoist; Maria Andersson; Ines Egli; Bahi Takkouche; Henrietta Allen[et al.] 2004
9. WHO, UNICEF, ICCIDD. Assessment of iodine deficiency disorders and monitoring their elimination. Geneva, World Health Organization, 2001 (WHO/NHD/01.1).

Experience of Indonesian Mothers in Implementing Kangaroo Mother Care During Hospitalization with Low Birth Weight Neonates

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Abstract

Background: Parents who have babies with Low birth weight (LBW) face various challenges. LBW caused various problem to child. Kangaroo Mother Care (KMC) is the factor is an effective and safe alternative way of treating neonates with LBW. The aim is to describe the barriers and mothers' experience in implementing KMC during hospitalization with LBW neonates in Medan, Indonesia.

Study Design: A qualitative study with phenomenological approach.

Method: The instruments used in this study are made up of demographics data, semi-structured interview, field notes and observation guidelines with reference to the Indonesian Ministry of Health and the Indonesian Perinatology Society modules.

Results: Mothers had moderate knowledge (33%) about KMC and poor knowledge (47%) about its benefits. The negative attitudes of the mothers 40% were due to the limited available facilities which cause inefficient implementation and reduce the mothers' motivation in performing KMC for their babies. Mothers with negative attitude towards its implementation were 40%, as they did not get enough support from the family.

Conclusions: KMC implementation during hospitalization was not optimal due to various factors. Those barriers could be identified from the lack of KMC socialization programs, the limited number of trained nurses who have knowledge and skills about KMC, nurses' attitudes that show lack of support and commitment in implementing KMC programs and cultural factors that are still unfriendly with the KMC program.

Keywords: *Mothers' experience, barriers, kangaroo mother care, low birth weight neonates.*

Introduction

Low birth weight (LBW) is a term used to describe a live-born baby weighing less than 2500 grams regardless of gestational age[1]. Complications that occur in neonates with LBW during the first 72 hours of life are jaundice, asphyxia birth, hypothermia, hypoglycemia, respiratory distress syndrome and sepsis[2]. According to the World Health Organization, Indonesia ranks 9th in the world with a percentage of LBW more than 15.5% of births every year[3]. The neonatal mortality rate in Indonesia in 2014 was 78.5% occurring at the age of 0 - 6 days[4]. Considering the high risk of death and other complications that occur during the first week of birth, each LBW neonate is mandated to undergo a series of regular standard assessment, at least twice during the first week. This is performed in order to detect any early signs of a disease or clinical disorders so that the proper assistance can be given immediately to prevent neonatal

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death. Therefore, it is necessary to assess mothers' knowledge in relations to providing care for babies with LBW. The Kangaroo method is very efficient in reducing the occurrence of complications in neonates with LBW and also an important intervention in reducing infant mortality as a result of LBW.

Previous studies revealed that parents who have babies with LBW face various challenges. According to Cervantes, Feeley, andLariviere [5], mothers experience depression considering the physical barriers encounter while administering oxygen as they are unable to carry or see the babies during these periods. Woodward, et al.[6]discovered that mothers experience some level of stress and the change in the role of parents was considered the most stressful while the communication between parents and staff was the least stressful. The stress is a result of lack of health education during pregnancy, stressful life events, postnatal depression and the unstable condition of the baby.

The KMC is an effective and safe alternative way of treating neonates with LBW, especially in developing countries. The method is very easy and inexpensive[7]. It is more effective in reducing mortality in LBW compared with the conventional method. KMC increases the body weight, head circumference and length, satisfaction during breastfeeding, enhancement of maternal-infant attachment and most mothers feel at home with the method[8]. KMC also allows mothers to have direct skin contacts with the babies through whom they could get some warmth from the mothers. According to a study, KMC provides physical and psychological discomfort for mothers comes with a boring environment, mothers feel tired, stressful and isolated. Its implementation requires mothers to stay in the hospital when they might be needed by other children at home[9].

Various health benefits have been achieved for neonates with LBW since the introduction of KMC in hospitals. Despite all these benefits that come with this method, not all mothers choose to it. And from the explanation above, it is obvious that there are few verifiable evidences as regards to mother's experience during hospitalization in implementing KMC, particularly in the Indonesian context.

Method

Study Design: A qualitative research with descriptive phenomenology approach was used to examine and describe the experiences of the mothers hospitalized with neonates having LBW at a perinatology unit in Indonesia.

Participant: Sample consisted of 30 mother who have babies with Low birth weight using the purposive sampling. However, the sample size was also determined by the saturation of data. The inclusion criteria for the participants include; having at least one month experience in the perinatology unit, having experience in KMC while being hospitalized and the willingness to participate in this study.

Data Collection: The instruments used in this study are composed of demographics data and semi-structured questionnaire interviews with field notes and observation guidelines in accordance with the Indonesian Ministry of Health and the Indonesian Perinatology Society modules. The data collected from the mothers' experience were recorded with a tape recorder.

Data Analysis: Data was analyzed using Colaizzi method. The method consisted of 7 steps, namely: 1) reading all transcripts of interviews transcripts to get participants' feeling, 2) reviewing each transcript and extracting of significant statement related parent experiences, 3) describing the meaning contained in the significant statement, 4) Organizing the meaning formulated into the theme group, 5) Integration the result into description form, 6) identify the structural basis of phenomenon and 7) asking participant to validate the finding of phenomenon as the end stage.

Findings: The implementation of KMC in the perinatology was not optimal because the healthcare personnel was not effective in passing the needed information to the participants, lack of knowledge and skills on the part of the mothers and healthcare personnel, inadequate support from the healthcare personnel and family members as well as other barriers from the mothers and the healthcare facilities.

Results

Knowledge, attitude and behavior of mothers regarding KMC

The first experiences perform: Table 2 shows that 14 mothers (47%) out of the 30 participants had poor knowledge about KMC, 18 mothers (60%) had positive attitudes toward KMC and 21 mothers (70%) perceived they had performed KMC.

Seen in table 1

Barriers in Implementing KMC: Table 3 shows that 8 mothers (27%) experienced limited support from the family, 5 mothers (17%) did not implement KMC due to some distinctive cultural beliefs in caring for babies with LBW and 6 mothers (20%) had limited facilities and equipment.

Seen in table 2: The results of this study illustrate several themes based on the experience of Indonesian mothers in implementing kangaroo mother care during hospitalization with low birth weight neonates. Five themes emerged from the interviews: 1) feeling scared that something would happen, 2) improving the survival and recovery of the baby, 3) increase bonding (emotional bond) between mother and baby, 4) mood disturbances and 5) environment as an obstacle.

Theme 1: Feeling scared that something would happen

Based on the results of interviews, the majority of participants stated that carrying out the kangaroo mother care (KMC) was something strange and frightening. Scary for mothers is the experience where for the first time doing KMC this is because the mother is afraid of hurting the baby, the release of tools attached to the baby's body and KMC makes a feeling strange to the mother and other family members.

"... I was afraid when I did KMC for the first time, because I was afraid to hurt my baby..." (P2).

Themes 2: Improving the survival and recovery of the baby

Participants explained that they did their best to pay attention to and fulfill their baby's needs. Mother's experience when applying KMC shows results in their babies avoiding cold, stabilizing temperature and respiratory rate, reducing the occurrence of infections, increasing body weight, body length and head circumference and increasing breast milk.

"... Every day, every time my baby thirsts hungry and I give milk to hug the baby's body and put it into my chest while giving breastfeeding..." (P20).

Themes 3: Increase bonding (emotional bond) between mother and baby

All participants in this study described bonding as a continuous process of affection between mother and LBW baby with hugging, talking, playing and breastfeeding.This interaction includes when the mother invites her baby to tell stories, touch, gaze and smile. It even when the baby is asleep or breastfeeding.

"... Hugging, touching the skin and seeing his face have made my heart happy..." (P1).

Themes 4: *Mood disturbances*

It is understandable that the majority of mothers with LBW show higher levels of stress and anxiety compared to mothers who have babies with enough months. Although the adverse effects of maternal anxiety and depression on infants have been well documented, little attention is paid to the mother's emotional response.

"... Sad, so sad when I first saw my baby. I cry, feel guilty. I don't know if my baby will survive..." (P21).

Themes 5: Environment as an obstacle

All participants stated that the unavailability of admission room is one of the obstacles for mothers to do KMC in the perinatology room.This feeling is based on the lack of privacy and feeling limited to the mother when doing KMC. Other factors that contribute to feelings of discomfort can be seen in the uncertainty about the ability to do KMC.

" ... There are many mothers around the room who have to share places to do KMC and lack of privacy makes me uncomfortable..." (P 29).

Table 1. Mothers Level of Knowledge, Attitude and Behavior regarding KMC (n= 30)

Variables	Frequency (n)	Percentage (%)
Knowledge		
High	6	20
Moderate	10	33
Poor	14	47
Attitude		
Positive	18	60
Negative	12	40
Behavior		
Perform	21	70
Not perform	9	30

Table 2. Barriers in Implementing KMC (n=30)

Barriers	Frequency (n)	Percentage (%)
Limited support from the family	8	27
Unclear procedure for implementing KMC	4	13
Ineffective KMC socialization to mothers and families	4	13
Nurses attitude	3	10
Traditional belief	5	17
Limitations of facilities and equipment	6	20

Discussion

The results showed that 6 mothers, representing 20% of the total participants, had high/good knowledge about KMC, 10 mothers (33%) had moderate/ average knowledge and 14 representing 47% had poor knowledge. This was as a result of the healthcare personnel ineffective way of communicating information about KMC to the mothers during hospitalization. The mothers only obtain information about breastfeeding techniques, how to change diapers and how to change baby clothes. Hence, these mothers were not provided with enough motivation to implement the method. Other factors that could be responsible are the fact that the mothers were less experienced and the low level of formal education. Therefore, it is very important to provide health education on the special care needed by premature babies.

The poor level of knowledge on KMC is as a result of the goals, benefits and ways of implementing this method. According to Notoatmodjo[10], some of the factors that influence mothers' knowledge about KMC are educational level, occupation, experience, religion, as well as some socio-cultural factors. Solomons and Rosant[11] in another study found out that majority of mothers, precisely 83.3%, had no prior knowledge about KMC and 60% of nurses did not have the required skills relating to the method. However, mothers who were committed to KMC seemed satisfied with the results and indicated that they would continue implementing it at home. And most of these mothers did not have the prior knowledge and were only told about KMC during the treatment of their babies at the perinatology unit.

KMC was considered as an ideal method in terms of meeting the baby's needs for warmth, breastfeeding, protection from infection, stimulation, safety and love[12]. This study found that 70% of mothers implemented KMC to their LBW neonates while receiving treatment at the perinatology unit. Lack of facilities and equipment were found as barriers in implementing KMC. The facilities and equipment include private rooms with curtains, Kangaroo bags, chairs, counseling room and media for program information like leaflets, booklets, flipchart and video. These limitations reduce mother's motivation in implementing KMC. According to Hill, et. al., [13], mothers felt they did not have good privacy while implementing KMC.

Some of the factors that hinder mothers in implementing KMC during hospitalization period are lack of support from family and healthcare personnel, unclear Standard Operating Procedure (SOP), ineffective socialization with mothers and families regarding KMC, lack of skilled healthcare personnel, traditional beliefs and limited hospital facilities and infrastructure. Other hindrance to KMC is personal experience, culture, media of communication and information, government, religious institutions and emotional factors [14].

According to this study, mothers had a lack of knowledge on the implementation of KMC method. It reflected in the themes that emerged, such as: fear that something would happen, mood disorders and the obstacles as a result of the environment. Insufficient knowledge would result in the difficulty in implementing KMC. This is in accordance with previous studies which found that mothers were also afraid of injuring their babies while performing KMC[15]. Moreover, it was found that the lack of information from healthcare personnel about the practical application of KMC was a barrier[16].

Conclusion

The complexity of KMC and the lack of standard operational are parts of what make its implementation very difficult. In this study, mothers' level of knowledge, attitude and behavior regarding KMC and its implementation were identified. It also found several

barriers in implementing KMC in Indonesia and results of the study are concluded as highlighted below.

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References

1. Muchemi OM, Echoka E, Makokha A. Factors associated with low birth weight among neonates born at Olkalou district hospital, central region, Kenya. Pan African Medical Journal. 2015; 20 (108):1-11.
2. Shaikh F, Laghari GS, Syal AR, Hameed A, Nizamani MA. Complications of low birth weight babies during first 72 hours of life. Medical Channel. 2016; 22(1), 18-24.
3. Haksati EL. Jumlah Bayi Berat Lahir Rendah Masih Tinggi. 2015. Available from: https://www.ugm.ac.id/id/berita/10695-jumlah.bayi.berat.lahir.rendah.masih.tinggi.
4. Ministry of Health Republic of Indonesia. Health Statistic. 2014. Available from http://www.depkes.go.id/resources/download/pusdatin/profil-kesehatan-indonesia/Indonesia Health Profile 2014.pdf.
5. Cervantes A C, Feeley N, Lariviere J. The experience of mothers whose very low-birth-weight infant requires the delivery of supplemental oxygen in the neonatal intensive care unit. Advances in Neonatal Care. 2011; 11(1): 54-61.
6. Woodward L, Boras S, Clark CA, Montgomery-Honger A, Pritchard VE, Spencer C, Austin NC. Very preterm birth: maternal experiences of the neonatal intensive care environment. Journal of Perinatology. 2014; 34(7): 555-561.
7. Namnabati M, Talakoub S, Mohammadizadeh M, Mousaviasl F. The implementation of kangaroo mother care and nurses' perspective of barriers in Iranian' NICUs. Iranian Journal of Nursing and Midwifery Research. 2016: 21(1):84-88.
8. Conde-Aguedelo A, Díaz-rossello J L. (2016). Kangaroo mother care to reduce morbidity and mortality in low birthweight infants (Review). 2016. Available from: https://www.cochrane.org/CD002771/NEONATAL_kangaroo-mother-care-reduce-morbidity-and-mortality-low-birthweight-infants.
9. Shah PE, Clements M, Poehmann J. Maternal resolution of grief after preterm birth: Implications for infant attachment security. Pediatrics. 2011; 127 (2):284-292.
10. Notoatmodjo, S. (2014). Sikapdalamkesehatan No Title. Jakarta. Retrieved from https://wepdf.com/bu/buku-perilaku-kesehatan-notoatmodjo-pdf
11. Solomons N, Rosant C. Knowledge and attitudes of nursing staff and mothers towards kangaroo mother care in the eastern sub-district of Cape Town. South African Journal of Clinical Nutrition. 2012; 25(1): 33-39.
12. Akhtar K, Haque M, Khatoon S. Kangaroo Mother Care: A Simple Method to Care for Low-Birth-Weight Infants in Developing Countries. Journal Shaheed Suhrawardy Medical College. 2013; 5(1):49-54.
13. Hill Z, Tawiah-Agyemang C, Manu A, Okyere E, Kirkwood B R. (2010). Keeping newborns warm: Beliefs, practices and potential for behaviour change in rural Ghana. Tropical Medicine and International Health. 2010; 15(10):1118-1124
14. Atik NS, Nugraheni S, Cahyo K. Analisis Implementasi Program Perawatan Metode Kanguru (PMK) dan Partisipasi Pasien Pada Pelayanan Kesehatan Bayi BeratLahir Rendah (BBLR) (Studi pada Pasien di Rumah Sakit Mardi Rahayu Kudus). Manajemen Kesehatan Indonesia. 2016; 5(1):98-108.
15. Blomqvist YT, Frölund L, Rubertsson C, Nyqvist K H. Provision of Kangaroo Mother Care: Supportive factors and barriers perceived by parents. Scandinavian Journal of Caring Sciences. 2013; 27(2): 345-353.
16. Dalbye R, Calais E, Berg M (2011). Mothers' experiences of skin-to-skin care of healthy full-term newborns - A phenomenology study. Sexual and Reproductive Healthcare. 2011; 2(3): 107-111.

Postoperative Hypersensitivity and Digital Radiographic Assessment of a Zinc Modified Versus a Conventional Glass Ionomer Cement in Deep Carious Lesion: Randomized Controlled Clinical Trial

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Abstract

Aim of the Study: This study aimed to determine the effect of different glass ionomer in the healing of deep carious lesion after partial caries removal

Design: A total of 50 teeth of patients who fulfilled the inclusion criteriawere selected to participate in the study. Then they were divided into two main groups: control group (Equia fill) and intervention group (Chemfill rock). Postoperative hypersensitivity (using thermal test and percussion test) and periapical lesions (using digital periapical radiograph) were tested in this period at the baseline (T0), after three months (T3) and after six months (T6).

Results: Categorical data were presented as Frequencies (n) and Percentages (%). Fisher's exact and Cochran's Q tests were used to analyze inter and intra group comparisons respectively. The significance level was set at $P \leq 0.05$ for all tests.

Conclusion: The hypersensitivity and periapical lesion was no affected by the type of glass ionomer

Clinical significance: Different type of glass ionomer can be used in deep carious lesion.

Keywords: *Deep carious cavities, glass ionomer cement, postoperative hypersensitivity, chem Fil Rock.*

Introduction

After the revolution in restorative materials due to the innovation of adhesive material and the change from the concept of drill and fill to biological model and conservatism, many techniques have been developed to treat deep carious lesion [(1)]. These techniques depend on decreasing the bacterial population allowing the remineralization of the remaining dentin by changing the ecological system by removing the superficial layer of carious dentin with the highest bacterial population and leaving the deepest layer of affected dentin (affected by bacterial acid that usually precede the bacteria itself) then sealing the cavity. Bacterial population has a main effect on the propagation of carious lesion, so elimination of bacterial acid increases the power of remineralization of infected dentin. One of these techniques is the partial caries removal[(2)]. The success rate of partial caries removal is up to 91%[(3)].

The glass ionomer was the material of choice for this technique due to their biocompatibility, chemical

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bond and fluoride release. Many modifications have been done to improve the glass ionomer properties, the addition of metal ions (silver and recently zinc) is one of this modification. Beside improving the mechanical properties, it was found that the addition of metal ion to glass ionomer decrease the bacterial growth[4].Few clinical studies have evaluated the role of antimicrobial agents incorporated into restorative materials and their potential anti-caries effect.[5]

Zinc increase the uptake of fluoride and enhance remineralization by preventing the surface remineralization (allow better penetrate of fluoride into deeper surface (prevent lesion arrestment). Zinc also bind with the hydroxy apatite crystal making it less soluble in acid[6]. Multiple in vitro studies showed that Zn modified glass ionomer has better mechanical performance and antibacterial action[7,8] but due to lack of evidence from enough well conducted clinical studies, this study will be conducted.

The null hypothesis was that both conventional glass ionomer and zinc modified glass ionomer are successful in the management of deep carious lesion.

Material and Method

A total of 50 teeth of patients who fulfilled the inclusion criteria were selected to participate in the study. Consent was taken from each patient prior to the commencement of the study. Teeth were divided into 2 main groupsby utilizing simple random sampling method each group was 25 participants according to base material tested. The selected participants were divided into two groups: group ($\mathbf{A_1}$) control group (EQUIA fill) and group ($\mathbf{A_2}$) intervention group (CHEMFILL). The study took place over a period of six months (**T**). Postoperative hypersensitivity and periapical pathosis were tested in this period at the baseline ($\mathbf{T_0}$), after three months ($\mathbf{T_3}$) and after six months ($\mathbf{T_6}$).

Simple randomization has been used every patient took a number from 1 using random integer set generator. The assessor was blind, but due to the difference in the material, the operator did not been blinded.

Clinical Procedures:

Preoperative Clinical Assessment: A detailed chart for each patient was taken. A proper pain history was taken to exclude the absence of any signs of irreversible pulpitis. Clinical examination was done to find any sign of inflammation like swelling, fistula or abscess. Cold pulp testing was done to ensure pulp vitality using Refrigerant spray (Endo Frost, Roeko, Coltène/Whaledent, Germany). The spray is applied by a cotton pellet and the patient told the operator in case of pain sensation. Percussion/palpation and mobility tests were performed, Periapical digital radiograph was performed (T0) to detect the presence of any periapical lesion or widening in periodontal ligament. These tests were repeated each follow up visit at T3 and T6.

Caries Removal Procedure: Local anaesthesia was given to the patient, then isolation using rubber dam was done. Access to carious lesion using high speed hand piece. The removal of Deep carious tissue was performed following the guidelines published by the International Caries Consensus Collaboration (ICCC) **.**The caries was selectively removed using spoon excavator *(no51,52, Dentsply, Maillefer)* The caries was totally removed from the cavity wall with spoon excavator or low speed hand piece with carbon-steel rose-head bur to perform a proper marginal seal.Glass ionomer restoration were applied according to manufacturer instruction.

Results

I-Postoperative hypersensitivity: Frequencies (n) and Percentages (%) of Postoperative hypersensitivityinc idence in both groups were presented in table (1)

Fisher's exact test showed no significant difference in the occurrence of postoperative hypersensitivity at baseline (P=0.667) and after 3 months (0.500), while after 6 months there was a significant difference between both groups (P=0.025). At baseline both groups had the same percentage of occurrence of postoperative hypersensitivity (13.0%). After 3 months the percentage decreased in the control group to (8.7%) while remaining fixed in the intervention arm. After 6 months there was no incidence of postoperative hypersensitivity in the control group, while intervention cases suffering from sensitivity increased from (13.0%) to (21.7%) by the end of the follow-up period.

Table (1): Frequencies (n) and Percentages (%) of postoperative hypersensitivity incidence in both groups

Follow-up	Postoperative hypersensitivity	Intervention		Control		P-value
		%	n	%	n	
Baseline	Absent	87.0%	20	87.0%	20	0.667ns
	Present	13.0%	3	13.0%	3	
3 months	Absent	87.0%	20	91.3%	21	0.500ns
	Present	13.0%	3	8.7%	2	
6 months	Absent	78.3%	18	100%	23	0.025*
	Present	21.7%	5	0%	0	

*; significant ($p \leq 0.05$) ns; non-significant ($p>0.05$)

II-Periapical Lesion: Frequencies (n) and Percentages (%) of periapical lesion incidence in both groups were presented in table (2).

Fisher's exact test showed no significant difference between both groups regarding the occurrence of periapical lesions after 3 and 6 months (P=0.500). Starting from baseline till the end of the follow-up period, members of the intervention group were free from periapical lesions. While for the control group only (4.3%)of participants had periapical lesions starting from 3 months till the end of the follow-up period.

Table (2): Frequencies (n) and Percentages (%) of postoperative hypersensitivity incidence in both groups

Follow-up	Periapical Lesion	Intervention		Control		P-value
		%	n	%	(n)	
Baseline	Absent	100%	23	100%	23	--
	Present	0%	0	0%	0	
3 months	Absent	100%	23	95.7%	22	0.500ns
	Present	0%	0	4.3%	1	
6 months	Absent	100%	23	95.7%	22	0.500ns
	Present	0%	0	4.3%	1	

*; significant ($p \leq 0.05$) ns; non-significant ($p>0.05$)

Discussion

In this study we use the partial caries removal techniques [9] as treatment for deep cavitated lesion according to the recent consensus recommendation that support it success, less risk of pulpal exposure and less cost compared to other alternative techniques like step wise excavation [10]. Clinical studies showed that No risk to left infected dentine under the restoration sufficiently sealed and no need for re-entry to remove the residual dentine. It showed high success rate both clinically and radiographically.[11,12]

In our study, we use two different type of high viscosity glass ionomer as with the Minamata Convention the use of mercury will be phased down and this undoubtedly will influence dental treatment regimens and economic resources [14]. Zinc modified glass ionomer is a new one of metal modified glass ionomer as zinc substitution calcium ions in the crystalline structure of glass ionomer resulted in increasing the density of glass as zinc due to higher atomic dentist of zinc ion[15] This substitution results an increase in oxygen density which represent the degree of atoms packing in glass which increase the strength and fracture toughness of glass ionomer [16]**.** In addition, the zinc has an antibacterial property and remineralizing effect,low concentrations

of zinc can both reduce enamel demineralisation and modify remineralisation but its effect on caries is not yet determined[6]**.**Zinc can interact with hydroxyapatite crystal by adsorption onto crystal surfaces and/or incorporation into the crystal lattice which result a decrease in hydroxyapatite solubility, Zinc also can modify the crystal-growth of orally relevant calcium phosphates [6]**.**

Most of dentist use the clinical sensitivity to hot and cold for assessment of pulp vitality, for many years the clinical sensitivity was considered irrevalant, but according to the study conducted by **Ricucci et al.,2014,**[17] there was a good correlation between the clinical sign and histological status of the pulp. **Pigg et al., 2016**[18] stated that the cold test using the endofrost had good validity to distinguish a vital pulp from a nonvital pulp.

Our follow up visit was scheduled after 3months and six months. The available evidence supports that the peak of increase in dentin microhardness and dentistry is the first 3 months after partial caries removal. This may be due to decrease of bacterial activity, reorganization of collagen fibre and the increase in calcium ion concentration [19]**.**as the pulp death could occur and remain silent a second visit is scheduled at 6 months to give more chance dentin formation [20].

The result of our studies showed that for hypersensitivity assessment both material (zinc modified and conventional glass ionomer) showing no statistical difference at base and 3 months follow up while there was a statistical increase in the postoperative hypersensitivity after 6 months favouring the control. **Molina et al,2013**[8] and **Molina et al 2014**[21] support this result. this could be attributed to many factors like the size of the cavities type of occlusion of the patient and the minor variable in the pulp response[22]**.**Another factor is the mechanical properties, the Equia fill showed higher diametral and flexure strength than the Chemfill rock[7, 23]. This could affect the clinical performance of glass ionomer and sealing ability of lesion and the lesion and the ingress of fluids, [24]**Giray et al 2014,** support that the microleakage with Chemfill rock is higher than the Equia fill on the other hand [25]**el Deeb and Mubarak 2018**, reported that bonding properties of Chemfill rock to stimulates carious dentin is better than the Equia fill.

Regarding the periapical lesion, there was no significant statistical difference between the two group or within the same group during the follow up periods, which could confirmed that partial caries removal and sealing of carious lesion is a successful line of conservative treatment for deep carious lesion [9, 11]**.** Even with the absence of statically difference two cases of the control group showed periapical lesion. This result could interpreted by the selection criteria of case and the possible variation between the clinical sign and symptoms and the histopathological status of the pulp[17] also its may contributed to the increase of ion release in the zinc reinforced glass ionomer which may result higher remineralization of affected dentin, increase the dentin hardness and increase the antibacterial effect[26], also [27] **Prudencio et al 2003,** found that the addition of zinc to glass ionomer present an increase in fluoride release than conventional glass ionomer .

Within the limitation of this study, the results supports that the partial caries removal could be the technique of choice for management of deep carious lesion without the need of second re-entery, this finding are in agreement with[9, 28] .also the result of our study support that glass ionomer could be used as final restoration especially due its less techniques sensitivity, time, cost of treatment which of mean concern due to the large national expenses on the dental health each year.

Conclusion

We concluded that both type of glass ionomer could be used successfully in deep caries management. the postoperative hypersensitivity and pulpal reaction were not affected by the type of restoration. The technique of caries removal could be effective factor in preservation of pulp vitality

Clinical Significance: Different glass ionomer could be used in treatment of deep cavities but further studies to assess the survival rate as final restoration

Funding: The study was self-funded.

Competing Interests: No conflict of interest

Ethical Approval: The Ethics and research committee, Faculty of Dentistry, Cairo University approved the study and patients' consent was obtained.

References

1. Bjorndal L, Demant S, Dabelsteen S. Depth and activity of carious lesions as indicators for the regenerative potential of dental pulp after

intervention. Journal of endodontics. 2014; 40(4):S76-S81.

2. Marending M, Attin T, Zehnder M. Treatment options for permanent teeth with deep caries. Swiss dental journal. 2016;126(11):1007-27.
3. Maltz M, Alves LS, Jardim JJ, Moura SM. Incomplete caries removal in deep lesions: a 10-year prospective study. American journal of dentistry. 2011 Aug;24(4):211-4.
4. Fernandes J, Menezes VA, Albuquerque AJR, Oliveira MAC, Meira KMS, Jnior RAM, et al. Improving antimicrobial activity of dental restorative materials. Emerging Trends in Oral Health Sciences and Dentistry. 2015:65-82.
5. Villat C, Attal J-P, Brulat N, Decup F, Domejean S, Dursun E, et al. One-step partial or complete caries removal and bonding with antibacterial or traditional self-etch adhesives: study protocol for a randomized controlled trial. Trials. 2016 Dec;17(1):404.
6. Lynch RJM. Zinc in the mouth, its interactions with dental enamel and possible effects on caries; a review of the literature. International Dental Journal. 2011 Aug;61:46-54.
7. Al-Angari SS, Hara AT, Chu T-M, Platt J, Eckert G, Cook NB. Physicomechanical properties of a zinc-reinforced glass ionomer restorative material. Journal of oral science. 2014;56(1):11-6.
8. Molina GFn, Cabral RJ, Mazzola I, Lascano LB, Frencken JE. Mechanical performance of encapsulated restorative glass-ionomer cements for use with Atraumatic Restorative Treatment (ART). Journal of Applied Oral Science. 2013 Jun;21(3):243-9.
9. Innes N, Schwendicke F. Treatment options for carious tissue removal. Clinical Dentistry Reviewed. 2019;3(1):3.
10. Schwendicke F, Frencken JE, Bjorndal L, Maltz M, Manton DJ, Ricketts D, et al. Managing carious lesions: consensus recommendations on carious tissue removal. Advances in dental research. 2016 May;28(2):58-67.
11. Bjorndal L, Simon S, Tomson PL, Duncan HF. Management of deep caries and the exposed pulp. International endodontic journal. 2019.
12. Mostafa NM, Moussa SA. The Effectiveness of the Partial Caries Removal as a Treatment Option in Deep Carious Lesion Management-Review. Oral Health Dental Sci. 2018;2(2):1-3.
13. Banerjee A, Frencken JE, Schwendicke F, Innes NPT. Contemporary operative caries management: consensus recommendations on minimally invasive caries removal. British dental journal. 2017;223(3):215.
14. Kielbassa AM, Glockner G, Wolgin M, Glockner K. Systematic review on highly viscous glass-ionomer cement/resin coating restorations (Part II): Do they merge Minamata Convention and minimum intervention dentistry? Quintessence International. 2017 Jan 1;48(1).
15. Khan AS, Khan RS, Khan M, Rehman IU. Incorporation of nanoparticles in glass ionomer cements: Clinical applications, properties and future perspectives. Nanobiomaterials in Clinical Dentistry: Elsevier; 2019. p. 113-38.
16. Zhang S, Stamboulis A, Ni W. The effect of boron substitution for aluminium on the microstructure of calcium fluoro-aluminosilicate glasses and glass-ceramics. Journal of the European Ceramic Society. 2019 May 1;39(5):1918-
17. Ricucci D, Loghin S, Siqueira Jr JF. Correlation between clinical and histologic pulp diagnoses. Journal of endodontics. 2014 Dec 1;40(12):1932-9.
18. Pigg M, Nixdorf DR, Nguyen RHN, Law AS, National Dental Practice-Based Research Network Collaborative G. Validity of preoperative clinical findings to identify dental pulp status: a National Dental Practice-Based Research Network Study. Journal of endodontics. 2016 Jun 1;42(6):935-42.
19. Leda L, Azevedo TD, Pimentel PA, de Toledo OA, Bezerra AC. Dentin optical density in molars subjected to partial carious dentin removal. Journal of Clinical Pediatric Dentistry. 2015 Sep; 39(5):452-7.
20. Dammaschke T, Galler K, Krastl G. Current recommendations for vital pulp treatment. Dtsch Zahnärztl Z Int. 2019;1:43-52.
21. Molina GF, Faulks D, Mazzola I, Mulder J, Frencken JE.One year survival of ART and conventional restorations in patients with disability. BMC Oral Health. 2014 Dec;14(1):49.
22. Casagrande L, Seminario AT, Correa MB, Werle SB, Maltz M, Demarco FvF, et al. Longevity and associated risk factors in adhesive restorations of young permanent teeth after complete and selective caries removal: a retrospective study. Clinical oral

investigations. 2017;21(3):847-55.

23. Molina GF, Faulks D, Mazzola I, Cabral RJ, Mulder J, Frencken JE. Three-year survival of ART high-viscosity glass-ionomer and resin composite restorations in people with disability. Clinical oral investigations. 2018 Jan 1;22(1):461-7.
24. Giray FE, Peker S, Durmus B, Kargul B. of new glass ionomer restorative materials in permanent teeth. EUROPEAN JOURNAL OF PAEDIATRIC DENTISTRY. 2014;15:122.
25. El-Deeb HA, Mobarak EH.Microshear Bond Strength of High-viscosity Glass-ionomer to Normal and Caries-affected Dentin Under Simulated Intrapulpal Pressure. Operative dentistry. 2018;43(6):665-73.
26. El Zayat I, El Banna M, Ahmed D. DENTINAL MICROHARDNESS UNDERNEATH FLUORIDE-RELEASING RESTORATIVE MATERIALS AND THEIR ASSOCIATED SHEAR BOND STRENGTH. Egyptian Dental journal 2016;62(2).
27. Osinaga PWR, Grande RHM, Ballester RY, Simionato MRL, Rodrigues ClRMD, Muench A. Zinc sulfate addition to glass-ionomer-based cements: influence on physical and antibacterial properties, zinc and fluoride release. Dental Materials. 2003 May 1;19(3):212-7.
28. Hoefler V, Nagaoka H, Miller CS. Long-term survival and vitality outcomes of permanent teeth following deep caries treatment with step-wise and partial-caries-removal: A Systematic Review. Journal of dentistry. 2016;54:25-32.
29. Gurgan S, Kutuk ZB, Ergin E, Oztas SS, Cakir FY. Clinical performance of a glass ionomer restorative system: a 6-year evaluation. Clinical oral investigations. 2017;21(7):2335-43.

Impact of Stimulation on Infant's Communication Development in Kuantan, Indonesia; A 2- 4- and 6-Month Follow-up Study

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Abstract

Introduction: Stimulation has a large effect on children's development, but the impact of stimulation especially in infant's communication development was unknown. The primary objective of the study was to evaluate the effect of stimulation on infant's communication development at 2, 4 and 6 months of age.

Method: This is a longitudinal study held in Kuantan Singingi District, Riau Province-Indonesia from January to October 2017. We enrolled all newborns whose parents lived and settled in Kuantan Singingi district and had normal delivery. Newborn with major congenital abnormalities, pathological jaundice, low birth weight and whose mother were smoking were excluded. Data of infant's communication development and parent's stimulation were collected at 2, 4 and 6 months. the Age and Stages Questionnaire third edition (ASQ-3) was administered to assess infant's communication development and the Infant/toddler Home Observation for Measurement of the Environment (HOME) Inventory was administered to assess parent's stimulation. We analyzed the relationship between parent's stimulation and infant's communication development at 2, 4 and 6 months using logistic regression analysis.

Results: We enrolled 474 newborns and their parents. Compared to less stimulated infants, infants who got enough stimulation by their parents had better communication developments at 2 months (OR 11.1 95% CI: 3.8-32.4), 4 months (OR 2.6 95% CI: 1.3-5.3) and 6 months (OR: 2.2 95% CI 1.1-4.3).

Conclusion: Giving enough stimulation by parents can affect the communication developments of their infants.

Keywords: *2-6 months; stimulation; infants; communication development.*

Introduction

The quality of human is determined from the first 1000 days of life, since the beginning of the fetus grows in the womb (270 days during pregnancy) and 730 days in the first 2 years of a child's life[1]. Early life is an important golden period in a child's life. In general, researchers and the government are very concerned about nutrition so that the human resources presented are of high quality. There is another thing that escapes attention is stimulation, growth and development of a child that needs to be considered well at that time. First 1000 days of life is a time when there are important opportunities in the growth and development of children[2]. Some studies related to child stimulation and development show that stimulation has a large effect on children's development. Growth can be observed with the addition of height and weight. However, for infant development it is not easy

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to measure because there are several variables that are measured to determine the baby's development.

Assessment of infant development is measured from 4 aspects. These aspects are gross motoric, fine motoric, social personal and language. Language ability is a combination of all children's development systems. Language skills involve motor, psychological, emotional and behavioral abilities[3]. Language is not just talking (vocal expressions to form words) but body language such as eye contact, facial expressions, body movements[4]. Talking is a mental skill of the group, because it is not only the coordination of the muscles that make up the sound, but also the mental aspects of the intellectual. The infant's language development is influenced by brain development, experience and stimulation. Delay in the early development of language skills can affect various functions of everyday life, social personal life, learning difficulties etc[4]. Language development disorders can be caused by various factors, one of which is lack of interaction between children and the environment, late maturation and family factors[5].

Infant development is influenced by various factors, generally divided into genetic factors and environmental factors. Environmental factors are distinguished into biological, biomedical, psychosocial, socio-cultural and socio-economic factors[6].

The purpose of this study is to assess the relationships between parent's stimulation and infant's communication development at 2, 4 and 6 months of age. In addition, we adjusted for the sociodemographic of infants and their mother including maternal education, economic status, density of home contents, number of siblings and also infant's health status including nutritional and breastfeeding initiation to maximize the statistical explanatory power of the results

Method

Settings: The study held in Kuantang Singingi District, Riau Province Indonesia. All participants were recruited from January to October 2017. The participants were followed up three times according to infant's age; 2- 4- and 6-months of age (times 1, 2 and 3 respectively). The study was approved by ethics committee of Faculty of Public Health, Universitas Indonesia (Approval number: 368/UN2.F10/PPM.00.02/2017).

Participants: We included all newborns who met the following criteria; (1) parents lived and settled in Kuantan Singingi District, Riau Province, (2) delivered normally. Newborns with major congenital abnormalities; *labio-palatoschiziz,* heart and lungs abnormalities and other abnormalities which impact infant's ability for direct breastfeeding, pathological jaundice, low birth weight and infant whose mother were smoking were excluded from this study. A sample composed of 432 subjects was calculated to give statistical power of 80%.

Measures:

Parent's Stimulation:

Parents stimulation was assessed using Infant/ toddler Home Observation for Measurement of the Environment (HOME) Inventory at 2, 4 and 6 months. The HOME Inventory is designed to observe parental responsivity, acceptance of the child, organization of the environment, learning materials, parental involvement and variety within the home environment through 45 items. Score of The Inventory is obtained during a 45 to 90 minutes home visits during a time when the target infant and parent are present and awake. Observation and scoring were made by a trained observer.

Infant's Communication Development

Infants communication development was assessed using Age and Stages Questionnaire third edition (ASQ-3) at 2, 4 and 6 months. The ASQ-3 is a set of questionnaires about children's development consisting of communication development, fine motor development, rough motor development, problem solving and socio-personal development. We measured child communication development by adding the score of communication section in ASQ-3 at 2, 4 and 6 months. A three items Likert's scale (yes/sometimes/ never) is used in scoring of ASQ-3 and scoring was made by a trained interviewer which was differ from those assessing parent's stimulation.

Confounding Factors: Confounding factors that appear to be related to parent's stimulation and infant's communication development were included in the models as control variables to rigorously examine the predictive effect of parent's stimulation on infant's communication development; sociodemographic features (mother's education status, social economy, density of house contents, number of siblings), birth status (birth weight, length of birth), nutritional status and early initiation of breast feeding. Information about these variables was obtained via interview to parents.

Statistical Analysis: All statistical analyses were conducted using STATA 12th version. First, univariate analysis of sociodemographic features, birth status and breast feeding were described as frequencies. Second, bivariate analysis using chi-square test was used to measure the association between parent's stimulation and infant's communication development. Third, the relationship between parent's stimulation and infant's communication development was analyzed using longitudinal logistic regression analysis. We accounted for confounding factors in the analysis to isolate the specific benefits of parent's stimulation.

Results

The descriptive results of this study are presented in Table 1. The sample compromised of 474 infants and parents.

Table 1. Characteristics of Study Participants

Variable	n (474)	%
Early initiation of breastfeeding		
Yes	192	40,51%
No	282	59,49%
Length of birth		
Normal	345	72,78%
Short	129	27,22%
Birth weight		
≥ 2500 gram	448	94,51%
< 2500 gram	26	5,49
Mother's education		
< High school	185	39,03%
≥ High school	289	60,97%
Number of siblings		
< 3	426	89,87%
≥ 3	48	10,13%
Density of house contents		
Not compact	400	84,39%
Compact	74	15,61%
Social Economy		
High	104	21,94%
Low	370	78,06%

Parent's stimulation and infant's communication development at 2 months of age: Table 2 shows the results of longitudinal logistic regression to examine the relationship between parent's stimulation and infants communication development at 2 months of age. Infants who were had enough parents stimulation had significantly higher communication development than did infants who got less parents stimulation (OR: 11.1, 95% CI: 3.8-32.4).

Table 2. Parent's stimulation and infant's communication development at 2 months of age

Variable	β	SE	OR	95% CI	
				Lower	Upper
Stimulation					
Enough	2,406	0,547	11,089	3,794	32,412
Less			Reff		
Density of house contents					
Not compact	1,020	0,404	2,773	1,256	6,124
compact			Reff		
Early initiation of breastfeeding					
Yes	0,823	0,417	2,278	1,006	5,159
No			Reff		
Length of birth					
Normal	0,779	0,384	2,179	1,027	4,623
Short			Reff		
Nutritional status					
Enough	0,898	0,434	2,545	1,048	5,747
Less			Reff		
Cons	-5,351				

Parent's stimulation and infant's communication development at 4 months of age: Table 3 shows the results of logistic regression to examine the relationship between parent's stimulation and infants communication development at 4 months of age. Infants who were had enough parents stimulation had significantly higher communication development than did infants who got less parents stimulation (OR: 2.6, 95% CI: 1.3-5.3).

Table 3. Parent's stimulation and infant's communication development at 4 months of age

Variable	β	SE	OR	95% CI	
				Lower	Upper
Stimulation					
Enough	0,972	0,356	2,643	1,314	5,314
Less			Reff		
Exclusive Breastfeeding					
Yes	0,905	0,457	2,471	1,010	6,049
No			Reff		

Parent's stimulation and infant's communication development at 6 months of age: Table 3 shows the results of logistic regression to examine the relationship between parent's stimulation and infants communication development at 4 months of age. Infants who were had enough parents stimulation had significantly higher communication development than did infants who got less parents stimulation (OR: 2.2, 95% CI: 1.1-4.3).

Table 4. Parent's stimulation and infant's communication development at 6 months of age

Variable	β	SE	OR	95% CI	
				Lower	Upper
Stimulation					
Enough	0,788	0,345	2,198	1,117	4,325
Less			Reff		
Social Economy					
Height	1,862	0,739	6,435	1,512	27,380
Low			Reff		
Exclusive breastfeeding					
Yes	1,661	0,617	5,267	1,572	17,642
No			Reff		
Cons	-6,268				

Discussion

Infants with enough parent's stimulation have a higher chance for developing age-appropriate communication development than infants receiving less parent's stimulation. The model formed in the multivariate analysis of this study proved that there was a relationship between stimulation and the development of communication. At 2 months an OR 11.1 on infants communication development, stated that enough parent's stimulation had a good chance of 11.1 times experiencing appropriate communication development compared to infants who did not get enough parent's stimulation. This large OR states that there is a strong relationship between the development of infant communication and stimulation. This is in line with the research conducted in Semarang concluded that stimulation has an effect on development where one of the developments measured is the development of communication with p value 0.001 ($p < 0.05$) which means there is a relationship between stimulation of development and the development of children aged 0-5 year in RW 8 Kalicari Urban Village, Semarang City[8].

The same results were found in at the age of, 4 months and 6. The most dominant factor affecting the development of communication for 4-month-olds is stimulation with OR 2.6 meaning that infants with sufficient stimulation have an opportunity 2,6 times to develop communication according to age development compared to infants with less stimulation. At 6 months of age the model produced by stimulation with communication had OR 2.2.

Other studies in Indonesia conclude the same thing that children with low family stimulation has a risk of developing abnormal speech[9]. Stimulation is related to communication in line with the purpose of stimulation, namely optimizing brain function[10]. Communication ability (language) is an indicator of all children's development due to sensitive language skills delay or damage to other systems because it involves cognitive, sensory motor, psychological, emotional abilities from the environment around the child. Lack of stimulation will affect the development of language and the impact will interfere with cognitive and emotional development[11].

Based on the evidence above, the effect of stimulation on the development of infant communication has a strong relationship, consistent with previous studies.

Conclusions and Recommendations

This research proves that there is a relationship between stimulation and the development of communication. Infants with stimulation have a higher chance of developing communication, especially in infants aged 2 months. Therefore, it is recommended to start doing stimulation as early as possible.

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References

1. Kemenkes. Kualitas Manusia Ditentukan Pada 1000 Hari Pertama Kehidupannya [Internet]. Ministry of health, Republic of Indonesia. 2017 [cited 2018 Sep 14]. Available from: http://www.depkes.go.id/article/view/17012300003/kualitas-manusia-ditentukan-pada-1000-hari-pertama-kehidupannya.html
2. UNICEF. The first 1,000 days of life: The brain's window of opportunity [Internet]. UNICEF. 2018 [cited 2018 Sep 14]. Available from: https://www.unicef-irc.org/article/958-the-first-1000-days-of-life-the-brains-window-of-opportunity.html
3. Widyastuti, D, dan Widyani R. Panduan Perkembangan Anak 0 Sampai 1 Tahun. Jakarta: Puspa Swara; 2001.
4. Dhamayanti M, Herlina M. Capute Scales. Sari Pediatr [Internet]. 2009 [cited 2018 Sep 1]; 11(3). Available from: https://www.researchgate.net/publication/312260352_Skrining_Gangguan_Kognitif_dan_Bahasa_dengan_MenggunakanCapute_Scales_Cognitive_Adaptive_TestClinical_Linguistic_Auditory_Milestone_Scale-CatClams
5. Soetjiningsih. Perkembangan Anak dan Permasalahannya. Jakarta: EGC; 2003.
6. Prof Susan P Walker P, Prof Theodore D Wachs P, Julie Meeks Gardner P, Prof Betsy Lozoff M, Prof Gail A Wasserman P, Prof Ernesto Pollitt P, et al. Child development: risk factors for adverse outcomes in developing countries. Lancet [Internet]. 2007 [cited 2018 Sep 2];145–57. Available from: https://www.ncbi.nlm.nih.gov/pubmed/17223478
7. Twisk JR. Applied Longitudinal Data Analysis for Epidemiology. second. Cambridge: Cambridge University Press; 2013.
8. Wati IC. Hubungan Stimulasi Perkembangan Terhadap Perkembangan Anak Usia 0-5 Tahun di RW 8 Kelurahan Kalicari Kota Semarang [Internet]. Diponegoro; 2016 [cited 2018 Oct 17]. Available from: eprints.undip.ac.id/49601/1/PROPOSAL_BUNEG.pdf
9. Jaenudin E. Stimulasi Keluarga pada Perkembangan Bicara Anak Usia 6-36 Bulan di Kelurahan Kuningan, Semarang Utara [Internet]. Diponegoro; 2000 [cited 2018 Oct 16]. Available from: http://eprints.undip.ac.id/12544/
10. Setijaningsih T, Noviana W. Pelaksanaan Stimulasi Perkembangan Bahasa dan Bicara Anak Usia 0-3 Tahun dalam Kelurga Di Posyandu Seruni Kelurahan Bendoggerit Kecamatan Sananwetan Kota Blitar (The Implementation of Language Development and Speak Stimulation To Child Age 0-3 Years In T. 2017 [cited 2018 Oct 17];4(2):160-7.

Available from: https://media.neliti.com/media/publications/232717-the-implementation-of-language-developme-34347f2a.pdf

11. Putra AY, Yudiemawati A, Maemunah N. Pengaruh Pemberian Stimulasi oleh Orangtua terhadap Perkembangan Bahasa pada Anak Usia Toddler di PAUD Asparaga Malang. Nurs News (Meriden) [Internet]. 2018 [cited 2017 Oct 18];3:563–71.

Cost and Benefit Analysis of Laboratory Health and Safety Management System

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Abstract

Laboratory safety is one aspect that must be considered. A variety of chemical materials contained in the laboratory, causing the potential for workplace accidents in high-risk laboratories. Accidents at work that occur in laboratories greatly affect the business and the community environment. The purpose of this study is to discover how much benefit in economic value of implementation of occupational safety and health in the laboratory. This research is explained about the method for cost benefit analysis of occupational health and safety in laboratory. This research was conducted at the campus laboratory. This study focuses on procuring implementation of occupational health and safety for the types of work that use chemicals in laboratory, based on government regulation in Indonesia. With effective application of occupational health and safety, the benefits that campus university perceive are reduced costs of replacing sick, sick leave, so operational costs will be lower, other disruptions in the production process will also be reduced and produce profits for entrepreneurs. Implementation of OSH of this laboratory requires adequate planning. Therefore the implementation must be coordinated by a Health and Safety team that works closely with various other professionals in the laboratory, with special emphasis on finance, management control and the human resources department.

Keywords: *Cost benefit Analysis, Cost of Safety, Benefit of Safety, Risk analysis of Safety Laboratory.*

Introduction

Working in a chemical laboratory will not be separated from the various possible dangers of chemicals. Accidents of working in the laboratory related to the use of chemicals greatly affect the business and society as a whole. Not only the use of chemical substances that are dangerous, but also the equipment in the laboratory can also cause hazards that are not uncommon high risk for workers who are doing work in the laboratory, if they do not know how and procedures for the use of tools that will be used will also increase the risk of work accidents in laboratory [(1)].

Economic losses incurred due to work accidents are huge. According to Liberty Manual Insurance 2015, a total of $ 53 trillion was spent by the company on caring for workers and paying compensation for workers who had an accident [(2–4)]. In Indonesia, BPJS (Social Security Administrator) noted that during 2016-2017 total claims for work accidents reached $278. This amount is the amount of compensation that must be paid by BPJS which is very large. Calculation of losses arising from work accidents can be done from a variety of performance data such as accident statistics and work accident risk assessment. These data can provide an overview of the possible risks that should be a priority in control[(4–6)].

In 2015, one of university laboratory in Indonesia had an explosion. The laboratory explosion caused

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14 injuries. All of victims were taken to the Hospital to get treatment. The injuries suffered by the victims were suture wounds around the face and neck due to glass fragments from distillation flasks. This accident certainly caused several material and immaterial losses. Occupational accidents in the laboratory are caused by the lack of knowledge and understanding of chemicals and the processes and equipment or equipment used in carrying out activities, the lack of clarity of laboratory instructions and also the lack of supervision carried out during laboratory activities, lack of guidance to students, Lack of or unavailability of safety equipment and protective equipment for laboratory activities, not following instructions or rules that should be obeyed, not using protective equipment that should be used or using equipment or materials that are not appropriate, not being careful in doing activities.

Managers should be able to provide a protection system for the safety and health of their employees through risk control analysis [7,8]. Cost-benefit analysis is a tool in making a decision process by giving a monetary value, usually in the amount of money to the costs incurred and the resulting profits making it possible to provide a comparison of quantities [7,9].

CBA expected that companies can find out how much profit or loss obtained from a risk control in the amount of money currency and can know whether the risk control makes sense or not to be applied [2]. Cost-benefit analysis can also be a tool in decision making from the choice of work accident risk reduction options [10]. Cost-benefit analysis consists of 4 parts, namely calculating costs, calculating benefits, calculating risks and comparing costs [11–13].

Costs are defined as things that cannot be avoided by the company as a result of efforts to increase OHS [12]. In other words, the only costs that can be incurred are those that are needed for the implementation of risk reduction[12]. Cost can take the form of engineering control such as the installation of fume hoods, administrative control such as the application of SMK3 PP 50 in 2012, or the use of PPE masks, goggles, glove.

Benefits (benefits) are gains in monetary value derived from risk reduction [12]. The value of benefits can be obtained from the avoidance of workers from fatality, accident and severity. By avoiding companies from this, companies can avoid costs for workers' compensation, cessation of production, recruitment of new workers or damage to equipment [14].

Risk has an important role in the calculation of cost-benefit analysis, because risk can be a benchmark if a control with certain costs can be said to be successful or not [15].

The comparison of costs with the value of benefits and risks is the final stage of cost-benefit analysis. This can be done by comparing the total costs of an accident, injury and occupational diseases which must be borne with the costs incurred for control costs [2].

So That, decision making in risk control must also consider the financial capability of the company which can be measured by analyzing the amount of funds that must be spent to control and the magnitude of the consequences in the financial side that arises if not carried out occupational safety and health risk controls [5,16]. The purpose of this study is to know the cost-benefit comparison of safety risks in laboratory work can8l be reduced by the implementation of OSH laboratory.

Research Question: How does the cost-benefit comparison of safety risks in laboratory that can be reduced by the implementation of OSH Laboratory?

Objectives: To discover the cost-benefit comparison of safety risks in laboratory work that can be reduced by implementing OSH Laboratory includes:

1. Find out the potential hazards that can be controlled by implementation OSH Laboratory
2. Find out the level of safety risks before and after the implementation of OSH Laboratory.
3. Find out how much money must be provided for the implementation of OSH Laboratory and how much benefit from the economic side.

Method

Study Setting: The location of the study was conducted at campus laboratory where the incidence increased in the 2015-2108.

Design Study: This study is a descriptive analytic using the method mix method, with a sequential explanatory study design. In the initial stages of the study, a quantitative risk analysis will be conducted. Then do a comparison of the costs needed to reduce risk, as well as the benefits of the direct and indirect benefits obtained because the risk is reduced by the implementation

of OHS Laboratory. In this study, researchers used a simple cost-benefit comparison to determine whether a control that is feasible or not. This concept does not aim to determine the effect of a variable on other variables. This research divided into 3 steps to find the cost-benefit comparison value of Laboratory OHS implementation. The stage consists of input, process and output. The input stage, observations will be made regarding the sources of hazard for laboratory safety. Researchers will conduct a job hazard analysis to determine the hazard and risk of working in laboratory. At this stage, direct and indirect costs will be seen if the implementation of OSH Laboratory is carried out. Then in the process stage, the level of exposure and consequences can be known from the job hazard analysis process through a semi-quantitative risk analysis. Probability before implementing OSH laboratory and probability after implementing OSH laboratory can also be known from the results of risk analysis based on job hazard analysis. After knowing the level of exposure, consequences and probabilities, the researcher then determines the level of risk semi quantitatively. From This study, the researcher also calculates the ratio between the costs of procurement to implementing OSH Laboratory well as the benefits obtained due to the absence of costs incurred due to the ability of implementing OSH laboratory to reduce the risk of working with chemical substance in laboratory. In the output stage, researchers will conduct a risk comparison before and after the implementation of OSH laboratory. The results of this risk comparison will then be included in the cost-benefit analysis formula to obtain the final value of whether the OSH laboratory implementation is feasible or not.

Quantitative Part: Quantitative data will be collected to identify independent variables in the conceptual framework through monthly safety report documents. In addition, data were also related to the cost of implementing OSH laboratory, laboratory salary, the amount to be paid in case of an accident, data on hazard identification, risk assessment.

Quantitative Part: Qualitative data will be collected by conducting interviews with key informants as well as semi-structured informants.

Data Collection: Data collection in this study includes primary data that is direct data collection to determine the potential risks of work in the laboratory by direct observation of work processes. For data related to costs, researchers used secondary data obtained directly from the company through the financial department of the company's department.

Key Informant Interview: A pre-test will be conducted to validate the interview tool, selection of informants and key informants using purposive sampling. Interviews will be conducted at the laboratory and the top management ranks where the function is as a decision maker, namely the head of the laboratory, the head of the department. Each interviewer to key informants/informants will spend approximately 1 hour and recorded with the informant's approval.

Document Review: The systematic review of the literature will be carried out based on the framework of the research concept. The researcher will review the document in the form of soft copy, but if triangulation is needed, the researcher will use hard copy notes.

Data Analysis: Qualitative data transcripts will be compiled and reviewed by at least two members of the research team. Data from interviews will be analyzed according to theme, using E-Z text software. Quantitative data will later be entered in a computer database using SPSS version 20 for descriptive analytics. The statistical test used is the proportion test. Data level of risk related to the calculation of costs and benefits in the implementation of OSH laboratory. The data that has been obtained will be grouped according to their respective variables. Data from the calculation of procurement costs for the implementation of OSH Laboratory are included in the cost category, data about indirect and direct costs that must be incurred by the laboratory in the event of an accident due to the absence included in the benefit category [17]. Then compare the risks after and before the control in percent to see whether the implementation of OSH laboratory can be used as an effort to control that is reasonable (reasonably practicable) or not. These costs and benefits are measured in a 3-year timeframe, from 2015 to 2018.

$$\text{BC Ratio} = \frac{\text{Total accident cost (benefit)}}{\text{Total accident prevention (cost)}}$$

Furthermore, the estimated loss that can be avoided by reducing work safety risk by installing safety net can be done with the formula:

$$\frac{L0}{L1} = \frac{R0\ (\text{benefit})}{R1\ (\text{Cost})} \rightarrow L1 = \frac{R1 \times L0}{R0}$$

Discussion

The CBA model allows monitoring of OSH costs and benefits. Thus, this provides a basis for assessing both the effectiveness of the application of OHS as well as specific activities to improve working conditions. The results of previous research work indicate that there is a large difference between the expected benefits and the return on investment imagined in companies [18]. In large companies, an analysis of benefits as a result of an investment project can be very useful at the departmental level because investment projects are rarely implemented to improve working conditions throughout the company [19]. The most prominent benefit of the investment project in occupational safety and health is that it improves working conditions pre-existing in high concentration companies, work stations and most operations are carried out manually[20]. Implementation of laboratory safety risk prevention requires adequate planning[21].

Conclusion

OSH Laboratory implementation is feasible to minimize the risk of working safety in the laboratory. Procurement of personal protective equipment is feasible. This is obtained from the results of the financial Benefit/Cost ratio showing a value of more than 1. In the UI Laboratory considered in this study, preventive measures for occupational risks at this dive height the Benefit/Cost ratio is higher than 1. In this case the company tries to increase cost effectiveness. Implementation of laboratory safety risk prevention requires adequate planning. Therefore the application must be coordinated by the Health and Safety team, which works closely with various other stakeholders in the university's organization, with special emphasis on finance, management control and the human resources department.

Abbreviations: OSH: Occupational Safety and Health, BPJS: Badan Penyelenggara Jaminan Sosial (Social Security Administrator), CBA: Cost Benefit Analisis

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References

1. Taylor WD, Snyder LA. The influence of risk perception on safety: A laboratory study. Saf Sci. 2017;
2. Oude Hengel KM, Bosmans JE, Van Dongen JM, Bongers PM, Van der Beek AJ, Blatter BM. Prevention program at construction worksites aimed at improving health and work ability is cost-saving to the employer: Results from an RCT. Am J Ind Med. 2014;
3. Curran WJ, Boden LI. Occupational health values in the Supreme Court: Cost-benefit analysis. Am J Public Health. 1981;71(11):1264–5.
4. Belay AM, Torp O, Thodesen C, Odeck J. A framework for Organizing a Resilient Cost Benefit Analysis for Construction Projects. Procedia Eng [Internet]. 2016; Available from: http://www.mendeley.com/research/framework-organizing-resilient-cost-benefit-analysis-construction-projects-1
5. Ramos D, Arezes P, Afonso P. Cost-benefit analysis in occupational health and safety: A proposal model. 11th Int Probabilistic Saf Assess Manag Conf Annu Eur Saf Reliab Conf 2012, PSAM11 ESREL 2012 [Internet]. 2012;2:1273–82. Available from: http://www.scopus.com/inward/record.url?eid=2-s2.0-84873148430 & partnerID=tZOtx3y1
6. Oxenburgh M, Marlow P. The productivity assessment tool computer-based cost benefit analysis model for the economic assessment of occupational health and safety. J Safety Res [Internet]. 2005;36(3):209–14. Available from: http://www.ncbi.nlm.nih.gov/pubmed/16038939
7. Ramos D, Arezes P, Afonso P. Cost-benefit analysis in occupational health and safety: A proposal model. 11th Int Probabilistic Saf Assess Manag Conf Annu Eur Saf Reliab Conf 2012, PSAM11 ESREL 2012. 2012;2:1273–82.
8. Rzepecki J. Cost and benefits of implementing an occupational safety and health management system (OSH MS) in interprises in Poland. Int J Occup Saf Ergon [Internet]. 2012;18(2):181–93. Available from: http://www.scopus.com/inward/record.

url?eid=2-s2.0-84864432693 & partnerID=40 & md5=d526a1aedb34ec41f084ddc507ff0743

9. Cordes JJ. Using cost-benefit analysis and social return on investment to evaluate the impact of social enterprise: Promises, implementation and limitations. Eval Program Plann [Internet]. 2017; Available from: http://www.mendeley.com/research/using-costbenefit-analysis-social-return-investment-evaluate-impact-social-enterprise-promises-imple
10. Annema JA, Mouter N, Razaei J. Cost-benefit analysis (CBA), or multi-criteria decision-making (MCDM) or both: Politicians' perspective in transport policy appraisal. Transp Res Procedia [Internet]. 2015; Available from: http://www.mendeley.com/research/costbenefit-analysis-cba-multicriteria-decisionmaking-mcdm-both-politicians-perspective-transport-po
11. Feng Y. Effect of safety investments on safety performance of building projects. Saf Sci [Internet]. 2013; Available from: http://www.mendeley.com/research/effect-safety-investments-safety-performance-building-projects
12. Baum SD. Value typology in cost-benefit analysis. Environ Values [Internet]. 2012; Available from: http://www.mendeley.com/research/value-typology-costbenefit-analysis
13. Abrahamsen EB, Abrahamsen HB, Milazzo MF, Selvik JT. Using the ALARP principle for safety management in the energy production sector of chemical industry. Reliab Eng Syst Saf [Internet]. 2018; Available from: http://www.mendeley.com/research/using-alarp-principle-safety-management-energy-production-sector-chemical-industry
14. Van Dongen JM, Van Berkel J, Boot CRL, Bosmans JE, Proper KI, Bongers PM, et al. Long-term cost-effectiveness and return-on-investment of a mindfulness-based worksite intervention. J Occup Environ Med [Internet]. 2016; Available from: http://www.mendeley.com/research/longterm-costeffectiveness-returnoninvestment-mindfulnessbased-worksite-intervention
15. Veland H, Aven T. Improving the risk assessments of critical operations to better reflect uncertainties and the unforeseen. Saf Sci. 2015;
16. Ikpe E. A Critical Assessment of the Viability of Cost Benefit Analysis in the Management of Construction Health and Safety. 2008;(September):1035–43.
17. Ale BJM, Hartford DND, Slater D. ALARP and CBA all in the same game. Saf Sci [Internet]. 2015; Available from: http://www.mendeley.com/research/alarp-cba-same-game
18. Bayram M, Ünğan MC, Ardıç K. The relationships between OHS prevention costs, safety performance, employee satisfaction and accident costs. Int J Occup Saf Ergon [Internet]. 2017; Available from: http://www.mendeley.com/research/relationships-between-ohs-prevention-costs-safety-performance-employee-satisfaction-accident-costs
19. Nagata T, Mori K, Aratake Y, Ide H, Ishida H, Nobori J, et al. Development of cost estimation tools for total occupational safety and health activities and occupational health services: Cost estimation from a corporate perspective. J Occup Health. 2014;56(3):215–24.
20. HSE - Health and Safety Executive. Internal guidance on cost benefit analysis (CBA) in support of safety-related investment decisions. 2015;11. Available from: http://orr.gov.uk/__data/assets/pdf_file/0018/18009/revised-safety-cba-guidance-290415.pdf
21. Targoutzidis A, Koukoulaki T, Schmitz-Felten E, Kuhl K, Oude Hengel KM, Rijken E, et al. The business case for safety and health at work : cost-benefit analyses of interventions in small and medium-sized enterprises. European Agency for Safety and Health at Work. 2014. 1-5 p.

Association between Syphilis and HIV in the Men Sex with Men (MSM) Population in Indonesia in 2015: Secondary Data Analysis of Integrated Behavior and Biological Survey (IBBS) 2015

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Abstract

Background: Each year, there are an estimated 6 million new cases of syphilis globally in persons aged 15 to 49 years. Syphilis remains a risk factor among Men Sex with Men and other groups who tend to have multiple sex partners. As is known, people who suffer from syphilis increase the risk for contracting and transmitting HIV infection to others. This is because the mode of transmission of Syphilis and HIV have in common. Syphilis among Men Sex with Men needs special attention because if it is not immediately addressed it is likely to enter the heterosexual population and the impact will be even greater.

Method: A cross sectional study: Integrated Behavior Biological Survey (IBBS) in 2015 is managed by the Ministry of Health every four years as part of evaluating HIV AIDS programs in Indonesia. The study was conducted in 6 selected provinces to 1,496 Men Sex with Men, behavioral data collection was done by interview while biological data in this case Syphilis and HIV were carried out by laboratory examination of blood samples

Results: Studies show that syphilis is a risk factor for HIV with (95% CI) RR = 2.2 (1.8 - 2.8). The combination of syphilis, education level and condom use consistently increases the risk to 2.5 (1.03 - 5.84).

Conclusions: There is a association between syphilis positive and HIV positive. Syphilis increases the risk of HIV cases up to 2 times among Men Sex with Men. Syphilis continues to be an uncontrolled public health problem with high rates of syphilis re-infection among Men Sex with Menpopulation in Indonesia. Prevention as a more effective approach can be done simultaneously considering that both Syphilis and HIV can be prevented in the same way

Keywords: *HIV AIDS; Syphilis; Condom; MSM.*

Introduction

The joint United Nations (UN) program for handling AIDS (UNAIDS) noted the spread (distribution) of Human Immunodeficiency Virus (HIV) in Indonesia reached 49 thousand or grew 16% each year. Indonesia ranks third with the largest growth in the spread of HIV among Asia Pacific countries.[5] In Indonesia in 2018: 640.000 people were living with HIV. As of June 2019, a total of 466,859 HIV cases were identified and 13% of them came from the MSM community.[9,10,11]

HIV infection in MSM groups has increased in the last 15 years in big cities in Asia. In Indonesia, HIV infection in the MSM group has increased significantly

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in recent years. IBBS data in the previous year showed a significant increase in syphilis prevalence (2017: 4.33%, 2011: 9.29% and 2015: 15.71%). The increase in syphilis prevalence was followed by an increase in the prevalence of HIV (2017: 5.35%, 2011: 8.48% and 2015: 25.80%). HIV prevalence in the MSM group increased by 2.5 times compared to previous STBP. MSM groups have a higher proportion of education and proportion. Comprehensive knowledge about correct understanding of the highest HIV prevention increased by 2.3 times compared to other risk groups.[6,7]

There were various reasons why MSM and bisexuals were at high risk for syphilis. The high number of sexual partners and sexual networks creates a vicious circle where the higher syphilis prevalence then leads to a higher incidence, which leads to a higher prevalence and cycles that can increase the frequency of infections.

Becoming MSM in Indonesia is not as simple as one might expect. A study conducted by Budiman and Boellstorff in 2005 showed that being gay in Indonesia was seen as a sexual deviation and had a negative influence on Indonesian culture. Such social perspectives and norms often lead to MSM stigma, discrimination, judgmental behavior, rejection and the threat of violence which ultimately leads to various things related to HIV/ AIDS thereby increasing the risk of HIV infection in MSM.

Method

IBBS is a 4-year survey,using cross-sectional design with respondent driven sampling (RDS) as a sampling method. RDS was used because MSM is a hidden population and has a very strong MSM network. IBBS for MSM was held in 6 of 34 province in Indonesia in 2015. The total number of respondents was 1.496 out of 1.500 targeted to represent MSM in Indonesia. The inclusion criteria of the respondents were that Men who have Sex with Men (MSM) were biologically male, aged 15 years or older and had lived in the survey city for at least one month and had had sex with a man in the past year. The collection of information about behavior was done by interviews while the collection of biological data was done through venous blood collection. The syphilis examination was carried out with RPR and TP rapid while anti-HIV with rapid test. Collecting, editing and analyzing data IBBS using software STATA (v.13, Stata Corp). The effect between the independent and dependent variables in this study can be determined by Prevalence Ratio (PR) with confidence intervals (CI) 95% and estimated using Cox Regression Model in constant time. To determine the model to be used, the method used was one at a time by comparing ΔPR> 10% between crude PR and PR adjusted

Results

The following was a general description of the respondent's social demographics: from a total of 1.500 targeted respondents, 1.496 respondents participated in this study. In general,66% respondents aged>25 years with not selling sex as a main occupation (88%), 61% had higher education. The tune of 87% was single status, live with family 51% and mostly (85%) had sex at age< 25 years. Related to HIV AIDS, 83% of respondents had attended meetings or discussions related to HIV, this had an impact on the good understanding of HIV AIDS reaching 62% and knowledge about themselves at risk reaching 70%. **(Tabel. 1)**Most MSM's regular partner were male, the range was between 40-85%, while those who have a female regular partner were in the range of 17-48% and MSM rarely had a trans gender as regular partner (0.33-3.34%). On the other hand, 68% of MSM had had blood tests to determine their HIV status, but 98% of those who tested positive from this study have not taken HIV treatment.

Table 1. Study population characteristic by inclusion status

Variable	HIV Positive N(%)	HIV Negative N(%)	Total (1496) N (%)	PR 95% CI	P-value
Syphilis					
No	226 (19)	955 (81)	1.181 (85)	1.0	-
Yes	77 (38)	125 (62)	202 (15)	2.2 (1.8-2.8)	< 0.0000
Age					
< 25 years	95 (21)	372 (79)	467 (34)	1.0	-
>25 years	208 (23)	703 (77)	911 (66)	1.1 (0.8-1.4)	0.35

Variable	HIV Positive N(%)	HIV Negative N(%)	Total (1496) N (%)	PR 95% CI	P-value
Main Occupation					
Not Selling Sex	267 (22)	949 (78)	1.216 (88)	1.0	-
Selling Sex	35 (22)	129 (78)	164 (12)	0.9 (0.6-1.3)	0.87
Education					
Low	22 (85)	4 (15)	26 (8)	1.0	-
Moderate	82 (84)	16 (16)	98 (31)	1.0 (0.3-3.1)	0.91
High	155 (82)	35 (18)	190 (61)	1.2 (0.4-3.3)	0.73
Current Living With					
Family/Wife	137 (20)	553 (80)	692 (51)	1.0	-
Alone/Partner/Friend	166 (24)	526 (76)	690 (49)	1.2 (1.0-1.5)	0.10
Attending a Meeting or Discussion Related to HIV					
Yes	884 (78)	254 (22)	1.138 (83)	1.0	-
No	182 (80)	46 (20)	228 (17)	0.9 (0.6-1.2)	0.73
Understanding of HIV AIDS					
Good	187 (22)	673 (78)	860 (62)	1.0	-
Poor	116 (22)	407 (78)	523 (38)	1.0 (0.8-1.2)	0.86
Consistency condom with regular partner					
Yes	62 (25)	186 (75)	248 (34)	1.0	-
No	102 (20)	388 (80)	490 (66)	0.8 (0.6-1.1)	0.25
Marital Status					
Married	142 (79)	39 (21)	181 (13)	1.0	-
Single	264 (29)	938 (71)	1.202 (87)	1.0 (0.7-1.4)	0.98
At Risk of HIV infected					
Yes	207 (33)	675 (67)	882 (70)	1.0	-
No	68 (18)	301 (82)	369 (30)	0.8 (0.6-1.0)	0.08
Age at The First Sex					
< 25	264 (23)	919 (77)	1.183 (85)	1.0	-
> 25	39 (20)	161 (80)	200 (15)	0.8 (0.6-1.2)	0.43

We conducted stratification analysis of Condom Use Consistency and Understanding of HIV AIDS. As compared to consistency of condom use with regular partner, all respondents with positive syphilis that inconsistent using condom were significantly about 2.3 times more likely to get HIV infection (PR=2.33; 95% CI: 1.52-3.57). As compared to understanding of HIV AIDS, all respondents with positive syphilis showed that there was not any significantly difference between respondent whose had good and poor understanding of HIV **(Table 2).**

Table 2. Stratification Analysis of Associations between Syphilis and HIV Infection According to Strata of Consistency Condom Use with Regular Partner and Understanding of HIV AIDS

Variable	PR Strata (CI 95%)		Crude PR (CI 95%)	Adjusted PR (CI 95%)	P-Value Homogenity	ΔPR (%)
Consistency condom use with regular partner	Consistent	1.95 (1.03-3.68)	2.195644	2.198544	0.645	0.13
	Inconsistent	2.33 (1.52-3.57)				
Understanding of HIV AIDS	Good	2.29 (1.66-3.15)	2.195644	2.195567	0.675	0.007
	Poor	2.04 (1.34-3.10)				

The results showed that respondents who were syphilis positive had a risk for HIV positive 2.6 times greater than those who were not syphilis (2.6; 95% CI:1.05-6.30) p-value 0.03. After adjusting for several variables suspected to be a confounder, the adjusted PR changed to (2.5; 95% CI:1.03-5.84) p-value: 0.04. **(Table. 3).**

Table 3. Results from the Multivariable Model

Model	PR (95% CI)	P-Value
Model 1 (Full Model): Syphilis, main occupation, education, current living with, attending a meeting or discussion related to HIV, understanding of HIVAIDS, consistency condom with regular partner, marital status, at risk of HIV infected, age at the first sex	2.6 (1.05-6.30)	0.03
Model 2 (Reduced Model): Syphilis, education, consistency condom with regular partner	2.5 (1.03-5.84)	0.04

This was the model used after controlling for several variables. This model showed that in addition to syphilis, the consistency of condom use and education was a determinant of the factors that most influence HIV infection. The results shown that respondents who were syphilis positive have a risk for HIV positive 2,5 times greater than those who were not syphilis PR = 2.50; 95% CI; 1.03–5.84; p-value:0.04**.** Education of respondent has 0.9 times effect (prevention) on HIV infection PR = 0.9;95% CI; 0.68–1.46; p-value: 0,99. Consistency condom with regular partner has 0.3 times (prevention) on HIV infection PR=0.3; 95% CI; 0.18-0.83, p-value: 0.01. **(Table 4).**

Table 4. Final Model Association between Syphilis and HIV

Variable	PR (CI 95%)	P-value
Syphilis	2.5 (1.03–5.84)	0.04
Education	0.9 (0.68 -1.46)	0.99
Consistency condom with regular partner	0.3 (0.18 - 0.83)	0.01

Discussion

Syphilis and other sexually transmitted infections (STI) were risk factors for HIV. Both syphilis and HIV were transmitted through sexual transmission mainly due to the presence of genital and inflammatory lesions.[1] All people who were sexually active could be at risk for syphilis. Both men and women could get syphilis even though more cases were found in men than women. Most of the new cases reported occurred in men who have sex with men.[13] In people living with HIV, syphilis increased the power of infection HIV and in those who have not been infected with HIV, syphilis increase susceptibility to contracting HIV. Various studies in many countries reported that syphilis infection could increase the risk of HIV transmission by 3-5 times.[8] Control over syphilis remains a challenge. Similar to previous studies, HIV-positive patients were found more often involving sexual behavior associated with syphilis than HIV-negative patients. Clinical manifestations were rather similar in the two groups, although anal chancre was most common in HIV-positive patients.[2]

IBBS 2011 and 2015 data revealed that syphilis rates among key populations remained high. Rates of condom use as a means of preventing syphilis and HIV has increased and condoms were becoming available at some clinics, even in Puskesmas (primary health care).Antibiotics for the treatment of syphilis (benzatin penicillin), gonorrhea (cefixime) and chlamydia (azithromycin) available at STI clinics, however sometimes the treatment was not up to standard and the handling was also not routinely carried out.[6,7]

Studies conducted in other countries also showed a similar trend where an increase in the prevalence of syphilis was followed by HIV prevalence. In China, the prevalence collected from HIV-syphilis coinfection across the country substantially increased from 1.4% (95% CI: 0.8-2.3%) during 2005-2006 to 2.7% (95% CI: 1.8-4.0%) during 2007-2008.[4] Peru also showed similar data as Indonesia. The prevalence rates of HIV and STIs, including syphilis, gonorrhea and chlamydia were very high among MSM registered from clinics and community sites in urban Peru. HIV prevalence was significantly higher among MSM enrolled from clinics, with previously undiagnosed HIV identified in 9.1% compared to 2.6% of community participants. 15.4% of all MSM screened were infected with a curable STI of ≥1, 7.4% with early syphilis (RPR ≥1:16) and 5.5% with urethral gonorrhea and/or chlamydia.[3] The high level of mobility, the number of sexual partners and the high prevalence of unprotected sex and syphilis infections indicate the potential for rapid spread of HIV among MSM in Beijing. Study showed that men partner with men in a lifetime>10 times were associated with seropositivity in both syphilis (OR, 1.9; 95% CI, 1.1-3.4) and HIV (OR, 4.3; 95% CI, 1.4-13.6). In addition, HIV infection was significantly associated with syphilis seropositivity (OR, 3.8; 95% CI, 1.3-10.8).[14]

There were various reasons why MSM and bisexuals were at high risk for syphilis and HIV. The high number of sexual partners and sexual networks created a vicious circle of infections between syphilis and HIV.

In addition to syphilis, condom use variables with a regular partner and education were two variables that were very strong predictors on positive HIV cases. The percentage of consistent condom use with regular partners, non-regular partners, when buying sex and when selling sex were: 33%, 51%, 52% and 62% respectively. This showed that the consistency of condom use (always using condoms when having sex) was still very low. This study also showed that condoms were quite accessible both those obtained by buying or getting them for free from Field Officers. Unfortunately, even though 83% said condoms were accessible, in practice only 35% always provided condoms and only 32% always provided lubricants.

The main limitation of this cross-sectional study was concerning the temporal sequence, i.e.that we could not fully assure that the occurrence of all syphiliscases (which was hypothesized as a causal risk factors of the HIV infection) came first before the occurrence of HIV infection.

Conclusions

There was significant association between syphilis and HIV infection. Among MSM, having Syphilis increased the risk of HIV infectionup to 2.5 times. Syphilis continued to be an uncontrolled public health problem with high rates of syphilis re-infection among MSM groups in Indonesia. Considering the serious complication/sequelae and its role in increasing the HIV transmission and thus accelerating the HIV epidemic, controlling Syphilis must be seriously emphasized with urgency. Efforts to prevent HIV and syphilis must be coordinated. Further studies to explain the behavioral and biological interactions between the two infections were needed.

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References

1. Agustina, Fitria, Lili Legiawati, Rahadi Rihatmadja, Sjaiful Fahmi Daili. Syphilis in Human Immunodeficiency Virus. Departemen of Dermatologist, Medical Faculty, University of Indonesia. Jakarta; 2013
2. Arandol, Maider, Candela Fernandez-Naval, Miriam Mota-Foix, Desi Martinez, Pere Armengol, Maria Jesús Barberá, Juliana Esperalba and Martí Vall-Mayans. Early syphilis: risk factors and clinical manifestations focusing on HIV-positive patients. BMC Infectious Diseases. 2019. 19:727
3. Brumer Amaya G. Perez, Kelika A. Konda, H. Javier Salvatierra, Eddy R. Segura, Eric R. Hall, Silvia M. Montano, Thomas J. Coates1, Jeff

D. Klausner, Carlos F. Caceres, Jesse L. Clark. Prevalence of HIV, STIs and Risk Behaviors in a CrossSectional Community- and Clinic-Based Sample of Men Who Have Sex with Men (MSM) in Lima, Peru. 2013. PLoS ONE 8(4): e59072

4. Aziz, Nuraki. HRW: Tekanan kepada LGBT tingkatkan infeksi HIV. BBC News. [Internet]. Cited 2019 Nov 30. Available: https://www.bbc.com/indonesia/indonesia-44686414
5. Kojima Noah, Klausner D Jeffrey. An Update on the Global Epidemiology of Syphilis [Internet] 2018 (cited 2019 Nov 23). Available https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6089383
6. Mboi, Nafsiah. HIV/AIDS in Indonesia: Building a Coordinated National Response. Global Health Delivery. 2011.
7. Ministry of Health. 2015 Integrated Behavior and Biological Survey Report. Jakarta: Ministry of Health; 2015.
8. Ministry of Health. Management Guidelines of Syphilis in Health Facilities. Jakarta. Ministry of Health. 2013.
9. Ministry of Health. Report on Indonesia HIV AIDS Situation. Jakarta: Ministry of Health; Juni 2019.
10. Ministry of Health. Indonesia Epidemiological Review on HIV. Jakarta: Ministry of Health; 2016.
11. Ministry of Health. Indonesia National Action Plan on STI and HIV 2015-2019. Jakarta: Ministry of Health. 2015.
12. Nelsensius Klau Fauk, Maria Silvia Merry, Mitra Andhini Sigilipoe, Sukma Putra, Lillian Mwanri. Culture, social networks and HIV vulnerability among MSM. Plos One Journal. 2017. PLoS ONE 12(6): e0178736.
13. Syphilis Fact Sheet. Canada's Source for HIV dan Hepatitis Information. (cited 2019 Nov 23). Available https://www.catie.ca/fact-sheets/infections/syphilis.
14. Yuhua, Ruan, PhD, Li, Dongliang MD, Li, Xinxu MD, Qian, Han-zhu MD, PhD, Shi, Wei MD, PhD, Zhang, Xiaoxi MD, Yang, Zhenkai MD, Zhang, Xiaoyan MD, PhD, Wang, Chen MD, Liu, Yingjie MD, Yu, Miao MD, Xiao, Dong BS, Hao, Chun MD, Xing, Hui MS, Hong, Kunxue MD, PhD, Shao, Yiming MD, PhD. Relationship Between Syphilis and HIV Infections Among Men Who Have Sex with Men in Beijing. Journal of The American Sexually Transmitted Disease. August 2007 - Volume 34 - Issue 8 - p 592-597

Social Immunity Not to Use Drugs on Youth (Case Study of the Marind and MUYU Tribes in The Border Region of Indonesia and Papua New Guinea)

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Abstract

Marind and Muyu tribe are tribes that are still very thick with their cultural values and still have blood ties or family ties with the tribes or villages in the surrounding areas of Papua New Guinea, where these villages are still rarely touched by modernity. However, among teenagers, it was found that they often brought cannabis into Indonesian territory. This study aims to look for concepts and relationships between concepts related to family security of the Marind and Muyu ethnic groups not to use drugs and to find a picture of the socio-cultural value system of the two tribes in protecting adolescents against drugs. The design used is qualitative research with a case study approach. This research was conducted in Sota sub-district, Sota District, Merauke Regency in July - August 2017. Data collection was carried out by interview, observation and document review. Research informants are adolescents who are not narcotics, adolescent drug users, parents and other community leaders. Analysis of the data used is qualitative data analysis and triangulation to ensure the validity of the findings. The results showed that empirically teenagers did not become drug users because of the mother's message. The emotional closeness of adolescents with the mother at home naturally flows into the superstructure. Although some teenagers who are not narcotics are friends with narcotics, they do not use drugs because it can make parents embarrassed and excluded from the community life in Merauke Regency.

Keyword: *Social immunity, drugs, youth, Papua.*

Introduction

Report on the development of the drug situation in the world in 2014, it is known that the estimated number of drug users in 2012 is between 162 million people to 324 million people(1). Based on reports from the survey conducted by BNN in 2014, it was found that the number of drug cases nationally in Indonesia in the age group of 10-59 years was 3,362,527 people in 2008, 4.274.257 people in 2011 and 4,022,702 people in 2014. The results of the National Survey on Drug Abuse Prevalence in 2014 predict that in the rising scenario there will be an increase in drug abuse nationally, 4.1 million people in 2014 to 5.0 million people in 2020 and also followed by an increase in economic and social cost losses. due to drug abuse around 2.3 times or increased from 63.1 million IDR to 143.8 trillion in 2020(1).

Data in 2015 stated that the biggest drug users in Papua based on education were high school students with 53% of the total new users totaling 334 people, followed by junior high school education of 35%. Whereas based on employment, the biggest cannabis users in 2015 in Papua were those who did not work by 43% and second were students by 31%. Through the survey results, it was also reported that the type of drug that was first used nationally, the province of Papua ranks first at 92% and for the types of drugs currently circulating in Papua is

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cannabis 99%[1]. Types of cannabis drugs are so popular in Papua because of their easy access to the Papua New Guinea border.

Marind and Muyu tribe are tribes that are still very thick with their cultural values and still have blood ties or family ties with the tribes or villages in the surrounding areas of Papua New Guinea, where these villages are still rarely touched by modernity. However, among adolescents and young people, it is found that they often bring cannabis into Indonesian territory. Based on a literature study it was found that the parents and children of the Marind tribe (all those belonging to the family) often rested while chatting on the porch of the house which was built on the front of the house. It is also used as a good time to share the tips of life with young people or teenagers in the family or advice about daily life. Parental advice and self-concept are the strength of a teenager in defending themselves from falling into the world of drugs. Parental advice, especially mothers are able to give effect to adolescents to protect themselves from drugs and self-concept which is a value or something that is believed by adolescents as something good and right not to fall into drugs.

Based on this information an initial proposition can be made that there is a value system in the tribes that inhabit the border area as a family immunity that is able to protect and prevent drug use in adolescents, through the advice of parents and adolescents self-views towards their future. If this is generally accepted, then actually teenagers in the community who inhabit villages in the border region have strong values (forms of immunity) within the family so that they can protect and prevent and avoid the influence of drug use. This needs further research to prove that the building proposition is generally accepted for people who inhabit villages in the borders of Indonesia and Papua New Guinea.

Method

This type of research is a qualitative study using a case study approach. This research was conducted in the Sota village, Sota District, Merauke Regency, in addition to the children of the Marind and Muyu tribes who were attending or studying at the University in Merauke City in July - August 2017. Data was collected through interviews, observations and document reviews. Research informants are adolescent drug users, adolescents who are not drug users and have friends who use drugs as well as adolescents who are not drug users and do not have friends who use drugs. In addition to adolescents, informants can also come from families (father/mother/grandfather/grandmother/housemates) and also community leaders (chiefs, teachers, priests, priests and others according to data requirements). Analysis of the data used is qualitative data analysis and triangulation to ensure the validity of the findings [2].

Findings: To find out the behavior and values of non-drug adolescents in the Marind and Muyu tribes, data collection was carried out by conducting in-depth interviews and observations of 14 non-drug adolescents.

The reason teens don't use drugs: There are several reasons that cause the Marind and Muyu ethnic groups not to use drugs, namely the knowledge that drugs can damage nerves and organs, fear of addiction and the prohibition of using drugs (Law and Religion).

"Tidakmenggunakannarkobakarenatakutketagihan" (Informan MRT).

"Tidakmenggunakannarkobakarenatidakbaikbagikesehatan dan dilarangkeras oleh Undang-Undang, agama dan Negara" (Informan MUS).

Fear of addiction/addiction is a symbol of the concern of a teenager on the long-term negative effects of drugs which when trying to use are difficult to get rid of or stop. This, of course, will have its own consequences it will be difficult to become normal when they become abnormal people, then they will find it difficult to carry out social activities. In addition, they will also have difficulty in carrying out social roles. This is certainly a very heavy consequence because they will automatically be rejected in their social environment. They also think that once using drugs it will be difficult to stop.

Some teens make parents the reason parents don't use drugs.

"Saya tidakmenggunakannarkobakarenatakutdimarahi mama. Saya seringcurhat dan ceritaapa-apasama orang tua" (Informan SAP).

Parents, especially mothers, are someone who is personified by the mother as someone who has the power to provide reward and punishment.

Advice received from family: The RES informant stated that he had received advice from his parents.

"Ada (nasihat orang tua), agar rajinbelajar, jangannakal, jangansukaringantangan (pukulteman)".

Mother's advice contains profound meanings for adolescents of the Marind and Muyu tribes. The content of the mother's advice that warns her child is a symbol that the child does not commit acts that violate, including falling into the use of drugs. Children are warned not to hang out at any time while being more selective in making friends.

Another informant (ASO) stated that he was often advised by his mother.

"mama selalukasihnasihat, sekolahbaik-baik, bergauldenganteman yang baik-baik, kalaujalanjanganmacam – macam, kalauadateman yang mau main, lebihbaik main kerumahdari pada keluar, dan kuliahbaik – baikjanganmengecewakan orang tua".

The contents of the advice suggest for teens not to just hang out and choose friends. The direction to call a playmate at home is a form of protection so that parents can still control the behavior of the child. The results of the study also found the fact that there are several support factors (factors - factors that support) so that adolescents do not use drugs, namely advice not to just hang out. Be careful in getting along is a symbol of efforts to fortify themselves by limiting/selective in choosing associates.

Sources of information about drugs: The description and knowledge of the dangers of drugs in adolescents make teens not want to use drugs. Knowledge about drugs is obtained by adolescents from counseling obtained at schools and the National Narcotics Agency (BNN) of Papua Province.

"Di sekolahitupernahdatang orang BNN kasihpe-nyuluhantentangbahayanarkoba. Itukatanyanarkoba-bikinkitasakit".

The existence of drugs around the Marind and Muyu tribes has made various parties make efforts to prevent drug use among teenagers. Teenagers get knowledge about the dangers of drugs from BNN and Schools. BNN is a government institution that specifically and aggressively undertakes efforts to prevent and deal with drugs in Indonesia, including in the Papua region. In conducting prevention efforts, BNN works closely with schools to provide students with lessons about the dangers of drugs.

The ideals of noble teenagers: Marind and Muyu teenagers have lofty ideals to be achieved. They assume that using drugs is something that can cause them to not be able to get the ideals they want.

"saya tidak mau kaka. Saya mau jadi perawat. Katanya jadi tenaga itu harus sehat dan tidak boleh ada penyakit."

The quote from the informant above shows that adolescents having drug beliefs can keep them from achieving their desired goals. Teenagers have, the aspiration to become a nurse is their desire to become a better person and make parents happy.

Discussions

Geographically, there are several villages/tribes that live in the border areas of Indonesia and Papua New Guinea, one of which is the Marind and Muyu tribes in Merauke, Papua Province. Marind and Muyu tribes have a kinship with the people of Papua New Guinea, both those caused by blood relations, as well as social relations, such as trade relations and other social interactions. This condition can provide its own threat to drug trafficking in both tribes. The Marind and Muyu tribes are one of the areas in Merauke that are used as drug trafficking routes, both by land and river waters [3].

Empirically, the state of Papua New Guinea is one of the countries that give citizens the freedom to use drugs with cannabis type freely. Marijuana plants can grow freely around the community and the community is free to use marijuana and the market to the community[4, 5]. In contrast to Papua New Guinea, Indonesia imposes a strict ban on the use of narcotics including in the form of marijuana. All forms of activities related to cannabis will be given strict sanctions both legally and social sanctions that develop normatively in society as a social order.

The existence of adolescents who do not use drugs in the Marind and Muyu tribes is certainly an interesting thing because among the Marind and Muyu tribes themselves many people use drugs. In addition, the location of the Marind and Muyu tribes that border directly with the State of Papua New Guineawhere drugs can freely enter certainly can be a motivating factor for adolescents in the Marind and Muyu Tribes to use drugs. The cause was explored by researchers in adolescents who did not use drugs by displaying findings and analyzing the meaning of findings based on the paradigm used in this study. Teenagers will get a reward if they obey and obey the commands of parents (mothers) and the norms and rules in their environment. Whereas punishment will be received if a child violates the commands, norms and rules of the parents and the environment.

When viewed using the symbolic paradigm of Mead's [6] symbolic interaction, parents are significant others who have a big role in the process of emotional development of adolescents. A teenager who does not use drugs normatively should internalize the norms and morals of his parents through interactions that occur in their daily communication. When there is an intense interaction between parents and adolescents, adolescents will get a role model in their lives as an antidote to deviant behavior. Using Mead's symbolic interaction paradigm, children's values are built by parents as part of the child's superstructure. Parents are still a central figure that cannot be separated from teenagers who are still in the process of searching for an identity.

The family as the smallest unit in social life has a very big role in shaping one's defense against social diseases early on [7]. However, the role of parents in child care changes as the child's growth and development. Father and mother both have an important role since the child in the womb. But there is a slight difference in touch from what is displayed by father and mother. Mothers tend to foster feelings of love and love for children through interactions that involve physical touch and affection. Whereas fathers tend to foster self-confidence and competence in children through physical play activities. Parents have an important role in nurturing and fostering their children's behavior. In the development of children, parents play a role as satisfying the needs of children, child development, role models for children and forming self-concept in the family.

For the Muyu Ethnic community, there is a set of traditional rules concerning social interactions with adolescents relating to dangerous issues such as drugs. Including the procedures for promiscuity in adolescents [8]. The position of children in the family, especially boys, is a source of pride in the Muyu family. This causes parents to provide protection to adolescents so that they can become heirs in the family. According to Sharf (2010) in Sisca and Gunawan [9], adolescents aged 15-18 years are an important period in which career choice commitments are made. At that age, teenagers have realized the importance of school for their career development. Teenagers know that they can determine their careers for their future related to career decisions. At the same time, teenagers' access to know things that can make it difficult for adolescents to achieve their goals is also greater. Teenagers as much as possible to protect themselves from things that damage their ideals.

Culture is a major force in people's lives [10]. One of the cultures of the Muyu and Marind tribes that are strongly attached to adolescents is religious life. This culture becomes a major force in binding the system of action. Religious life mediates interactions between people, interacts personalities and unifies social systems. Teenagers take good grades in every pastor's lecture and activities in the church. Religion provides teenagers with knowledge about God and the prohibitions to take actions that are forbidden by God. This becomes a system of values and norms inherent in adolescents to ward off drug use behavior.

Conclusion

Empirically teenagers do not become drug users because of the mother's message. The emotional closeness of adolescents with the mother at home naturally flows into the superstructure. Although some teenagers who are not narcotics are friends with narcotics, they do not use drugs because it can make parents embarrassed and marginalized in the community life in Merauke Regency.

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References

1. Badan Narkotika Nasional. Survey Nasional Prevalensi Penyalahgunaan Narkoba Tahun Anggaran 2014. Jakarta: Badan Narkotika Nasional, 2015.
2. Creswell JW. Research Design Pendekatan Metode Kualitatif Kuantitatif dan Campuran. Jakarta: Pustaka Pelajar; 2016.
3. Badan Nasional Pengelola Perbatasan. Peraturan Badan Nasional Pengelola Perbatasan No 1 tahun 2015 tentang Nasional Rencana Induk Pengelolaan Perbatasan Negara tahun 2015 - 2019. Jakarta: Badan Nasional Pengelola Perbatasan; 2015.
4. Falgout S. The decline of the Ponapean nightcrawler? Marijuana and interpersonal relations

in a Micronesian culture. Unpublished manuscript. 1984.

5. Arisoi TV. Analisis Kegagalan MOU Liaison Meeting dalam Mengatasi Masalah Anvaman Keamanan Non Tradisional di Kawasan Perbatasan Indonesia dan Papua New Gunea 2008 - 2011 [Tesis]. Jakarta: Universitas Indonesia; 2012.
6. Ritzer G. Teori Sosiologi Modern. Depok: Prenadamedia Group; 2014.
7. Goode WJ. Sosiologi Keluarga. Jakarta: Bumi Aksara; 2002.
8. Laksono AD, Faizin K, Raunsay EM, Soerachman R. Perempuan Muyu dalam Pengasingan. Jakarta: Pusat Humaniora, Kebijakan Kesehatan dan Pemberdayaan Masyarakat; Lembaga Penerbitan Balitbangkes (Anggota IKAPI); 2014.
9. Sisca S, Gunawan W. Gambaran Adaptabilitas Karier Remaja. Jurnal Psikologi. 2016;11(2):111-9.
10. Dumatubun AE. Pengetahuan, Perilaku Seksual Suku Bangsa Marind-Anim. Jurnal Antropologi Papua. 2003;1(3).

Psychoeducation for Improving Self Efficacy of Care Givers in Risk Coronary Heart Disease Prevention: The Study of Family Empowerment

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Abstract

Objectives: This study aims was to examine the self efficacy effect on family members as caregivers in preventing the incidence of CHD among family members at risk of CHD after obtaining family psychoeducation.

Method: The study was a quasi-experimental pre-post control group design on caregivers which have one risk factor of CHD in family members in Malang Regency. The sampling technique used was purposive sampling with 96 respondents (48 intervention groups and 48 control groups). The measuring instrument used is Cardiac self-efficacy questionnaire. The data analysis employed chi square test, t dependent test and independent t test.

Results: The characteristics of the respondents in the psychoeducation group and control group (Age, sex, relationship and family support) had no relationship (P> 0.005). The family psychoeducation group (1.88) and the control group (1.66) had the same selective value of self-efficacy in preventing CHD among family members at risk of CHD. There was an effect in the family psychoeducation group (p <0.005) and there was no effect on the control group (p> 0.005). Family psychoeducation and control groups had differences in terms of self-efficacy of caregivers in preventing CHD among family members at risk of CHD (p <0.005) .

Conclusions: The groups that get family psychoeducation have better self-efficacy than those given health education (control groups).

Keywords: *Psychoeducation, self-efficacy, caregivers, coronary disease, Qualitative.*

Introduction

Heart disease is one of the major causes of deaths in many countries, including in Indonesia. World Health Organizations (WHO) predicts that by 2020, the number of heart disease cases will continue to increase until 2030. Nearly 60% of deaths related to heart disease were caused by CHD[1]. Indonesia is one of the countries that records the incidence of CHD. The identified symptoms are as much as 1.5%[2]. The results of study in 2017 conducted by the researcher at Talok village Malang Indonesia, 50 people had the risk of CHD and 40 caregivers caring for family members with the risk of CHD had less self-efficacy against the prevention of CHD risk.

Family empowerment approach was one of the

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efforts that can be done to prevent CHD[3]. The concept of family enlargement involves families to prevent and care for family members who are sick. In addition, family empowerment aims to improve health facilities as an effort to prevent the disease[4]. Family empowerment can be done by caregivers in the family independence process to monitor and maintain health. The process of family empowerment can improve the function and task of family health care[5].

Family empowerment aims to increase the role of caregivers in improving psychological motivation and self-efficacy of caregivers in preventing the disease[6]. The role of caregivers in preventing CHD improves the function of family health, reduces the anxiety that occurs in the family, increases self-efficacy in preventing CHD and increases self-efficacy in CHD prevention process. The dominant role of the caregivers is related to self-efficacy in preventing CHD[7].

Therapeutic modalities are one of the efforts for enhancing the self-efficacy of a person. The therapeutic modalities are family psychoeducation. Psychoeducation aims to provide information for improving the ability of family members, reducing recurrence and improving the function of clients and families[8]. Therefore, family psychoeducation can be implemented to provide education for the family in terms of knowing the disease, assisting and training the caregivers in overcoming the changing behavior of risky family members and strengthening family support and empowerment in the community[9]. Thus, this study identifies the influence of family psychoeducation on the enhancement of caregivers' self efficacy in the prevention of CHD in CHD family members.

This study aims to examine the self-efficacy differences of caregivers in preventing the incidence of CHD among family members at risk of CHD after obtaining family psychoeducation. It also analyzes differences in the self-efficacy of caregivers in preventing CHD among family members at risk of CHD in family psychoeducation and control groups. Further, it analyzes the self-efficacy effect of the family in preventing the case of CHD among family members at risk of CHD after obtaining family psychoeducation.

Materials and Method

Study Design: The research design of the study was quasi experimental pre-post control group design. The study was conducted from August 2017 to January 2018. The sampling technique used was purposive sampling. Determination of CHD risk groups used Framingham 10-years estimation with a minimum inclusion criteria for a person with CHD risk is in the low risk category[10]. Determination of risk category of CHD by sex, Age over 35 years, someone with hypertension (> 120 mmHg) without taking hypertension medication regularly, had a history of diabetes mellitus, smokers and someone with a history of dyslipidemia. Exclusion criteria for a person who had been diagnosed with cardiovascular disease by a physician as well as someone with CHD risk but had no caregiver

Study Area: The data were collected in Turen District, Malang Regency. Data collection was done by conducting home visits to families with risk factors for CHD. During the visits, the researcher provided family psychoeducation to the intervention group and health education on CHD to the control group.

Sampling Technique: The sampling technique used was purposive sampling. The number of samples involved was 96 respondents. The sample is divided into 2 groups, namely family psychoeducation group (48 respondents) and control group (48 respondents).

Instrument: The instrument used was a Cardiac self-efficacy questionnaire (CSE)[11]. The approval for the use of the questionnaire has been obtained from the owner. CSE was translated into Bahasa Indonesia at Universitas Brawijaya's language training center. Then tested the validity of the contents of the questionnaire to someone who was competent for cardiovascular. The questionnaire comprises 15points statement about risk factors and self-efficacy related to the risks of CHD into the family. The Likert scale was used in the questionnaire, consisting of (1) for unsure, (2) unsure, (3) sure and (4) very sure. The higher the value, the better the self-efficacy of a person. Reliability test was conducted in Bantur Village, Kabupaten Malang with 32 respondents who have the same criteria with family risk factors at CHD. The reliability test obtained Cronbach's alpha value of 0.988.

Collection Procedure:

Caregivers in the family of psychoeducation group were given 4 interval interventions:

(a) Session 1: Caregivers recognized family health problems in preventing CHD;

(b) Session 2: The management of stress for caregivers

in caring among family members with risk factors of CHD;

(c) Session 3: Caregiver load management in caring for family members who have risk factors for CHD;

(d) Session 4: Family empowerment for preventing CHD in the community.

The control groups were given health education using CHD materials, consisting of the definition of CHD, signs of CHD, CHD risk factors, first aid and care if a member of family could have a heart disease.

Family psychoeducation was given by researchers who have competencies as mental health nurses, medical surgical nurses and community nurses. The family psychoeducation was conducted in 4 sessions. The Method of family psychoeducation and health education in the control group had differences. Family psychoeducation was done by sharing experiences about family problems while caring for family members who are at risk of CHD to family empowerment with CHD risk in the community. The duration of each session was 45-60 minutes. The control group was given intervention by researchers with a one-time frequency of encounters with a duration of 45-60 minutes of health education.

The intervention media used in the family psychoeducation group were the family psychoeducation module for CHD prevention, caregiver workbook on CHD prevention, feedback sheet on CHD materials, leaflets on CHD materials, management of family burdens and family empowerment with CHD risk factors in the Community, book on management stress consisting of progressive muscle relaxation. The control group used a Flipchart and a leaflet of CHD materials.

Data Analysis: The data analysis employed the Statistical Package for the Social Science software 20 (SPSS 20). Normality test data in this study using Kolmogorov-Smirnov. The decision used was probability value (p> 0,05), so the data was normal distribution. The value of self-efficacy pre-test in the family psychoeducation intervention group (p = 0,571: 95% CI) and posttest value (p = 0.132: 95% CI), whereas the pretest control group (p = 0,116: 95% CI) and posttest (p = 0,116: 95% CI) = 0.299: 95% CI). It can be concluded that the distribution was normal.

The homogeneity test of the data in this study used Levine test. The result value of the test was the probability value (P> 0.05) then the result had the same variant (homogeneous). Pretest value of self-efficacy in family psycho education group (p = 0,571: 95% CI) while value pretest in control group (p = 0,116: 95% CI). The conclusions of both groups had the same variant value (homogeneous).

The Chi-square test was used to determine the difference of variables on characteristic data of respondents. The statistical test for cardiac self-efficacy within groups were used dependent t-test. Independent t-test was used to determine the difference of cardiac self-efficacy between family psychoeducation and control group.

Ethical Considerations: Ethical approval for the study has been obtained from the Medical Research Ethics Commission of the Faculty of Medicine, Universitas Brawijaya Malang, Indonesia with a research ethics number No.383/EC/KEPK/11/2017.

Results

The characteristic data of the respondents consists of age, sex, family relationship and family support. The characteristic age of majority respondents in the 41-50 years age range (68.8% family psychoeducation group and 72.9% in control group). The respondent's gender was female-dominated in treating risky CHD members in two groups (54.2% family psychoeducation group and 58.3% control group).The family relations of the respondents with the most at-risk members of CHD were wives in both groups (41.7% of family psychoeducation group and 50.0% control group) and the respondent's characteristic in providing the majority medication adherence was reminiscent of the two groups (54.2% family psychoeducation group and 52.1% control group) as shown in table 1.

The family psychoeducation group (1.88) and the control group (1.66) had the same selective value difference to self-efficacy of caregivers in the prevention of CHD in members at risk for CHD. There was effect on the family psychoeducation group (dependent t-test: p= 0.008; 95% CI) and there was no effect on the control group (dependent t-test: p= 0.889; 95% CI) as shown in table 2. The family psychoeducation group and the control group had differences in caregivers' self-efficacy in the prevention of CHD in family members at risk of CHD (Independent t-test: p= 0.004; 95% CI) as presented in table 3.

Discussion

Family psychoeducation in this study is based on previous studies on the psychoeducation effect on the mental health of clients with CHD. In the previous studies, there were also sessions on CHD, stress and anxiety management and family empowerment[12]. The literature on family psychoeducation sessions for analyzing health problems, stress management, burden management and family empowerment in the community is also consistent with the research on psychoeducation programs on family attitudes in caring for sick family members[13,14].

Session 2 of the community-based psychoeducation aims to manage stress and psychosocial problems with stress management approaches[15]. One of the functions of stress management is increasing self-efficacy in the prevention of CHD disease. This is in line with the research on the relationship of self-efficacy and the anxiety level of cancer patients. From the results of the study, it is found that someone who has high anxiety will have negative self-efficacy[16].

Empowerment of community in families with CHD is also present in session 4 of the family psychoeducation. The purpose of the empowerment is to prevent and solve family health problems. The empowerment model can be used by the health team to seek help when experiencing health problems. The information obtained by the health team can improve self-efficacy. Empowerment can also be interpreted as a model of educational intervention for individuals or families to enhance their ability to think critically and act independently in improving self-confidence and self-efficacy[17,18].

The method can also increase knowledge about the prevention of acute coronary syndrome risk factors for patients looking for the aid to the health care team if they experience shortness of breath and chest pain due to acute coronary syndrome[19]. So, there are different method and results between sharing and discussion method than conventional method[20,21,22].

Two prior studies regarding psychoeducation illustrated some variations compared to this study, for instance number of sessions applied and outcomes achieved. Those studies explained eight sessions of the therapy which included modality therapy and assessment of mental illness stigma related to cardiac disease, but this study applied only four sessions of that. Besides, outcomes of the therapy described in those were its effectiveness to relieve anxiety of cardiac disease sufferer and family burden of people living with mental illness. On the other hand, this study shows that family psychoeducation has develop caregivers' self-efficacy in order to prevent the risk of cardiac disease.

In this way, the improvement of caregivers' self-efficacy was influenced by the method of psychoeducation that researcher applied. Moreover, researcher also gave stress management during second session of the therapy that improve their self-efficacy. As a result, caregivers were able to empower their family members with high risk of cardiac disease so the members will have a better quality of life as the part of community. So, this method is really effective compared to conventional health education such as giving leaflet that only improve self-knowledge.

Conclusion

There is a difference of self-efficacy of the family as caregiver in preventing the incidence of CHD among family members at risk of CHD after obtaining family psychoeducation. Further, there are differences in family psychoeducation with the control group on self-efficacy of caregiver in the prevention of CHD among family members at risk of CHD

Conflict of Interest: The authors declare they have no competing interests.

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References

1. World Health Organization. Global status report on noncommunicable diseases 2010. World Health [Internet]. 2010; 176. Available from: http://whqlibdoc.who.int/publications/2011/9789240686458_eng.pdf
2. Agency for Health Research and Development of the Indonesian Ministry of Health. Basic Health Research (RISKESDAS) 2013. Lap Nas 2013. 2013, 1-384.
3. Vahedian-Azimi A, Miller AC, Hajiesmaieli M, Kangasniemi M, Alhani F, Jelvehmoghaddam H, et al. Cardiac rehabilitation using the Family-Centered Empowerment Model versus home-based cardiac rehabilitation in patients with myocardial infarction: A randomized controlled trial. Open

Hear. 2016; 3 (1).

4. Hage, A., M and Lorensen M. A philosophical analysis of the concept empowerment: the fundamental of education-program to the frail elderly. Nurs Philos. 2005; 6 (4): 235-46.
5. Kaakinen JR, Gedaly-Duff V, Coehlo DP, Hanson SMH. Family Health Care Nursing Theory, Practice and Research. Family Health Care Nursing: Theory, Practice and Research. 2010. 333 p.
6. Mohalli F, Hossien G, Rad M. The Effect of Family-centered Empowerment Modelon Blood Pressure in Patients with Hypertension. 2016; (3): 1071-7.
7. Allahverdipour H, Asgharijafarabadi M, Heshmati R, Hashemiparast M. Functional status, anxiety, cardiac self-efficacy and health beliefs of patients with coronary heart disease. Heal Promot Perspect [Internet]. 2013; 3 (2): 217-29. Available from: http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3963669 & tool=pmcentrez & rendertype=abstract
8. Lukens EP, McFarlane WR. Psychoeducation as Evidence-Based Practice: Considerations for Practice, Research and Policy. Br Treat Cris Interv [Internet]. 2004; 4 (3): 205-25. Available from: http://www.portico.org/Portico/article?article=pf10g1t5xj
9. Stuart GW & Laraia MT Principle and practice of psychiatric nursing. Edition 10. St.Louis Missouri: Mosby Elsevier; 2013.
10. WHO. Prevention of Cardiovascular Disease. World Health Organization; 2007.
11. Kang Y, Yang IS. Cardiac self-efficacy and its predictors in patients with coronary artery diseases. J Clin Nurs. 2013; 22 (17-18): 2465-73.
12. Valiee S, Razavi NS, Aghajani M, Bashiri Z. Effectiveness of a psychoeducation program on the quality of life in patients with coronary heart disease: A clinical trial. Appl Nurs Res [Internet]. 2017; 33: 36-41. Available from: http://dx.doi.org/10.1016/j.apnr.2016.09.002
13. Rahmani F, Ranjbar F, Ebrahimi H, Hosseinzadeh M. The Effects of Group Psychoeducational Program on Attitude toward Mental Illness in Families of Patients with Schizophrenia, 2014. Tabriz Univ Med Sci [Internet]. 2015; 4 (3): 243-51. Available from: http://dx.doi.org/10.15171/jcs.2015.025
14. Dixon, L., Adams, C. & Lucksted A. Update on family psychoeducation for schizophrenia. Schizophr Bull. 2000; 26: 5-20.
15. Aldcroft SA, Taylor NF, Blackstock FC, O'Halloran PD. Psychoeducational rehabilitation for ealth behavior change in coronary artery dsease: A systematic review of controlled trials. J Cardiopulm Rehabil Prev. 2011; 31 (5): 273-81.
16. Mystakidou K. Tsilika., Parpa, Gogou T and V. Self-efficacy beliefs and level of anxiety in advanced cancer patient. Eur J Cancer Care (Engl). 2010; 19: 205-2011.
17. Anderson RM, Funnell MM Patient empowerment: myths and misconceptions. Patient Educ Couns. 2010; 79 (3): 277.
18. Abedini F, Zareian A, Alhani F TF. Assessing the Impact of Family-Centered Empowerment Model on Self-Care of Patients With Prosthetic Heart Valves. Crit Care Nurs J. 2016; 9 ((3): e8371).
19. Hess EP, Hollander JE, Schaffer JT, Kline JA, Torres CA, Diercks DB, et al. Shared decision making in patients with low risk chest pain: prospective randomized pragmatic trial. Bmj [Internet]. 2016; i6165. Available from: http://www.bmj.com/lookup/doi/10.1136/bmj.i6165
20. Durand MA, Moulton B, Cockle E et al. Can shared decision-making reduce medical malpractice litigation? A systematic review. BMC Heal Serv Res [Internet]. 2015; 15 (167). Available from: doi: 10.1186/s12913-015-0823-2.
21. Hargraves I, LeBlanc A, Shah ND MV. Shared Decision Making: The Need For Patient-Clinician Conversation, Not Just Information. Heal Aff [Internet]. 2016; 35 (627): 9. Available from: doi: 10.1377/hlthaff.2015.1354. 19
22. Wihastuti TA, Rahmawati I, Rachmawati SD, Lestari YC, Kumboyono K. Barriers of Nurse Collaboration for the Care of Acute Coronary Syndrome Patients in Emergency Departments : A pilot study. 2018;3–10.

Community Experience on the Issue of BPJS (The Indonesian National Health Insurance System)

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Abstract

Background: BPJS **(**The Indonesian National Health Insurance System) is Public Legal Entity that is directly responsible to the President and has the duty to organize National Health insurance for all Indonesian people. BPJS. Today the BPJS has experienced a 100% increase. BPJS tariff increase of 100% has an impact on community participation and BPJS services to the community.

Method: This research was conducted descriptively with qualitative research using a phenomenological approach using Interpretative Phenomenological Analysis (IPA). This research was conducted on 25-29 November 2019. Sampling with a purposive sampling technique. The sample size of 15 participants in this study were people aged 15-64 years. Data collection in this study was conducted by in-depth interviews using voice recorders and verbatim observation techniques. Interviews were conducted structurally using interview guidelines compiled by researchers based on response theory and phycology theory.

Result: There are 8 themes, namely services with positive and negative community view sub themes, BPJS types with BPJS-PBI (The Indonesian National Health Insurance System-Beneficiary Contribution) and BPJS-Non PBI(The Indonesian National Health Insurance System- Non Beneficiary Contribution) sub themes, BPJS system with positive and negative value sub-theme views, BPJS policies with sub-policies complaint themes that occur, BPJS selection with BPJS-PBI and Non-PBI BPM sub-themes, Costs with BPJS contribution payment sub-themes have an impact on BPJS views, Tariff Increase with sub-theme opinions on BPJS and Hope with BPJS improvement sub-themes.

Conclusion: People heard the issue of rising BPJs made them have to rethink to drop out of class, in addition they questioned the quality of services and facilities because they paid more the government is asked to be wiser in determining the increase in BPJS costs

Keywords: *BPJS, Society, Increase in Rates.*

Introduction

BPJS Health is Public Legal Entity that is directly responsible to the President and has the duty to organize National Health insurance for all Indonesian people. BPJS must be owned by every Indonesian resident. BPJS users are all Indonesian people. Today the BPJS has experienced a 100% increase in tariffs. Even though BPJS is mandatory but not all Indonesian people are already registered with BPJS. As a result of the increase in BPJS, many impacts will arise related to the number of BPJS users and services[1].

UU No 24 of 2011 concerning BPJS forms two Social Security organizing bodies, namely the Health BPJS and the Employment BPJS. Health BPJS is a State-Owned Enterprise that has been transformed into a Public Legal Entity assigned specifically by the government to organize health insurance for all Indonesians. This program serves various layers of the community[2]. BPJS Health is intended to provide protection so that all levels of society get access to health equally. Society is a human who is related (interacts) with other humans in a groups. Life a society that is always changing (dynamic) is something that cannot beavoided. Humans

as social creatures always need other humans to meet their needs[3]. In a broad sense, the community appoints on complex interactions of a number of people who have interests and goals together even though they do not live in one particular geographical area. Such a society can be referred to as societas or society [4].

The above statement encourages researchers to examine about the 100% increase in BPJS rates with community participation and BPJS services to the community. Researchers feel interested to examine this because there has been no previous research related to it[5].

Materials and Method

This research was conducted descriptively. Qualitative research used a phenomenological approach. By using this method, researchers want to explore or express the meaning of a concept or phenomenon of experience based on awareness that occurs in some individuals. This research was conducted in November 25 to 29 November 2019. The method of selecting participants was carried out using a basic probability of sampling with a purposive sampling technique, which was considered suitable for the criteria. A total of 15 participants interviewed in this study were people of productive age, aged 15-64 years (coded as P1, P2, P3, P4, P5, P7, P7, P8, P9, P10, P11, P12, P13, P14, P15). All participants reside in the village of Kedung Pedaringan. All participants expressed their desire to provide information needed by researchers to achieve the objectives of this study. Data collection in this study was conducted by in-depth interviews using voice recorders and direct observation techniques. Interviews were conducted structurally using interview guidelines compiled by researchers based on response theory and phycology theory[6]. All data obtained from in-depth interviews were then analyzed using Interpretative Phenomenological Analysis (IPA)[7].

Result

The data that has been obtained is data from respondents who are homogeneous with criteria of age 15 to 64 years, residents in the Village of Kedung Pedaringan who have BPJS cards and have used BPJS.

Theme 1: Service

The public has a view on health insurance services, especially BPJS. Community's views are positive and negative. The community's view of BPJS services is positive in some respondents, namely:

P3 "I took my mother to control using BPJS at the hospital clinic, the service is the same, alright"

p8 "BPJS is a service that I think is good and appropriate"

P9 "My family has been using BPJS for a long time and so far I have used it in hospitals, the service has been good"

P11 "In my opinion, the service of BPJS is different from the general one, why is it like that because if you use BPJS, you cannot go directly to the hospital, you must have first level health facilities"

P12 "This BPJS service is good"

The negative value of society's view on BPJS services is found in respondents p1, p2, p4, p5, p6, p7, p10, p13, p14, p15 namely:

P1 "BPJS services from the beginning until now are the same if you put them in a hospital or Puskesmas at the same time.

P2 ". I used to use BPJS in a hospital but it was like that, if the nurses were the same but the medicine was different, the treatment wasn't immediate "

P4 "BPJS is actually good but there are lots of people who use it so it's not optimal service"

P5 "Why do you use public and how come it's better when you use public so that it is easier than the general public."

P6 "If I choose, it is good for BPJS, but the service is the same, if it hurts, it will be the same medicine, but if that's the case, it won't be too long for the process."

P7 "The first service is like this, but who knows in the future, we don't know"

P10 "BPJS services are just the same as general, rather complicated there must be a reference and others.

P13 "The government for this BPJS if you use a lot of ma'am so the service is not so optimal"

P14 "The service is good but what makes it lazy is complicated sis"

P15 "The actual service of the BPJS is important

for you, if in my opinion how is that good but there is still a lack because there are many who use it as well as you"

Theme 2: Types of BPJS

BPJS has several types such as BPJS Employment and BPJS Health (BPJS-PBI and BPJS-Non PBI). The focus of data collection is on the use of BPJS Health types. Communities who use BPJS Health with the type BPJS-PBI (Donation Assistance Assistance) are found in respondents P3, P5 and P7 with the following statements:

P3 "I am KIS from the village"

P5 "From the village do not pay"

P7 "Free from the government"

Communities who use BPJS Public Health with BPJS-Non PBI types (Not Recipients of Contribution Aid) are found in respondents p1, p2, p4, p6, p8, p9, 10, p11, p12, p13 with the respondent's answers are as follows:

P1 "Mandiri if you are my BPJS type"

P2 "I pay every month in my family"

P4 "Mandiri"

P6 "Independent in the family every month pay through Indomaret"

P8 "Yes, pay every month, independent means yes"

P9 "Independent of my family"

P10 "Self paid type means"

P11 "Yes, pay yourself, sis, I'm independent"

P12 "Yes pay monthly to Indomaret"

P13 "I am independent"

Theme 3: BPJS system

The BPJS system that has been running the BPJS user community has a positive and negative view. The community's view of the BPJS system is positive in some respondents p2, p4, p5, p6, p8, p9, p10 namely:

P2 "What is the system, yes, it is good because everyone can participate, starting from those who do not have money to those who have money, all can"

P4 "Simple system is good, miss, now one of them can be online now, makes it easier too, sis"

P5 "Yes, the system is good for all Indonesian citizens without exception"

P6 "This BPJS without an age range is so good, it can last a lifetime not to think like that, sis"

P8 "If you use this BPJS the system is young, if the list is not complicated, the preparation is not like the private sector, they must have medical check-ups, etc."

P9 "The system is good evenly distributed to all people in Indonesia"

P10 "Yes, joining this system is delicious, cheaper than joining other insurance companies, but it is reportedly going up, this is going to be hard"

The community's view of the BPJS system is negative in some respondents p1, p3, p7, p11namely:

P1 "There are less and more bpjs systems, if there is a lack of systems, there is a queue of classes which are not beaten flat"

P3 "This is why there are classes and why does the class only have a maximum level of up to one level, why is the system like that"

P7 "The service used to be like this now, but who knows in the future, we better not know"

P11 "There are a number of systems that are lacking in some respects, for example there are classes here and why are you limited to the grade"

Theme 4: BPJS Policy

BPJS has a policy in carrying out its function as a health insurance under the government. Some of the respondents' views on this matter revealed that they still did not understand this and some expressed complaints related to the policies that had been implemented as evidenced by the statements of several respondents

p1, p2, p3, p4, p5, p6, p9, p12, p15 with several statements follows: "I do not understand the details of the policy, sis, if I am ya sis, the policy is lacking because only a few items are covered by BPJS"

Theme 5: Selection of BPJS

The data focused on BPJS Health, namely BPJS-PBI

and BPJS-Non PBI because it was from 15 respondents, during the interview session 2 respondents (p3, p8) stated that they were more likely to choose BPJS-Non PBI as evidenced by the following statement:

P3 "If I may choose, I want free, ma'am, from the government"

P8 "Yes, I prefer those from the government, but I cannot from the government"

Theme 6: Costs

Expensive health care costs make Indonesian people use BPJS health insurance. Type of Non-PBI BPJS with dues that have been determined in accordance with the policy. This was revealed by several respondents p1, p5, p6, p8, p11with the following statements:

P1 "Costs for bpjs are cheaper when sick"

P5 "Yes, I am really using BPJS so if it hurts, it can be used more and is more effective, but sometimes I forget to pay so I'm in arrears"

P6 "In terms of cost, I don't pay, so it's safe, there are no complaints, right? If you get free, sir, if you add a new class, pay"

P8 "Yes, if you calculate the cost of treatment, it is expensive, but with BPJS it is cheaper, I say if we are sick"

P11 "The cost of treatment is expensive, miss, but if you use it, it is cheaper"

Theme 7: Increase Rates

BPJS according to the issues that have been circulating there will be the determination of the latest contribution rates there are tariff increases. This increase in health insurance rates makes a huge impact on society. Some respondents said that they disagree, stated by p2, p8,

P2 "I heard that there was an increase in the tariff for bpjs per January, I did not agree why it had to go up"

P8 "Increase the tariff I do not agree"

Theme 8: Hope

The community has future expectations related to BPJS. This expectation is expressed by p1, p3, p5, p6,

P1 "I hope that the system can be slightly changed, miss, it's better, if you can, the tariff will still not increase, if we pay it will be expensive"

P3 "I hope it is better, younger, waiting time can be improved faster"

P5 "There is my hope for the BPJS so that the process will be faster, yes everyone, so that it can be covered so that certain people do not discover"

P6 "My hope is better"

Discussion

The first research result, namely Service, service is every beneficial activity in a collection or unit and offers satisfaction even though the results are not physically bound to a product[8]. This shows that the service is related to the inner satisfaction of the service recipient. The theory is in line with the results that have been obtained by researchers, namely users in BPJS services, there are negative and perceived positive sides[9].

BPJS has several types of participation that can be followed by Indonesian citizens[10]. Hals are in line with existing provisions, according to (Perpres No. 101 of 2011) BPJS Health membership is divided into two groups, namely Participants Receiving Donation Assistance (PBI) and Participants Not Receiving Donation Assistance (Non-PBI)[11].

As for other problems that arise with changes in the contribution increase. This is because the hospital feels disadvantaged by the application of the INA CBG's package system that is applied to BPJS Health patient care, so the hospital must adjust the amount of fees specified in the INA CBG's package[12]. There is an assumption that hospitals feel disadvantaged through the INA CBG package program, resulting in losses, even though the losses suffered by a hospital cannot be seen only by looking at cases on a case-by-case basis, but rather by seeing all cases that have been handled by the hospital[5]. Even though it is the hospital's obligation to provide health services and it is the community's obligation to get health services so that it can improve the welfare of the community. Occurrence of restrictions on health services performed by the hospital[13]

Form of authority that is determined by the hospital[14]. This can occur because there is no clarity in the cooperation agreement between the hospital and the Health BPJS in granting permission to limit services

to BPJS Health patient [15]. This is the gap between the two, besides the emergence of the problem results in losses suffered by the community as a recipient of health services and as an agent of the policy of increasing tariffs[2].

Conclusion

People heard the issue of rising BPJs made them have to rethink to drop out of class, in addition they questioned the quality of services and facilities because they paid more. the government is asked to be wiser in determining the increase in BPJS costs

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Ethical Clearance: Not required

Reference

1. Rarasati DH. THE IMPACT OF INCREASE OF BPJS HEALTH RATES ON HEALTH SERVICES IN MALANG CITY. Polit Muda. 2017;6(1):34–40.
2. Aditya RS, S FK, Yusuf A, Suwito J. Experience of the Healthworkers in Conductin Methadone Rehabilitation Therapy at the Public Health Center. Dama Int J Res. 2017;2(2):107–13.
3. Lusiana Y, Frinaldi A, Putri NE. THE EFFECT OF SERVICE QUALITY ON TRUST OF PBPU BPJS HEALTH CARE IN BPJS PADANG BRANCH HEALTH IN PADANG CITY. 2019;2(1):86–96.
4. Kusumaningrum F, Soewondo P. The Role of Health Insurance Against Utilization of Health Workers as Helpers in Childbirth in Indonesia. J Kesehat Reproduksi. 2018;9(2):109–24.
5. Ika Widiastuti. SOCIAL SECURITY GUARANTEE (BPJS) SERVICES IN WEST JAVA. 2017;91–101. Available from: http://www.ghbook.ir/index.php?name=گنهرف نیون یاه هنارسر و & option=com_dbook & task=readonline & book_id=13650 & page=73 & chkhashk=ED9C9491B4 & Itemid=218 & lang=fa & tmpl=component
6. Yusuf A, PK FR, Tristiana RD, Aditya RS. Qualitatif Research in Nursing. 1st ed. Surabaya: Mitra Wacana Media; 2017.
7. Aditya RS, Solikhah FK, Kurniawan SB. Teenager Response to the Conditions of Basic Level Emergency: A Phenomenology Study. Indian J Public Health. 2019;10(1):170.
8. Wardani CK, Widyawati MN, Suryono S. The effectiveness of acupressure at LI 4 and SP 6 point on uterine contraction in the first stage of labor on primiparous women. Indian J Public Heal Res Dev. 2018;9(11):565–70.
9. Yandrizal, Machmud R, Noer M, Hardisman, Afrizal, Lipoeto NI, et al. Stakeholder collaboration model to empower integrated health education centers for non-communicable diseases: A study in Bengkulu. Indian J Public Heal Res Dev. 2018;9(1):133–8.
10. Intarti dkk WD. Factors that Influence Utilization of Elderly Posyandu. J Heal Stud. 2018;2(1):110–22.
11. Aditya RS. Phenomenology Study of the Experience of Relapse of Drug Addictions During Methadone Therapy. Perpust Univ Airlangga. 2017;
12. Rahman F, Marlinae L, Setyaningrum R, Putri AO, Hilmiyati. The role of midwife through antenatal class pregnancy for improvement delivery assistance with professional health workers. Indian J Public Heal Res Dev. 2018;9(1):170–4.
13. Aditya RS. Perbandingan Metode Health Coaching dan Ceramah Tentang Basic Life Support (BLS) Untuk Remaja Masjid [Internet]. Jurnal Keperawatan BSI. 2019 [cited 2019 Nov 1]. Available from: http://ejurnal.univbsi.id/index.php/keperawatan/article/view/105
14. Aditya RS. COMPARISON OF LIST AND HEALTH COACHING METHOD ABOUT BASIC LIFE SUPPORT (BLS) FOR TEENAGERS. 2019;4(1):5–10. Available from: http://ejurnal.poltekkesjakarta3.ac.id/index.php/JKep/article/view/231/172
15. Riskesdas. Hasil Utama Riskesdas Penyakit Tidak Menular 2018. Has Utama Riskesdas Penyakit Tidak Menular. 2018;8.

Acute Respiratory Infection Incidence among Toddlers Around the Steel Industry in Bekasi, Indonesia (2019)

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Abstract

Background: Acute Respiratory Infection (ARI) is an acute infection that attacks one part/more of the respiratory tract from the nose to the alveoli including adnexanya (sinus, middle ear cavity, pleura). This study aims to determine the description of individual characteristics and ARI events in children under five who live around the steel industry in Sukadanau Village, West Cikarang, Bekasi Regency. Acute respiratory infections in the world are the main cause of morbidity and mortality in children under five years old. ARI is a health problem with ARI prevalence in children under five in Indonesia with a diagnosis of Symptoms (DG) of 12.8% according to the Basic Health Research of the Republic of Indonesia in 2018.

Objective: Describe individual characteristics and ARI events in under-fives around the Steel Industry in Sukadanau Village, Cikarang Barat District, Bekasi Regency in 2019.

Method: The research method used is a quantitative method with a cross-sectional design. The sampling technique used in this study is proportional stratified random sampling. Data analysis was performed by univariate analysis, with a population of children aged 12-59 months living around the steel industry, with a sample of 96 toddlers. Data collection was done by interview using a questionnaire and carried out anthropometric measurements by weighing the subject's weight.

Results: Univariate analysis results showed the incidence of ARI as many as 36 (37.5%), male sex 63 (65.6%), the most toddlers' analysis unit at the age of 12-23 months ie 34 toddlers (35.4%) status nutrition 82 (85.4). Based on the results of the study suggested improvements

Conclusions: Toddlers who live around the steel industry are at risk of ARI, the unit of analysis is more on male sex, age 12-23 months and normal nutritional status of toddlers.

Keywords: *Individual characteristics, acute respiratory infections, around the industry.*

Introduction

Sources of air pollution come from sources that move (motor vehicles) and sources that do not move (industry). The steel industry is a part of the basic metal industry, which includes the upstream industry, which is a strategic industry in Indonesia (Media Indonesia, 2008). Pollutants are a public health problem, including particles. Particles that have a diameter greater than 5.0 microns will stop and accumulate mainly in the nose and throat. Although these particles can partly enter the lungs but are never farther from the air sacs or bronchi, they can even be removed immediately by the ciliary movement. Particles with a diameter of 0.5-5.0 microns

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can accumulate in the lungs to the bronchiole and only a small portion reaches the alveoli. Most of the particles collected in the bronchiole will be removed by cilia within 2 hours. Particles with a diameter of fewer than 0.5 microns can reach and stay inside the alveoli. The removal of these tiny particles from the alveoli is very slow and imperfect compared to the larger channels. Some particles that remain in alveoli can be absorbed into the blood[1]. In Sukadanau Village there is a Steel Industry, which in its production process emits which can pollute the environment. Emissions issued by industry are one of the steel industry and high cases of ARI in the working area of the Telagamurni Health Center, based on this research interested in examining the effect of PM_{10} exposure on ARI incidence in toddlers around the steel industry.

Acute respiratory infections in the world are the main cause of morbidity and mortality in children under five years old. In Nepal, ARI is considered the number one killer, in the city of Gorkha, the prevalence of ARI in children under five is found to be 21.5% [2]. In 2018, the prevalence of ARI in Indonesia under-fives with a diagnosis of symptoms (DG) is 12.8%, whereas with a diagnosis of health workers (D) of 7.8%. In the province of West Java, the prevalence of ARI through diagnosis and symptoms was 8.2%, while with a diagnosis of 14.7% [3]. The incidence of ARI is one of the main diseases with high patient visits in Puskesmas (40% -60%) and hospitals (15% -30%). [4]

In Bekasi District, the pattern of Puskesmas disease first ranked was ARI disease, 32.50%. Sukadanau Village is in the West Cikarang District and is a working area of the Telagamurni Health Center. The number of children under five in Sukadanau Village in 2019 is 3,695 children under five, 1855 boys under five and 1840 girls under five. From the report of the top 10 diseases in Telagamurni Health Center, ARI ranks first. In 2018, children under five with ARI 21.6%. And from January to August 2019 37.6% were diagnosed with ARI [5].

In general, in the West Cikarang Sub-district, Bekasi Regency, West Java Province is one of the industrial areas where there is one steel factory that is included in the category of large steel industry companies. The conditions surrounding the factory are resettlement which should be by Government Regulation Number 35/M-IND/PER/3/2010 concerning technical guidelines for industrial estates, that the ideal settlement is at least 2 (two) Km from the location of industrial activities[6] Conditions in the field around the steel industry are densely populated settlements, with several 3,695 toddlers where the steel industry is located [7]. Following these conditions, this research is important to do to know the description of individual characteristics and ARI events in toddlers living around the steel industry in the region.

One of the acute respiratory infections that need attention is influenza because influenza is a disease that can cause epidemics under the Minister of Health Regulation No. 1501/Menkes/Per/X/2010 regarding Specific Infectious Diseases that Can Cause Plague and Mitigation Efforts.

Some of the similar studies that have been carried out are research in the State of Nigeria by using the 2013 Nigeria Demographic and Health Survey to assess individual and environmental risks in the North-Western Province and Sout-Southern Province communities and see the relationship with ARI symptoms. Descriptive findings showed that the prevalence of ARI symptoms was significantly higher in preschoolers in North-Western Province (5.7%) than in South-Southern Province (1.4%) ($p < 0.001$). In addition to regional differences, the multilevel logistical model further showed that the increased likelihood of children suffering from ARI symptoms was significantly associated with the dry season (aOR 1.42; 95% CI: 1.02-1.97)[8]. The results of research at Garut District General Hospital in 2014 showed that 58% of boys suffer from ARI and boys are more at risk of getting ARI 1,839 times compared to women and children aged 1-3 years more at 1.77 times more than children ages 3-5 years[9]. This research focuses on toddlers aged 12 to 59 months around the steel industry because toddlers are more susceptible to disease.

Method

The research design used in this study was cross-sectional. Research locations around the steel industry Sukadanau Village West Cikarang District Bekasi Regency West Java Province Indonesia. Univariate analysis using a frequency distribution table by describing individual characteristics (sex, age, nutritional status and incidence of ARI based on symptoms) in the form of proportions. Data collection for ARI events, sex, age and nutritional status was carried out by interviewing a research questionnaire with toddlers or under-fives and anthropometric measurements of toddlers weighing

toddlers' weight. The population is toddlers aged 12 - 59 months with a large number of samples used with the sample formula and obtained a sample of 96 samples research location at Sukadanau Village, West Cikarang District, Bekasi Regency. The study was conducted in 2019. With the inclusion criteria of selected households who have toddlers aged 12-59 months,

Results

Based on interviews with 96 mothers or under-fives and anthropometric measurements on 96 under-five children, the incidence of ARI was based on the symptoms of 36 children under five (37.5%). of 96 toddlers with male gender are 63 toddlers (65.6%), the most age at 12-23 months is 34 toddlers (35.4%), good nutritional status 82 toddlers (85.4%) (Table 2).

Table 1: Distribution of Frequency of Respondents by Gender

Type of Sex	Frequency	Percentage
Female	33	34.4
Male	63	65.6

Table 1 shows the sex of men 63 toddlers (65.6%) and women 33 toddlers (34.4%). Gender influences the incidence of ARI as in the study in Iraq, the majority of cases in Erbil Hospital, boys are more susceptible to ARI than girls[10], according to the results of Iskandar, Tanuwujaya and Yuniarti in 2015, as many as 58 % of boys suffer from ARI [9].

Table 2: Distribution of Frequency of Respondents Age by age

Age	Frequency	Percentage
12-23 months	34	35.4
24-35 months	19	19.8
36-47 months	18	18.8
48-59 months	25	26.0

From table 2 it can be seen that the distribution is more in the 12-23 month age group that is equal to 34 toddlers (35.4%). Acute Respiratory Infection (ARI) is associated with significant morbidity and mortality worldwide, especially in children under 5 years of age. Nearly 2 million children die from ARI each year and most of them come from developing countries. The prevalence and correlation of pathogens in ARI is poorly understood, but it is very important to improve the prevention, treatment and management of cases [11]. The results of basic health research in 2018 aged 12-23 months based on a diagnosis of 9.4% and based on diagnosis/symptoms 14.4% [3].

Table 3: Distribution of Respondent Frequencies by Nutrition Status

Nutritional Status	Frequency	Percentage
Normal	82	85.4
Less	14	14.6

Table 3 shows that the nutritional status of toddlers around the steel industry based on BB/U is more on the indicator of normal nutritional status as many as 82 toddlers (85.4%) and less on the indicator of undernourished nutrition of 14 toddlers (14.6%). Nutritional status is a picture of the consumption of nutritious food for toddlers. Toddlers who consume food with adequate nutrition every day will have a good nutritional status but vice versa if toddlers do not consume enough nutritious food every day it will lead to nutritional problems namely poor and poor nutrition[12]. Toddlers who have less nutrition are at risk for ARI, children who have undernourished children have a risk of 1.561 times greater than toddlers who have good nutrition[13].

Table 4: Distribution of Respondent Frequencies According to ARI Occurrence

ARI Event	Frequency	Percentage
No ARI	60	62.5
ARI	36	37.5

Table 4. Distribution of toddlers based on ARI events around the steel industry, namely 60 toddlers (62.5%) who did not experience ARI and 36 toddlers (37.5%) had no ARI. In this study, more toddlers did not have ARI, but toddlers whose ISPA had a greater percentage than the national rate of ARI based on 2018 basic health research data, according to Diagnosis (D) 7.8% and according to diagnosis and symptoms (DG) 12.8 % [3]. The incidence of ARI is one of the main diseases in patient visits at the Puskesmas at 40% -60% and the largest hospital visits 15% -30%[14].

Conclusions

Toddlers with ARI incidence of 36 toddlers (37.5%) exceed national figures. The unit of analysis is more male sex, age 12-23 months and normal nutritional status of toddlers. ARI is more common in children with the category of toddlers compared with the age of the baby because due to the immune system of toddlers

and the development of toddlers who socialize more with friends and people around it so that transmission is possible. Seeing the magnitude of the impact of pollutants the Bekasi District Government of West Java Province should relocate settlements in the area or innovate to reduce these impacts.

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Ethical Approval: This study uses the unit of analysis is Toddler. The ethical approval number drawn up by the Ethical Research Committee is provided in this study, namely the Ethical Research Commission and the Public Services Faculty of the Public Health University of Indonesia. The number is 669/UN2.F10/ PPM.00.02/2019 valid until December 2020.

Competing Interest: The author states there is no conflict.

References

1. Fardiaz S. Air and water pollution. Yogyakarta, 1992.
2. Simoes EAF, Cherian T, Chow J, et al. Acute Respiratory Infections in Children_Bookshelf_ NBK11786. 2006.
3. Ministry of Health Republic of Indonesia. Indonesia Basic Health Research Results Report 2018.
4. Ministry of Health Republic of Indonesia. Indonesia Basic Health Research Results Report 2007.
5. Departement of Health Bekasi Regency. Bekasi Regency Health Profile 2014. Bekasi. Epub a head of print 2015. DOI : 10.1017/ CB09781107415324.004.2015.
6. Ministry of Industry Republic of Indonesia. Januari 2008; 27 : 2017.
7. Telagamurni community health center. Profile of Telagamurni Health Center in 2018. Bekasi. 2018.
8. Adesanya OA, Chiao C. Environmental risks associated with symptoms of acute respiratory infection among preschool children in north-western and south-southern Nigeria communities. Int J Environ Res Public Health; 14. Epub ahead of print 2017. DOI: 10.3390/ijerph14111396. 2017.
9. Iskandar A, Tanuwijaya S, Yuniarti L. Relationship between Sex and Age of Children One Year to Five Years with the Occurrence of Acute Respiratory Infection (ARI). Global Medical & Health Communication (GMHC) 2015; 3: 1.
10. Chalabi DAK. Acute respiratory infection and malnutrition among children below 5 years of age in Erbil governorate, Iraq. East Mediterr Heal J 2013; 19: 66–70. 2013.
11. Liu J, Ai H, Xiong Y, et al. Prevalence and correlation of infectious agents in hospitalized children with acute respiratory tract infections in central China. PLoS One 2015; 10: 1–14. 2015.
12. Agrina, Suyanto, Arneliwati. Toddler Aspect Analysis of the Occurrence of Acute Respiratory Infection (ARI) at Home. J Nursing 2015; 5: 115–120. 2015.
13. Supriatin E. The Relationship between Factors and the Occurrence of ARI in Toddlers in Puskesmas X Bandung City. J Nursing 2013; 1 No.1: 39–46. 2013.
14. Ministry of Health Republic of Indonesia. Guidelines for the Prevention and Control of Acute Respiratory Infection. Jakarta, 2016.

Suitability of Fertility Indicators between Smart Fert and Indonesia 2010 Population Census

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Abstract

Fertility is one of the main indicators in population development, especially the control of the population quantity. Fertility indicators such as Crude Birth Rate (CBR), Total Fertility Rate (TFR), General Fertility Rate (GFR) and Gross Reproductive Rate (GRR) are often unavailable in many districts/cities level. The purpose of this research is to develop "Smart Fert" information technology which produces fertility indicators that are valid, practical, easy to apply in districts/cities level. This research is an explanatory action research that is aimed to test hypothetical research the compatibility between the result of "Smart Fert" and Indonesia 2010 Population Census data. this research showed that fertility indicators result with "Smart Fert" was not different with result of Indonesia 2010 Population Census.

Keywords: *Fertility Measurement, Information System Technology, Smart Fert Application.*

Introduction

The term fertility is the same as birth but is different from fecundity. Fertility is a clue to reproduction that results in a live birth, whereas fecundity is a clue to a woman's physiological and biological abilities. Measure of fertility is always associated with the number of live births with a certain population. A birth is called born alive when at birth there are signs of life such as breathing, heart throbbing, crying, moving and so forth[(1)].

Fertility indicator is one of the main indicators in population development, especially controlling population quantity[(2)(3)(4)(5)]. Along with the enactment of regional autonomy, population affairs become one of the authority of the district/city. One of the obstacles faced by district/city governments is the availability of fertility indicators. the cause of the unavailability of indicators is the very limited resources and method/tools to measure fertility indicators in districts/cities. As a result, the population planners and staff in carrying out their activities are usually only oriented to the process and output of activities. They pay less attention to outcome indicators that are usually measured by fertility indicators such as Crude Birth Rate (CBR), Total Fertility Rate (TFR), Age Specific Fertility Rate (ASFR), General Fertility Rate (GFR), Gross Reproductive Rate (GRR).

Crude Birth Rate (CBR) is useful to know the number of births every 1000 population. Total Fertility Rate (TFR) is useful for knowing the average number of children born to women during reproduction. Age Specific Fertility Rate (ASFR) is useful for knowing the number of births for each age group of mothers. Gross Reproductive Rate (GFR) is useful for knowing the average number of births for every 1000 women of reproductive age and knowing the average number of girls born by women during their reproductive period.

Demographic data plays an important role in determining policy, development planning and evaluation of development outcomes. Moreover, demographic data is strategic information and is needed by various parties

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[6] in fact, various fertility calculation method have been found by many demographers and population institutions with various approaches [7][8][9][10][11][1][12]. But for the district/city level, felt the method was less applicable in the field due to various limitations, especially the limitations of tools (applications), data, method and capabilities of officers. The presence of a fertility information system application that is practical and easily applied is expected to be present at the district/ city level.

Until now, there has been a software or application for the calculation of fertility indicators developed by international institutions, for example Mortpak for Windows [13] and Eas Wes Pop [14]. To calculate fertility indicators by Mortpak, we usually using FERTPF and FERTCB modules. Number of children born alive and Age Specific Fertility Rate are needed. Both indicators are only available for each population census which is conducted every 10 years. Therefore, the availability of fertility indicators every year in districts/cities is still a problem. Meanwhile, East West Pop software still uses DOS, so at the district/city level are less familiar.

System development is the preparation or replacement of a system that has been implemented with a new system, either a complete replacement or only with repairs. The reason for the development of the system is because of the problems that arise in the old system. This problem can be caused due to intentional fraud, intentional or unintentional mistakes, or because of violations of management policies that have been implemented, inefficient operations. Other problems that arise are due to organizational growth, where organizations need more complex information due to increased data processing volumes, these changes need to be made to support management needs [15].

Therefore, the development of fertility application as a tool to calculate fertility indicator where is practical, easy to apply, in accordance with the available data input is very feasible to be made. The app will be named "Smart Fert" which means a useful tool for calculating simple, easy to apply.

Material and Method

This research is a design research with approach of DRM (Design Research Methodology) which is explanatory research that aims to test hypothetical research. Hypothesis in this research is fertility indicators by Smart Fert are appropriate with Indonesia 2010 Population Census. Unit of analysis is 38 districts and cities in East Java. The material used in this research is a set of Smart Fert applications result based on indirect method calculation, result of Indonesia 2010 Population Census with direct method and use independent t test to assess the suitability of Smart Fert result with 2010 Population Census result.

When using the direct method, TFR is calculated from sum of total births which broken down by women's age group (ASFR). One indirect method of calculating TFR is "rele" method. Main data input for "rele" is Child Woman Ratio (CWR), where data on infants and women of childbearing age can be obtained up to the district level each year.

In the indirect method, GFR in the Smart Fert application is calculated using the association method, using CWR and TFR data from the "rele" method. This data input is easily obtained because the data collection of infants and women of childbearing age has been done routinely.

When using the direct method, CBR is calculated from the number of births divided by 1000 inhabitants. It should be noted that up to now routine reporting on the number of births annually has not been good. In the indirect method, the CBR in the Smart Fert application is calculated using the association method.

The procedure of this research is Clarification covering identification of availability problem of indicator, identification of indicator requirement and analysis of literature of fertility measurement technique; Then Stage 2: Descriptive Study 1, which includes identification of population data input, Manual fertility calculation and idea of designing Smart Fert application; stage 3: Prescriptive Study, including Application Planning, application system analysis, application design and application implementation.

The Authenticity of Research: The authenticity of this research is Development of Smart-Fert fertility information system Technology is a new, practical, valid, easy to apply tool suitable for population data condition in Districts/Cities. Modules in this application can be opened and executed more than one at the same time.

Research Framework	Activity
Stage 1: Research Clarification	• Identify the availability of indicators • Identify the needs of indicators • Analysis of fertility measurement technique literature
Stage 2: Descriptive Study 1	• Identification of population data input • Manual fertility calculation • The idea of designing a Smar Fert application
Stage 3: Prescriptive Study	• Application Planning - System identification - Preparing the module to be created • Analysis of application systems - Analysis of input data, process, output • Application design - Physical design - Menu design • Implementation of the application - Testing system - System repair

Figure 1: Research Framework

Results

To find the compatibility between the results of the Smart Fert application and the results of the 2010 Population Census, a statistical test between the results of the two method was conducted. Indicators to be compared are indicators *Total Fertility Rate* (TFR), *General Fertility Rate* (GFR) dan *Crude Birth Rate* (CBR).

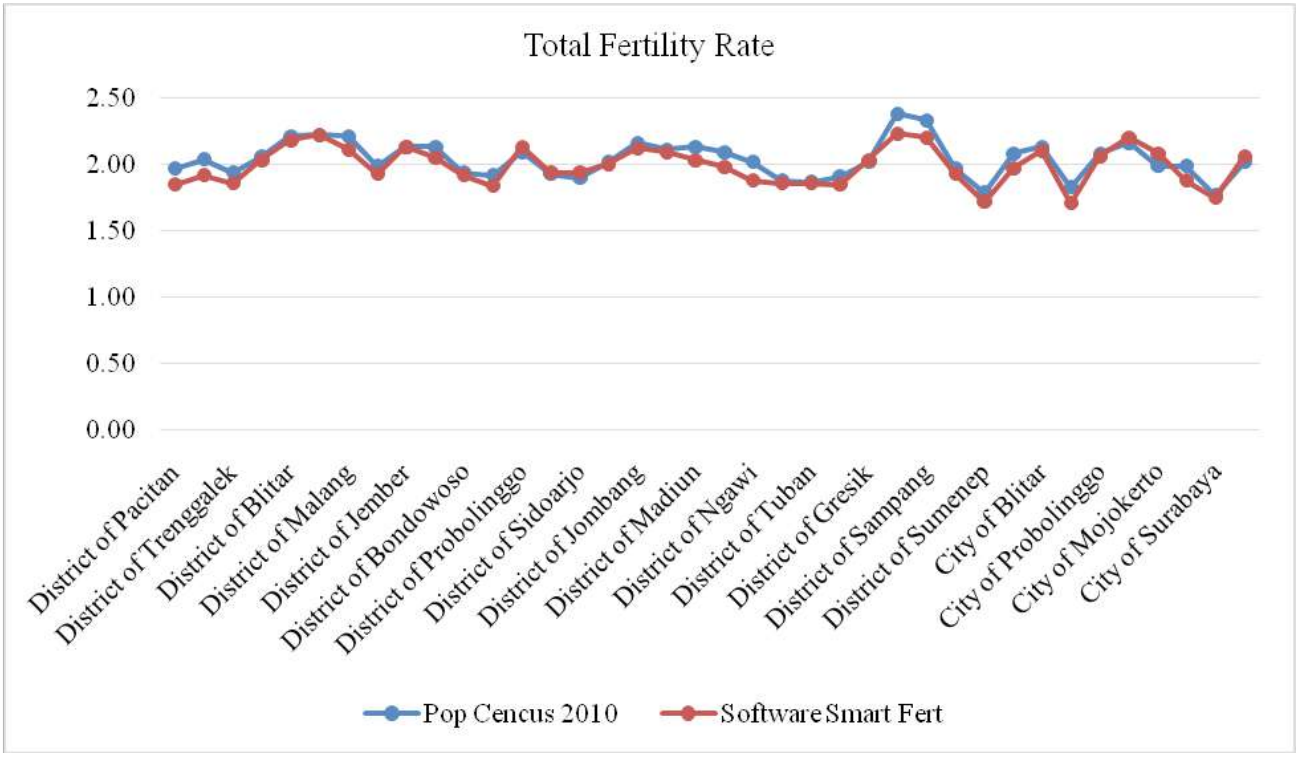

Figure 2. TFR result between Smart Fert and 2010 Population Census

Based on the independent t-test, difference between Smart Fert and Population Census in 38 districts/cities were not significant (Sig. = 0.132). Its show that there were no significant differences between the two TFR calculation method.

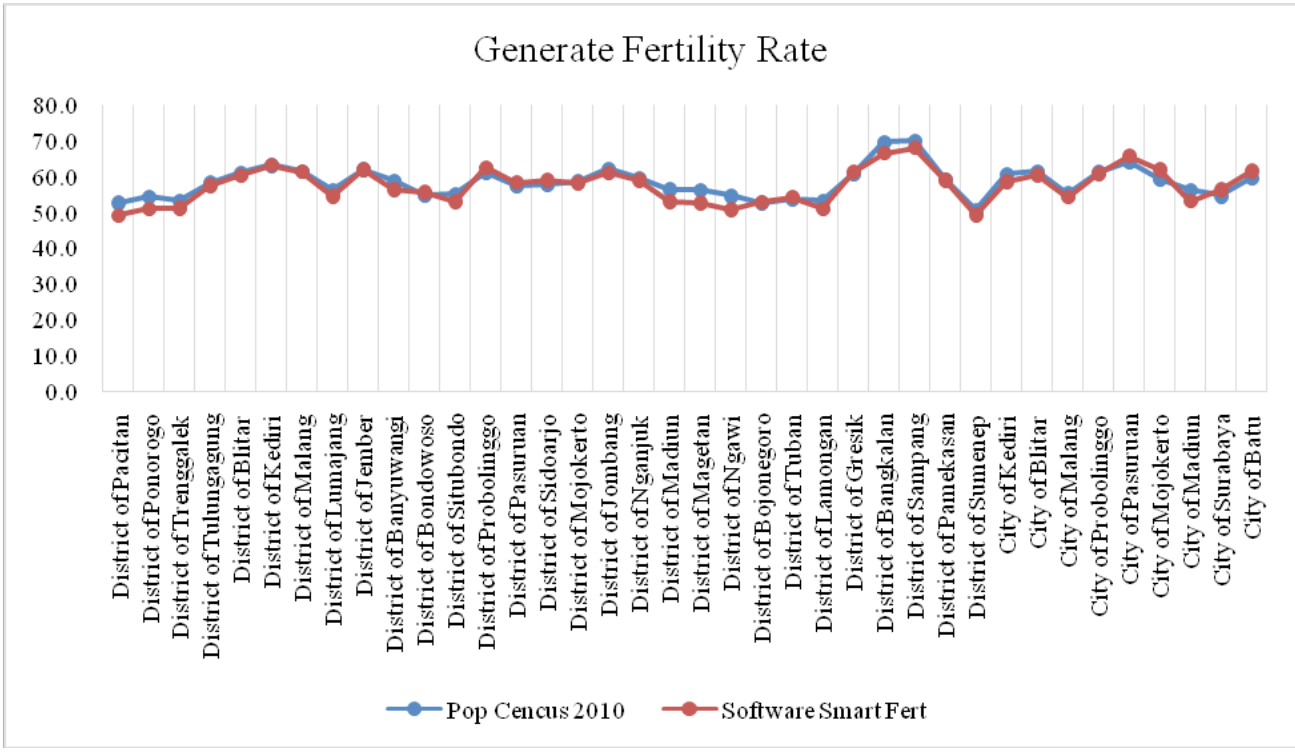

Figure 3. GFR result between Smart Fert and 2010 Population Census

Based on the t-test, difference between Smart Fert and Population Census in 38 districts/cities were not significant (Sig. = 0.423). Its show that there were no significant differences between the two GFR calculation method.

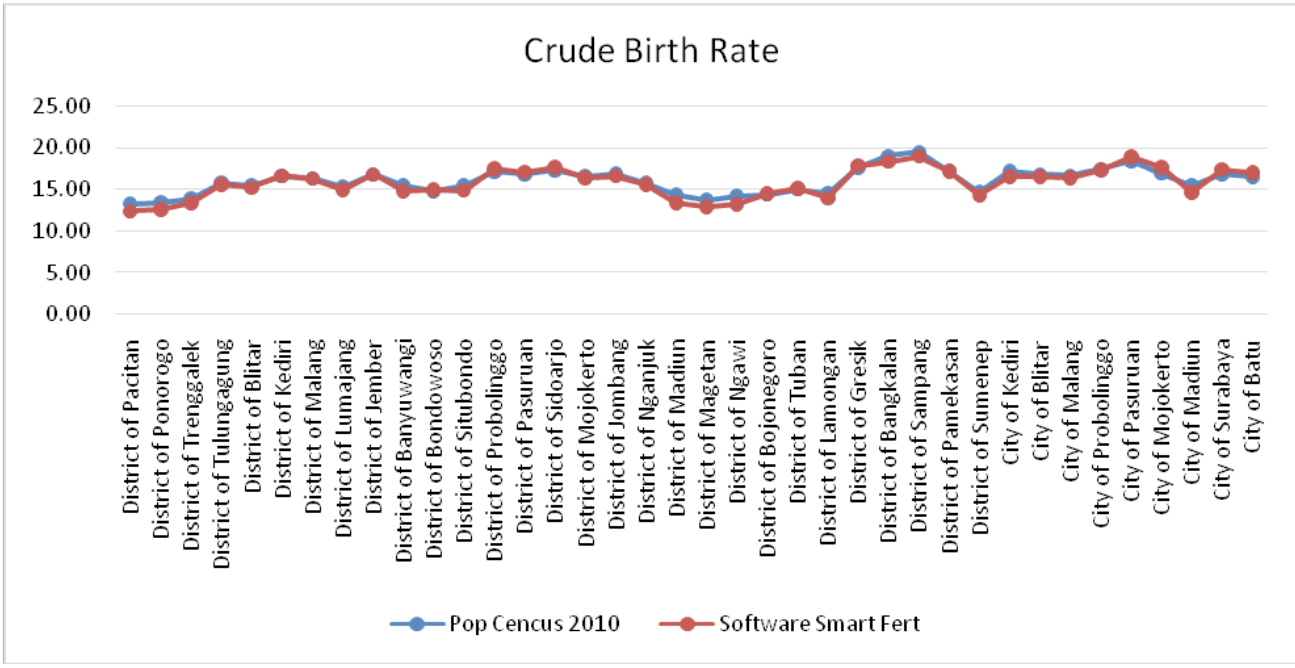

Figure 4. CBR result between Smart Fert and 2010 Population Census

Based on the t-test, difference between Smart Fert and Population Census in 38 districts/cities were not significant (Sig. = 0.575). Its show that there were no significant differences between the two CBR calculation method.

Table 1. Statistical analysis using Independent T-test

Indicators	Statistical Test	P-Value	Conclusion
TFR	Ttest	0.132	No difference
GFR	T test	0.423	No difference
CBR	T test	0.575	No difference

From the statistical test of the three fertility indicators mentioned above, it can be concluded that the application of Smart Fert is not significantly different with the results of the 2010 Population Census. Thus, the use of Smart Fert application can be used to calculate the fertility indicator every year.

Discussion

Results of statistical analysis show that there is no significant difference between the two method of calculation of TFR, GFR and CBR. Both using indirect method by Smart Fert or using direct method like population census. Thus, Smart Fert application can be used to calculate fertility indicators every year in districts/cities in Indonesia.

Needs to noted is population data in the districts/cities should be first checked feasibility before use and input to Smart Fert. For the age structure of the population can be checked first with "join index" or "myersindex" formula. If it is found that the age structure is not good, neatness of age structure must to do with "graduation" formula. Age and sex according to the age structure is always available in any surveys like such as population census, inter-census population survey, and national social economic survey.

After obtaining good age structure according to demographic criteria, data entry is applied to in module 3 Smart Fert application. Ease of module 3 is using "rele" method, where the main data input is Child Woman Ratio(CWR), data of toddler and woman in fertile age can be obtained up to the district level every year. After obtained the value of CWR and TFR, it can be directly used to calculate GFR and CBR. The main advantage of this method is its simplicity, because it requires only the age distribution of the population and the estimated death. Based on the composition of population according to age and sex can be generated mother-to-child ratio. By knowing a rough estimate of life expectancy at birth, this amount can be converted to estimated TFR.Data requirements are limited to the population distribution by age and sex, as well as indications of mortality rates in the form of life expectancy at birth. To obtain life expectancy data in module 3 Smart Fert can be obtained from the official publication of Central Bureau of Statistics (BPS) every year at the district level.

If the CWR data input is not good enough because of the limitations of population data, to calculate fertility indicator in Smart Fert can use module 6, through CBR data input. This CBR data can be obtained from the table 4 health profile table on the system developed in the Health Department. For now, the CBR rate of this profile is better than the CBR number from birth registration reporting from the Administration of Population Administration System(SIAK) Population and Civil Registry of the districts/cities because the birth data in SIAK is the one taking care of the birth certificate so that it tends to be less than the actual birth rate.

Conclusion

This result show that Smart Fert Fertility Information System Technology can be used as a valid, practical and easy to implement fertility measurement tool at the districts/cities level and even at the sub-district level in accordance with existing data input. Available data and Smart Fert generated indicators can be annually available, without waiting for the results of the Population Census once every 10 years.

Suggestions from the results of this study are as follows, the need for technical guidance on the integration of fertility indicators in development planning and calculation techniques so as to facilitate the planners and implementers of population programs in urban districts. In the guidelines it is necessary to describe various fertility calculation techniques, both direct and indirect method and the introduction of fertility applications including Smart Fert applications that are proven to be valid, simple and easy to implement. The need for demographic technique training, especially periodic fertility measurement techniques for population program managers in urban districts because in addition to upgrading the demography sciences also because there are often mutations or personal changes of population program managers in districts/cities.

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References

1. Kasto. Handout Teknik Demografi. Jogjakarta: Demographic Study Program, Gajah Mada University; 1995.
2. Hull TH. Striking a Most Delicate Balance: The Implications of Otonomi Daerah for the Planning and Implementation of Development Cooperation Projects. 1999;
3. Dwiyanto A. Reformasi Tata Pemerintahan dan Otonomi Daerah. Jogjakarta: Pusat Studi Kependudukan dan Kebijakan UGM; 2003.
4. PSKK. Dinamika Kependudukan dan Kebijakan. Faturochman, editor. Pustaka Pelajar; 2004.
5. Kemenkokesra. Grand Desain Pembangunan Kependudukan 2010-2035. Jakarta: Kementerian Koordinator Bidang Kesejahteraan Rakyat RI; 2012.
6. Kemendagri. Grand Design Sistem Administrasi Kependudukan. Jakarta: Ditjen Adminduk Kemendagri; 2010.
7. UN Manual X. Indirect Technique For Demographic Estimation. New York: United Nations; 1983.
8. UN Manual IV. Method of Estimating Basic Demographic Measures From Incomplete Data. New York: United Nations; 1967.
9. Barclay GW. Technique of Population Analysis. New York: John Willey & Sons Inc; 1970.
10. Bogue DJ. Demographic Techniques of Fertility Analysis. Community and Family Study Centre University of Chicago; 1971.
11. Iskandar. Demografi Teknik. Jakarta: Lembaga Demografi Fakultas Ekonomi Universitas Indonesia; 1977.
12. Lembaga Demografi U. Dasar Dasar Demografi. Jakarta: Lembaga Demografi Fakultas Ekonomi Universitas Indonesia; 1981.
13. UN. Mortpak For Windows. New York: Population Devision Depart of Economic and Social Affairs UN; 2003.
14. East West Center Research Program. EASWESPOP Fertility Estimate Programs. USA: The East West Center Research Program; 1992.
15. Jogiyanto. Analisis dan Desain Sistem Informasi. Pendekatan Terstruktur, Teori dan Praktik Aplikasi Bisnis. Jogjakarta: CV Andi Offset; 2005.

Depression and Cyber-Victimization among Middle School Students in Morocco

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Abstract

Background: Cyber-victimization is a real health problem worldwide. It has a negative impact on middle school students' mental health.

Objective: To evaluate the depression score among cyber-victimized middle school students in Morocco.

Method: It's a cross-sectional study based on an anonymous self-report questionnaire about cyber-victimization and depression during the last twelve months. Data were collected in 44 middle schools in the urban area of three Moroccan zones. A total of 3785 students aged between 12 and 16 participated in the study. Cyber-victims refer to students who were cyber-victimized twice or more in the past twelve month. In our sample 72,3% (n=2736) were cyber-victims. We used a hierarchical multiple Regression to examine the relationship between independent variables and depression.

Results: In the past twelve months 49,4% (n=1351) of cyber-victim participants were depressed and the difference between girls and boys was significant: (51,4% (n=732) vs 47,2% (n=619)) respectively p= 0,03.

The most important predictor of depression score was cyber-victimization score β=0,17 t = 10,98 p< 0,001. The cyber-victimization score variable explained 3 % of variation to the depression score among middle school students and p<0,001. Age is a strong positive predictor of depression (β = 0.10, T = 6.59, p< 0.001). both cyber-victim adolescents and depressed cyber-victim ones spoke little of their experience of cyber-victimization.

Conclusion: Cyber-victimization is a real problem among middle school students in Morocco. It is the main cause of depression. Hence action needs to be taken to face this problem.

Keywords: *Cyber-victimization, adolescent, middle school, depression, coping, Morocco.*

Introduction

Cyber bullying is a growing problem among adolescents in middle school[1]. Most of the existing research concerned young adolescents because the problem is very widespread among this category[2] anywhere and at any time[3]. Currently, several definitions have been used. Smith defines cyber bullying as "an aggressive, intentional act carried out by a group or individual, using electronic forms of contact, repeatedly and over time against a victim who cannot easily defend him or herself"[4]. While, Hinduja defines it as"voluntary and repeated damage caused by the use of computers, cell phones and other electronic devices"[5]. In general, cyber-bullying rate prevalence ranges between approximately 2,3% and 72%[5].

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Regarding cyber-victimization, individuals who received cyber bullying behaviors are considered cyber-victims. Researches on the effect of gender on cyber-victimization showed no difference between girls and boys[6]. Others have demonstrated that girls are more cyber-victimized than boys[7]. Regarding the effect of age on cyber-victimization,some studies found no correlation between age and cybervictimization[8]. Others revealed that cyber-victimization increases with age[7].

Cyber-victimizationcauses many psychological problems among adolescents especially depression[9,10], suicide and suicidal ideation[11], social anxiety, low self-esteem[12] and addictive tendency[13]. Besides cyber-victimization hasa negative impact on academic performance[14].

The current study aims to investigate moderator effects of gender, age,type of school andcyber-victimization on depression among middle school students and their coping strategies.

Materials and Method

Study Population: This is a cross-sectional study conducted from 1st November 2017 to 30th March 2018 in three.

Moroccan zones (North, East and South). The 3785 Participants were randomly taken from 44 middle schools in urban areas.

The inclusion criteria were middle school students aged between 12 and 16 and had regular access to internet. The exclusion criteria were either students' or parents' refusal to participate or participants who did not answer all questionnaire items.

Stage of the research:

1st Step: The Ethics Committee for Biomedical Research of Mohammed V University in Rabat has approved the study protocol (IORG0006594). The study was approved also by the ministry of education, the regional education academy and schools' principals. Parents received a written letter of consent which included information about the study, explanations about their child's participation and a reply coupon. In addition, the students were informed of the anonymous and confidential nature of the study .What is more important is that no investigation was done before getting students' verbal consent.

2nd Step

Measuring Tool:

Cyber-victimization: The study used a self-report questionnaire based on the Hinduja one[11]. The questionnaire included 20 questions exploring the socio-demographic context, the practices of information and communication technology (ICTs), and seven items on cyber-victimization during the last twelve months. The seven items are: 1-receive unpleasant texts messages, 2-show others embarrassing photos or videos online without permission,3-Log in to someone's IM account without his permission and pretend to be him,4-Take someone's personal mail without permission and publish it, 5-Hack someone's personal data**,** 6-Insult someone online, 7-Block and exclude someone from the online group**(**Alpha coefficients for this scale was 0,88). The questionnaire was evaluated according to the seven variables of the Likert scale: never happened (coded 0), once (coded 1), twice to three times a month (coded 2), once a week (coded 3) and several times a week (coded 4). A total score is calculated by summing the seven items (scores range from 0 to 28). We can't talk of cyber-victimization unless the student was cyber-victimized twice or more.

Depression Questionnaire:

The risk of depression was measured using the self-administered adolescent questionnaire (ADRS) 10 item patient version[15]. For each item, the student answered yes (coded 1) or no

(coded0). The total ADRS score was between 0 and 10. Indeed, the identification of the risk of depression is when the score falls below the threshold of 4.**(**Alpha coefficients for this scale was 0,70)

3rd Step:

Statistical Analysis: The data were analyzed using SPSS software version 23.0. The results expressed as mean ± standard deviation for the quantitative variables and frequency for the qualitative variables. We performed Hierarchical multiple regression analysis. The effect of gender, age and type of school were tested independently as control variables before examining the effect of cyber-victimization on the depression score.The confidence interval of 95%was considered statistically significant at 5%.

Results

Prevalence of depression and cyber-victimization: Our study showed that depression prevalence among cyber-victim participants were 49,4% (n=1351). There was a significant gender difference: 51,4% (n=732) were girls and 47,2% (n=619) were boy s*p*= 0,03. The difference was significant between the depressed cyber-victim participants aged between 15 and 16 years and those aged between 12 and 14 (56,7% (484) vs 46,1% (867)) *p*<0,001. 52,9% (1092) were public school students and 38,5%(259) were private school ones.

Effects of gender, age and type of school on depression score: The Hierarchical multiple regression revealed that age, gender and type of school contributed significantly to the regression model, F= 29,55 df =3 p<0,001 and accounted for 2,2 % of the variation in depression score. Age is a strong positive predictor of depression (β = 0.10, t = 6.59, p<0.001). This means that students aged between 15 and 16 years were more likely to be depressed than students aged between 12 and 14. Girls were more prone to depression than boys (β = 0.06, t = 3.69, p < 0.001) (table 1).

Cyber-Victimization and Depression: The cyber-victimization score variable explained 3 % of variation to the depression score and this change in R^2 was significant, F= 53,02, df = 4 p<0,001.

The Interaction Effects of gender,age and type of school with Cyber-Victimization.

The most important predictor of depression score was cyber-victimization score β=0,17 t = 10,98 p< 0,001. The addition of gender*cyber-victimization score, age*cyber-victimization score and type of school*cyber-victimization score to the regression model has no significant effect on the depression score. In other words, the interaction between each of the four variables: age, gender, type of school and cyber-victimization. Neither add any change to the variation of the depression score nor were significant predictors of depression score (table 1).

Table 1: hierarchical multiple regression using depression as dependant variable

	Unstandardized Coefficient		Unstandardized Coefficient	t value	CI
	B	SEB	β		
Variables					
Model 1					
Gender	0,28	0,07	0,06***	3,69	[0,13-0,44]
Age	0,58	0,08	0,10***	6,59	[0,40-0,75]
Type of school	0,46	0,09	0,08***	5,02	[0,28-0,65]
Model 2					
Cyber-victimization	0,07	0,007	0,17***	10,98	[0,06-0,09]
Model 3					
Gender*cyber-victimization	0,001	0,014	0,004	0,077	[-0,027-0,029]
Age*cyber-victimization	0,016	0,015	0,055	1,037	[-0,014-0,046]
Type of school*cyber-victimization	0,005	0,018	0,022	0,296	[-0,029-0,040]

Model 1, adjusted for gender, age and type of school, R^2= 0,022, df= 3, f=29,66.

Model 2, adjusted for cybervictimization, R^2=0,052, df= 4, f=53,02.

Model 3, gender*cybervictimization, age*cybervictimization, type of schoo*cybervictimization, R^2=0,052, df=7, f=30,47.

n= 3785. ***p<0,001**p<0.01; *p<0.05.

Behavior Reaction: In our sample generally cyber-victimized adolescents didn't talk about their cyber-victimization to someone. However,most of the participants who reported talking about their experience talked about it to foreign person 32,2% (n=882)or to their friends 28,5% (n=780). Few adolescents informed their families or their teachers about their cyber-victimization.

The difference was not significant between the depressed cyber-victim adolescents and those who were not concerning the fact of talking about their cyber-victimization (table 2).

Table 2: Students' reaction to cyber-victimization

	Cyber-victims n=2736				
	Depressed Participants				
[b]**Variables:** Talking about cyber-victimization	Yes n=2736	Yes n=1351	Not n=1385	X^2 [a]p-value	CI
foreign person	882(32,2%)	436(49,4)	446(50,6)	0,002	[-0,15-0,16]
With parents	235(8,6)	107(45,5)	128(54,5)	1,522	[-0,43-0,10]
With siblings	219(8,0)	106(48,4)	113(51,6)	0,091	[-0,31-0,23]
With teachers	46(1,7)	29(63,0)	17(37,0)	3,495	[-0,03-1,17]
With friends	780(28,5)	374(47,9)	406(52,1)	3,118	[-0,01-0,31]

Note: [a] P-value by X^2 test, ***p<0.001; **p<0.01; *p<0.05.

[b]Effectif (percentage)

Discussion

Our results showed that half of cyber-victim participants were depressed and that the more students are cyber-victimized the more they become depressed. This result is consistent with that found by previous studies[7,16].

Regarding age, our results showed that participants aged between 15and 16 years developed depression more than younger adolescents. This result was in line with previous studies[17].

According to previous studies cyber-victimization,which is the major predictor of depression, increases with age[7]. This is probablywhy older adolescents were more likely to be depressed. It maybe causedby the fact that they are more isolated. They believe that they can solve their problem by themselves. Moreover, theyget less help or inappropriate one from adults.

Considering gender effect, girls were more likely to be depressed than boys. This finding were consistent with the previous studies[17,18]. This tendency to depression in girls would be linked to variations in hormonal secretions especially during the puberty,more dissatisfaction with their bodies and low self-esteem than boys[19,20]

The effect of type of school was more important. Public school cyber-victims were more likely to develop depression. Unfavorable conditions in public schools: crowded classes as well as the low socioeconomic level of pupils would be among the causes of the differences between private and public schools. Students in private school probably have more knowledge about the risks of inappropriate use of ICTs. Some studies showed that adolescents from low socioeconomic background and those with a low level of education are more vulnerable to cyber-victimization and depression[21].

Regarding the Strategy of dealing with cyber-victimization, we foundthat most of the cyber-victims preferred not to confide. Few cyber-victim participants talked about their suffering. Those who do, prefer to talk to foreign people or friends. As previously reported, cyber-victim adolescents have a tendency to confide especially to their friends[22]. This is due to the fact that friends or foreign people have no power on adolescents and therefore they won't be punished. Few of those who confided spoke to their family (parents (less than 10%),

sibling) or to their teachers. Those results were in line with previous researches[23,24]. May beadolescents just resort to silence for fear of being punished by adults by depriving them of internet access or supervising them more. Besides, theyseek independence from their families.

Furthermore,depression has no impact on adolescents' behavior. In other words talking about cyber-victimization is not influenced by the fact of being depressed or not

Despite the interesting results obtained, many difficulties were encountered. As we used a self-administered questionnaire, the answers could be over or under estimated by the respondents. However, the strength of this study is the large sample and the use of validated scales. The responses related to events that have occurred in the past. Their impact could change over time. There by, longitudinal researches were needed to assess the impact of cyber-victimization on mental health.

Conclusion

In conclusion, the current study suggests that Cyber-victimization is a real problem among middle school students in Morocco. Adolescents involved in cyber-victimization are at increased risk for depression. Moreover, cyber-victimized girls are more prone to depression than boys,though none of them tend to talk about it. Hence,prevention programs should include teachers and families intervention in order to show them the importance of social support. Undoubtedly, parent teachers–adolescents communication is the important point to prevent cyber-victimization and its negative impact.

Conflict of Interest: No

Source of Funding: No

Ethical Approval: The procedures were carried out in accordance with the recommendations of the Internal Ethics Committee of the Center for Doctoral Studies, Faculty of Medicine and Pharmacy, Mohammed V University, Rabat, Morocco. This procedure was examined and approved by the Committee.

References

1. Landoll RR, La Greca AM, Lai BS, Chan SF & Herge WM. Cyber victimization by peers: Prospective associations with adolescent social anxiety and depressive symptoms. Journal of Adolescence. 2015; 42, 77–86.
2. Alim S. Cyberbullying in the World of Teenagers and Social Media. International Journal of Cyber Behavior, Psychology and Learning. 2016; 6(2), 68–95.
3. Musharraf S, Bauman S, Anis-ul-Haque M & Malik J. (). Development and Validation of ICT Self-Efficacy Scale: Exploring the Relationship with Cyberbullying and Victimization. International Journal of Environmental Research and Public Health. 2018; 15(12), 2867.
4. Smith PK, Mahdavi J, Carvalho M, Fisher S, Russell S, Tippett N. Cyberbullying: Its Nature and Impact in Secondary School Pupils. Journal of Child Psychology and Psychiatry. 2008; 49, 376-385.
5. Hinduja S & Patchin JW. Bullying beyond the schoolyard: Preventing and responding to cyberbullying. 2nd ed. Thousand Oaks, CA; 2015a. Sage Publications.
6. Kowalski RM, Limber SP. Electronic bullying among middle school students. Journal of Adolescent Health. 2007;41:S22-S30.
7. Messias E, Kindrick K & Castro J. School bullying, cyberbullying, or both: Correlates of teen suicidality in the 2011 CDC youth risk behavior survey. Comprehensive Psychiatry. 2014; 55(5), 1063–1068.
8. Slonje R, Smith PK & Frisén A. Processes of cyberbullying and feelings of remorse by bullies: A pilot study. European Journal of Developmental Psychology. 2012; 9, 244–259.
9. Nixon C. Current perspectives: The impact of cyberbullying on adolescent health. Adolescent Health, Medicine and Therapeutics. 2014;5, 143–158.
10. Bonanno RA, Hymel S. Cyber bullying and internalizing difficulties: Aboveand beyond the impact of traditional forms of bullying. Journal of Youth and Adolescence. 2013;42(5):685–697.
11. Hinduja S, Patchin JW. Bullying, Cyberbullying and Suicide. Archives of Suicide Research. 2010;14(3): 206-221.
12. Fredstrom BK, Adams RE, Gilman R. Electronic and school-based victimization: Unique contexts for adjustment difficulties during adolescence.

Journal of Youth and Adolescence. 2011;40:405–415.

13. Hinduja S, Patchin JW. Offline consequences of online victimization. Journal of School Violence. 2007; 6(3): 89-112
14. Price M, Dalgleish J. Cyberbullying: experiences, impacts and coping strategies as described by Australian young people. Youth Studies Australia. 2010;29:51-59.
15. Revah-Levy A, Birmaher B, Gasquet I & Falissard B. The Adolescent Depression Rating Scale (ADRS): a validation study. BMC Psychiatry. 2007; 7(1).
16. Hellfeldt K, López-Romero L & Andershed H. Cyberbullying and Psychological Well-being in Young Adolescence: The Potential Protective Mediation Effects of Social Support from Family, Friends and Teachers. International Journal of Environmental Research and Public Health. 2019; 17(1), 45.
17. Almenayes J. The Relationship between Cyberbullying Victimization and Depression: The Moderating Effects of Gender and Age. Social Networking. 2017; 6, 215-223.
18. Bennett DS, Ambrosini PJ, Kudes D, Metz C & Rabinovich H. Gender differences in adolescent depression: Do symptoms differ for boys and girls? Journal of Affective Disorders. 2005; 89(1-3), 35-44.
19. Albert P. Why is depression more prevalent in women? Journal of Psychiatry & Neuroscience. 2015; 40(4), 219–221.
20. Marcotte D, Fortin L, Potvin P, Papillon M. Gender differences in depressive symptoms during adolescence: Role of gender-typed characteristics, self-esteem, body image, stressful life events and pubertal status. Journal of Emotional and Behavioral Disorders 2002; 10:29-42
21. Vandebosch H & Van Cleemput K. Cyberbullying among youngsters: profiles of bullies and victims. New Media & Society. 2009; 11(8), 1349-1371.
22. Slonje R & Smith PK. Cyberbullying: Another main type of bullying?.Scandinavian Journal of Psychology.2008); 49(2), 147–154.
23. DeSmet A, Aelterman N, Bastiaensens S, Van Cleemput K, Poels K, Vandebosch H., et al. Secondary school educators' perceptions and practicesin handling cyberbullying among adolescents: A cluster analysis. Computers & Education. 2015; 88, 192-201.
24. Cañas E, Estévez E, León-Moreno C & Musitu G. Loneliness, Family Communication and School Adjustment in a Sample of Cybervictimized Adolescents. International Journal of Environmental Research and Public Health; 2020; 17(1), 335.

Application of Health Impact Assessment in Development of Sustainable Community-Based Tourism Strategies, Krabi Province, Thailand

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Abstract

This article presents the development of sustainable community-based tourism strategies (SCBTS) by using Health Impact Assessment (HIA). This study followed four steps of HIA. Data were collected from 50 participants including of 10 local communities, 15 officers from the community-based tourism (CBT) development committee, 10 delegates from governmental and private agencies, 10 members from local organizations and 5 concerned people,using literature review, observations, semi-structured interviews and focus group discussions. Descriptive analysis was used to analysed data. The results indicated that the SCBTS' goal was "healthy community" with five strategies. Strategy One was to promote skill and competency of local people; Strategy Two was value-added to community products and services, as well as developing to be the learning model of CBT; Strategy Three was to develop the management of CBT marketing; Strategy four was to develop the management mechanism and networking; Strategy five was to develop happiness and well-being indexes of local people and tourists. Finally, it was recommended that the strategy should be focused to control the number of tourists especially in the sensitive tourist attractions.

Keywords: *Health impact assessment; community-based tourism; strategies; Krabi Province, Thailand.*

Introduction

Krabi is one of the provinces in Southern Andaman Sea of Thailand, which has a great deal of tourism potential both nationally and internationally. There are exactly millions of tourists visiting Krabi each year, resulting in a very large number of tourism incomes ranked in one of the top tourism provinces in Thailand. Krabi Provincial Statistical Office reported that 6.05 million tourists travelled to Krabi in 2017, which increased by 4.4% from 2016. In terms of incomes, Krabi earned 96,973 million Baht in 2017, which was 9.7% more than incomes in 2016.[1] It could be seen that tourism made more incomes in Krabi. Meanwhile a lot of tourism activities could affect people, society and environment; such as, pollution from transportation and construction, waste and sewage, destruction and decrease of natural resources, as well as concerns for climate change impacting health.[2] Moreover, Bennett et al. (2014) found that the adaptation of communities on the Andaman Sea coast to coastal resources management and conservation was at low level.[3]

From the above mentioned data, community-based tourism (CBT) could be a choice of tourism model, based on sustainable development. CBT process included seeking for equality among conservation of existing resources and developing for mutual social justice.[4] The development plan of Krabi's mass tourism has thus been revised and continuously enhanced. However, this CBT development plan could not fully

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efficiently stimulate much investment and community potential to apply to tourism activities. Bann Tam Suea and Lam Sak in AoLuk district, Krabi province are the first two communities of CBT development, which have high potential of geography and ecological diversity including history and ancient civilization.

Health impact assessment (HIA)could be a tool for sustainable development inCBT strategies. It is a process for people to mutually learn to assess empirical facts which can be support a decision on developing a healthy public policy. It can result in community strength based on health care.[5] In addition, HIA can assist policy determiners to have evident facts for a policy in dimensions of economy, society and cultures and environment. Therefore, it could be good for health, well-beings, less inequality, cooperation promotion between government, private and people sectors.[6]

Literature Review:

Application of HIA in Development of SCBTS: HIA is a tool which can be used to assess in two method: firstly, an assessment and approval for a project together with environmental impact assessment; and, secondly, the development of public policy.[7] HIA employed various tools in order to assess impacts from policy, plan, project, or activity. It could attribute to the change of health factors and health impacts on people[8]. HIA Procedures were determine into six steps: Public Screening, Public Scoping, Assessing, Public Review, Influencing and Public Monitoring and Evaluation.[9]For this research, SCBTS could developed by using HIAprocedures to create healthy public policy.

Community-Based Tourism (CBT): Community-based tourism means to travel with consideration natural resources, environment, society and cultural sustainability. This tourism is managed and operated by community for community, considered as community-based innovation. Suansri and Nitikasetsoontorn mentioned that there are ten principles for success CBT: a community as an owner, villagers participating in decision and determination, support for being proud of themselves, enhancing life quality, environmental sustainability, conserving local identity and culture, learning among people in diverse cultures, respect for diverse culture and human-being, fair benefits for local people and income distribution to community.[10,11]

Research Methodology

This research was conducted at two voluntary communities promoting competency of tourism communities for well-being project since 2016- Ban Laem Sak and Ban Tham Suea Tourism Community, AoLuek District, Krabi Province in Southern Thailand. Data were collected byusing the review of literatures, observations, semi-structured interviews and focus group discussions. There were 50 participants comprising ten of local communities, fifteen officials from the CBT development committees, ten delegates from governmental and private agencies, ten members from other local organizations and five concerned people. The data were analysed by using descriptive analysis. Triangulation was used to ensure that the results would be gained in the study from different perspectives.

Four steps of HIA were conducted to collect data, as the following:

Step One, Screening: The reviewed literature was used to screen a CBT strategy, program, plan and project in various levels including community, provincial, regional and national. The data extraction sheet was used to compare the similarity of each format to develop the first draft of SCBTDS' guideline.

Step Two, Public Scoping: The focus group discussion was carried out to set the scope of issues for developing strategies by using the results from screening step as input for the discussion.

Step Three, Assessing: The focus group discussion was carried out; as well as, semi-structured interviews and three observations (participatory and non-participatory) in order to know about actual situations in regions and strategy issue. Then, SCBTS draft was developed.

Step Four, Public Review: The SCBTS draft was reviewed by three experts for comments and suggestions. Then, it was adapted and standardized by public participants.

Results

The results revealed that the communities determined the mature goal of CBT to be "healthy community" under the five following strategies.

Strategy One: To promote skill and competency of local people.

Goals of the strategy:

(1) Local people in communities gain knowledge about CBT and standard service provision.

(2) Tourists are satisfied with this tourism.

(3) Courses development fordeveloping CBT personnel.

(4) Personnel are developed to be lecturers and consultants for nationally and Asian community-based tourism.

(5) Government and private sectors know and understand about CBT.

Strategy:

(1) To develop CBT knowledge gained from wisdom teachers and outside experts about CBT and suitable services for tourists according to community context.

(2) To encourage and cheer up local people to develop their tourism through activities to become knowledge exchange and learning of cultural and natural diversity.

(3) To develop short-term and long-term courses of CBT and push on utilization of the courses for community personnel development.

(4) To manage human capital of CBT in order to promote and support the operation of CBT.

(5) To develop local people, lecturers, researchers and academics to have ability to teach and provide CBT knowledge for members of ASEAN countries.

Strategy Two: Value-added to community products and services, as well as develop to be the learning model of CBT

Goals of the strategy:

(1) Value-added to products and services to be more highly standardized.

(2) Promote a number of tourism communities which have standards and suitably quality for tourists.

(3) Increase a number of learning model communities for CBT development and management.

Strategy:

(1) To promote communities located in tourism spots to develop themselves and become CBT based on the community capital as well as their notability and identity of mixed cultures among Thai, Chinese and Muslim.

(2) To promote communities in order to appropriately add value of products and services in CBT: food, costumes, folklore activities; such as Peranakan culture, Rong Ngeng dance, Patik painting and local fishing

(3) To promote communities to have tourism operation according to the CBT standard in order to be accepted by tourists and international quality regarding community potential.

(4) To promote development of public utilities and suitable facilities for CBT.

(5) To develop CBT learning centers in for the tourism learning exchange and prevention of sensitive areas from tourism; such as,nursery grounds for wild orchids, lady's slipper orchids and local aquatic animals.

Strategy Three: To develop the management of CBT marketing by balancing the happiness between local people and tourists

Goals of the strategy:

(1) Supporting incomes from tourism in order to reduce social inequality, income distribution of CBT and incomes fairly earned to the local people

(2) Providing tourists perception and understanding of CBT

Strategy:

(1) To promote information collection and develop CBT marketing database

(2) To develop and support community participation in CBT marketing promotion by community for quality tourists

(3) To study and create CBT marketing image

Strategy Four: To develop the management mechanism and networking. The management system should be planned and linked between the public and private networks

Goals of the strategy:

(1) Strengthen the CBT network in Thailand

(2) Amount of CBT management systems with unity at any level

Strategy:

(1) To install system and networking mechanism of CBT with unity at any level

(2) To develop the database of communities managing CBT

(3) To develop CBT management to have standard based on community potential

(4) To have measurements and promotion mechanism and support CBT

Strategy Five: To develop happiness and well-being indexes of local people and tourists

Goals of the strategy:

(1) Number of communities having happiness indexes between communities and tourists

(2) At least 85 percent of communities' satisfaction

(3) At least 85 percent of tourists' satisfaction

(4) Number of cooperation in CBT among ASEAN countries and mutual activities

Strategy:

(1) To create happiness indexes of tourism for communities and tourists

(2) To evaluate happiness in tourism communities

(3) To promote operation of CBT in ASEAN countries

Discussion

The strategies of CBT in AoLuek district, Krabi province have been developed by the determination of the economic, social and environmental balance based on the concept of sustainable development. According to Action Plan on Development of Sustainable and Creative Community-based Tourism[12], tourism development in local areas related and similarly directed to the National Sustainable Development Concept focused on the following five strategies:

Strategy One: Promotion of quality, skills and competency of human resources in communities as well as focus on raising good awareness of tourists and local people in communities according to Sustainable Development paradigm; that is, resources are sustainably used and cultural capital of communities is preserved. Regarding Ely (2013), responsible tourism was developed in order to raise awareness of tourists who can realize value and be part of cultural, historical and natural resources conservation.[13]

Strategy Two: Value-added to community's resources capital and development to be a learning model; that is, the value of products and services emphasized on identity in communities is added. The examples of outstanding identity are diversity of three cultures—Thai, Chinese and Muslim, food traditions, costumes and community way of life. Moreover, local people in communities are developed to enhance tourism services internationally in order to have satisfaction of tourists and repetition of their trips. This is related to tourism development of Kampung Jayengan community in Indonesia that finds out its identity of such things as food, cultures, arts and colonial buildings. Meanwhile, value of products in the community is added by designing its own products and industrially enhancing them under the concept of creativity by community and promote local people in the community to be owners.[14] In terms of being a learning model, sensitive areas; such as,nursery grounds for wild orchids, lady's slipper orchids and aquatic animals are highlighted on knowledge development and exchange among local people in a community, tourists and interested people in order to simultaneously have natural resources conservation in the areas.

StrategyThree: The management of CBT marketing; marketing is one of important business activities for the success of CBT. Communities should be supported to participate in marketing management. Ngo, Hales & Lohmann (2019) stated that CBT marketing should be performed in a form of collaborative marketing and potential stakeholders should also take part in this activity.[15] In addition, Carr et al. found that CBT marketing should be focused on the balance between commercial viability and community development.

Strategy Four: Development of the management mechanism and networking which is united, secure and sustainable; that is, community-based tourism is used for the management mechanism and the management format is developed and operated by all related authorized public and private sectors. Tolkach, Pearlman & King[16] found that CBT management by professionals can be helpful to build a CBT network in and outside the countries. Furthermore, the committee should be established in order to play a role in coordination with all related

sectors, especially the government sector which is an essential network for determining measurements, rules and regulations appropriate to the areas. Networks of education should be built to develop potential of students and tourism personnel; a network of private sectors; such as, tour agencies should be built to provide tour programs. Importantly, NGO should take part in CBT network in order to provide suggestions and follow up tourism operation.

Strategy Five: Development of happiness and well-being indexes of local people and tourists as well as development to be the ASEAN learning center; that is, the government sector should specify goals of sustainable CBT development which is economically, socially, culturally and environmentally balanced. If tourism development is performed together with good quality of life, a community can be well affected on increasing employment, local products and services, developing local education and promoting health and environmentally friendly tourism[17]

Conclusion

The SCBTS from this study should be operated simultaneously with the development of well-being in local people. Since the natural resources conservation and environmental management are closely related and beneficial to the well-being of people, local people should be educated to aware and their skills and competency for managing the limited natural resources should be then developed. These resources should be worthily used and value-added to create products and services that appropriate with the community contexts. For the marketing management, local people should be developed in public relations skill and marketing tactics. Local people with such skills will make fair balance of income distribution in their community and lead them to have well-being. Regarding the natural resources, it is recommended that the strategies should be focused to control the number of tourists to the sensitive tourist attractions; such as, the agreements at local aquatic animal care and mangrove reforestation among local people and tourists.

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References

1. Krabi Provincial Statistical Office. Situation of Krabi Tourism 2012 - 2017 [Internet]. [cited 2020 Feb 9]. Available from: http://krabi.nso.go.th/index.php?option=com_content & view=article & id=992:2018-02-28-14-46 & catid=84:2011-10-11-07-23-12 & Itemid=590
2. Bert F, Scaioli G, Gualano MR, Siliquini R. How can we bring public health in all policies? Strategies for healthy societies. J Public Health Res [Internet]. 2015 Apr 1 [cited 2019 Oct 6];4(1). Available from: http://dx.doi.org/10.4081/jphr.2015.393
3. Bennett NJ, Dearden P, Murray G, Kadfak A. The capacity to adapt?: communities in a changing climate, environment and economy on the northern Andaman coast of Thailand. Ecol Soc. 2014;19(2):art5.
4. ShengHshiung T, YuChiang L, JoHui L. Evaluating ecotourism sustainability from the integrated perspective of resource, community and tourism. Tour Manag. 2006;27(4):640–53.
5. Mattig T, Cantoreggi N, Simos J, Favre Kruit C, Christie DPTH. HIA in Switzerland: strategies for achieving Health in All Policies: Fig. 1: Health Promot Int. 2015 Aug 27;dav087.
6. New Zealand, Public Health Advisory Committee. A guide to health impact assessment: a policy tool for New Zealand [Internet]. 2005 [cited 2020 Feb 5]. Available from: https://nhc.health.govt.nz/system/files/documents/publications/guidetohia.pdf
7. Kang E, Lee Y, Harris P, Koh K, Kim K. Health impact assessment in Korea. Environ Impact Assess Rev. 2011 Jul;31(4):438–40.
8. Mattig T, Cantoreggi N, Simos J, Favre Kruit C, Christie DPTH. HIA in Switzerland: strategies for achieving Health in All Policies. Health Promot Int. 2015 Aug 28;32(1):149–56.
9. Guideline for health impact assessment on public policy, 2016 | National Health Commission Office [Internet]. [cited 2020 Feb 9]. Available from: https://www.nationalhealth.or.th/node/1563

10. Potjana Suansri. Community based tourism handbook. Bangkok, Thailand: Responsible Ecological Social Tour-REST; 2003.
11. Nitikasetsoontorn S. The Success Factors of Community-Based Tourism in Thailand. 55(2):35.
12. Action plan for sustainable community-based tourism development 2018-2022 of Ministry of Tourism and Sports [Internet]. [cited 2020 Feb 9]. Available from: https://secretary.mots.go.th/ewtadmin/ewt/secretary/news_view.php?nid=1481
13. Ely PA. Selling Mexico: Marketing and tourism values. Tour Manag Perspect. 2013 Oct 1;8:80–9.
14. Astuti W, Permana AS, Qomarun Q, Febela A, Andisetyana R. Integrated planning model of creative industry-based kampung tourism in Jayengan Surakarta, Indonesia. Plan Malays J [Internet]. 2017 Nov 11 [cited 2019 Sep 25];15(3). Available from: http://planningmalaysia.org/index.php/pmj/article/view/298
15. Ngo T, Hales R, Lohmann G. Collaborative marketing for the sustainable development of community-based tourism enterprises: a reconciliation of diverse perspectives. Curr Issues Tour. 2019 Nov 8;22(18):2266–83.
16. Key Implementation Factors in Pro-poor Tourism: Tourism Recreation Research: Vol 37, No 1 [Internet]. [cited 2020 Feb 9]. Available from: https://www.tandfonline.com/doi/abs/10.1080/02508281.2012.11081683?journalCode=rtrr20
17. Hanafiah MHM, Harun MFM. Tourism Demand in Malaysia: A cross-sectional pool time-series analysis. 2010;1(1):4.

Molecular Characterization of Virb4 Coding Gene: A Virulance Factor on Brucellosis as Zoonotic Disease

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Abstract

Brucella abortus is a zoonotic pathogen bacteria which can cause brucellosis commonly known as undulant fever in human and abortion in cattle. VirB4 is one of the virulence factor that cause these bacteria became pathogen during infection period. Molecular characterization was performed by using *Polymerase Chain Reaction* (PCR) for further understand within antigens involved in the virulence or the immune system, genetic and immunologic characterization of a VirB4 protein which play role as virulence factor. Local isolate of *B. abortus* that were already obtained were cultured on *Brucella* agar media. Subsequently, the PCR results were performed running in a 1% of agarose gel and can be visualized with the aid of UV transluminator. DNA sequencing of VirB4 protein *B. abortus* of local isolates was performed using PCR and primer products that were positive in amplification. The examination results showed that encoding genes of the VirB4 protein using PCR molecular examination had positive bands with an 1600 bp amplicon length. This present study are expected to provide scientific information on the characterization of VirB4 protein as virulence factor of *B. abortus* local isolates in the medical field and can be developed and applied as a diagnostic kit for controlling brucellosis.

Keywords: *Brucellosis, Identification, PCR, Zoonosis.*

Introduction

Brucellosis is one of the most common bacterial zoonotic disease and endemic in many countries,particularly in developing countries, such as Indonesia. Brucellosis is caused by intracellular bacteria from the genus of *Brucella*. Currently human can be infected by *Brucella abortus, Brucella melitensis a*nd *Brucella suis*. Although control program has been done using the S19 and RB51 vaccination, the incidence of brucellosis remain relatively high.[1] Some pathological manifestations of brucellosis in human are meningitis, endocarditis and arthritis. Brucellosis mostly infect farm animals even male and female with asymptomatic clinical signs. In pregnant ruminant, the target organ of *B. abortus* infection is placenta because it has erythritol compound which lead to placentitis and abortion. If the abortus does not occur, bacteriacan be excreted into the placenta, fetal fluids and vaginal discharge. Mammary glands and lymph nodes may also be infected and this bacteria is excreted into the milk. *Brucella* infection also occurs through inhalation, ingestion, or congenital of the infected organism.[2,3]

Intracellular pathogenic bacteria have developed ways to evade host defenses or bacterial degradation system, suchas controlling the maturation of phagocytic cells and transforming them into a nutrient-rich environment so that the bacteria can replicate.[4] *Brucella* entering host cells directly go to the vacuolar traffic inphagocytic cells by avoiding endocytosis and inhibiting phagosome-lysosome fusion. *Brucella* transits in cells via *Brucella Containing Vacuole* (BCV). BCV's next interaction with the membrane of the endoplasmic reticulum (ER) allows the bacteria to undergo the process of maturation and replication so that the bacteria can multiply within intracellular.[5]

Brucella has displays unique virulence characteristics since there are many determinants of the

virulence, including the secretion system of type I, II, III and IV. Due to the many virulence factors of *Brucella* so that virulence mechanisms underlie to be used by *Brucella* remains unknown.[6] Research on virulence factors states that VirB is known to be an important persistent factor. The VirB protein is homologous to type IV secretion systems (T4SS) of other types of bacteria involved in intracellular survival. VirB is also induced inmacrophages, required for the transport of *Brucella* in the process of maturation. Characterization of protein coding genes that affect the survival of *Brucella* will provide more information about the functions and roles of VirB as virulence factor.[7] Therefore, this study was aimed to investigate the molecular characterization of the VirB4 protein encoding genes which contained in the local isolate of *B. abortus*.

Material and Method

Isolation and identification Brucella abortus: This study was conducted at the Bacteriology Laboratory, Faculty of Veterinary Medicine, Universitas Airlangga. The research also took place at the Laboratory of Molecular Biology of the Faculty of Veterinary Medicine, Universitas Airlangga and ITD (Institute of Tropical Disease) Surabaya. The sample used was local isolate of *B.abortus* obtained from the Balai Besar Veteriner (BBV) Maros, South Sulawesi. The sample was collected and grown in *Brucella* Agar Media (BAM) (Oxoid) by a streak and then incubated at 37ºC in a CO_2 incubator. The growth of the bacterial colony could be seen after 3 days of incubation. The colonies of bacteria grown in BAM were observed and identified by using Gram staining technique and biochemical tests using catalase, urease, indole and citrate.

DNA Amplification and Electrophoresis: *B. abortus* that had been successfully cultured in the media were then extracted and the DNA was isolated. A total of 2µl of DNA sample was mixed with the primers (1µl of BAMH1F, 1µl of BAMH1R)(Gen Bank: AF226278.1), 7µl of NFW (Nuclease Free Water) and 10µl of PCR *master mix* into tubes of a PCR bead so that the total volume of PCR tubes containing beads became 25µl. The PCR tubes were then inserted into a PCR thermocycler machine that had been programmed. The PCR thermocycler program was made with the sequence: the initial denaturation process for 45seconds at a temperature of 95°C followed by denaturation for 30 seconds at a temperature of 95 ° C, annealing for60 seconds at a temperature of 52˚C and extension for 60 seconds at 72˚C. The thermocycling cycle was run 35 times and ended with a final extension for 7 minutes at 72˚C. The electrophoresis used 5-7 ml of *B. abortus* DNA added 2µl of loading buffer, then was entered in 1% agarose well containing 1 µg/ml of red gel for running processes. The results were visualized by ultraviolet light at a wavelength of 302 nm by using a UV transilluminator.[8]

DNA Sequencing: Cycle sequencing was performed on GeneAmp PCR System 2400 (Perkin Elmer, CT) under the following conditions: denaturation 96^0C for 10 seconds, annealing 50^0C for 5 seconds, 60^0C extension for 4 minutes,performed 25 cycles. The results were precipitated with ammonium acetate and absolute ethanol, thenelectrophoresed and the result readings were performed with Automated DNA Sequencer ABI PRISM 377 (Perkin Elmer, CT). The sequenced results were then analyzed on the basis of nucleotide sequences.[9]

Results

The colonies of *B. abortus* bacteria were described as round,smooth, yellow and shiny like honey. The results showed that *B. abortus* bacteria were Gram-negative,shaped like coccobacillus and clustered or in pairs. The biochemical tests on *B. abortus* were showed positive results oncatalase and urease respectively. While citrate and in dole test were showed negative results. Further more Triple Sugar Iron Agar (TSIA) media showed butt and slant results that were alkalic, marked with red color on the top and the bottom of the media and did not form gas.

The results of the PCR electrophoresis in this study referred to the VirB4 target gene by using a primer BAMH1. That primer could be used to detect the gene that encoded a VirB4 specific protein on the *B. abortus* species with an amplicon length of 1600 bp. DNA sequencing of VirB4 protein from *B. abortus* local isolates was performed using PCR and primer products that were positive in amplification. The length of the DNA amplicon in the VirB4 protein *B. abortus* local isolate is 1600 base pairs. DNA sequencing of VirB4 protein *B. abortus* local isolates obtained in the study can be seen in the table 1.

Table 1. Sequence of VirB4 gene from B. abortus local isolate.

1	GCACCTACGCACAAGCGTTCGACCCCTGCAAGAACCTGAAGATGGGATCCAAGATCCTTG
61	AAGACTGCTACCGTCGGGGCATCGTGAAGATGCCCGGTCAGGAACAAGGCGCGCTTCGCG
121	CCGCATTCTCCTGTTACTACGCCGGCAACTTTACGGGCGGCTTCAAGACGAAGCCCGGCA
181	GTCCCAGCTACGTGCAGAAGGTCGTGGCAAGCGCCGACGTGACCACAAAGCCGATTGTTG
241	TCGTGCCCATGATCCGGAAAACGCCGGATGCGGCGGCAGCAGTAGCTGCCCCAGTAAAAA
301	AACGACAGCCGGCTGATCGTAATTCTGTTCTTGTCGATCTGCATCCATCATCGCAGTCGA
361	TGCCAGCCACCGGCACGGCGAACGCGCCTGTAAGGCTGAAGACAGAGCAGCCGGCGACAA
421	CCGATGCGCCGCCAGGGAAGGATAATACGGACGGCGTAGTTGTTTTCTAACCCATCATCC
481	GATCAGGCACGCATATAAAATTGATGATGGTGGAGGGTCCGAACAGGACTGGGAAGGTTA
541	TAGCGGCGGGCGGCGACGATAGGAGGCAGTCGCACACCATAGACGCATCTGCGATCTGGA
601	GCATTTCCCATTTTATTGAGCCCTTAGAGGTGCTCTATCCATTTGTTTGAAGCGCATCTT
661	GCGCCGAGAACTATGTCACTCTTTTGAGGATGCGCTCTAACTCAACGCAGAGCAGGCATA
721	AGCAAGTAAATTACATGCTGTAATATGGTGTCCTCCGGTAATCTCGGTGCAACGCCACCA
781	GCCGACTGGTGCCGAAATGCAGTCTGCTAGACAATTGTTTGAGGCAACCAAGTTGAATAG
841	ACATTGAGTGTGCAGACCGTGCTGAAATCCAGGTCTAGTCGTCGTCGTCATAAGTAATAG
901	AGATCATGATAACCGCTTCGCCCAGCAAGAAGCCGCTATCGCGGATAGTAGCTCACTTAC
961	TGCTGGCGCTGATAGTCTGCATCGCTGCAATCGGGCCTAAGCTGGCGCACGCCGACGGTG
1021	GCCTCGATAAGGTAAATACATGCATGCAGAAAGTGCTGGACTTGCTAAGCGGCGTATCGA
1081	TCACCATCGTTCCCATAGCCATCATCTGGTCCGGTTACAAGATGGCATTCCGGCACGCCC
1141	GCTTCATGGATGTAGTGCCGGTGCTGGGCGGCGCCCTGGTGGTTGGCGCTGCCGCCGAAA
1201	TTGCCTCTTACCTGCTTAGGTAAAGGGACACAGATCATGACAACGGCACCACAGGAATCC
1261	AACGCACGAAGCGCAGGTTATCGCGCGATCCAATATTCAAGGGCTGTACACGGCCAGCCA
1321	TGTTGTTTGGGGTTCCTGTGATCCCGCTTGTCATCGTTGGCGGCAGCATCGTTCTCTTAT
1381	CGGTCTGGATTTCCATGTTCATATTGCCGCTGATCGTACCAATCGTGCTGGTCATGCGGC
1441	AGATCACGCAGACTGACGATCAGATGTTCCGCCTGCTCGGCCTGAAGGCGCAATTCCGCC
1501	TGATCCACTTCAACCGCACCGGGCGCTTCTGGCGGGCATCCGCCTATAGCCCGATTGCCT
1561	TCACAAAGCG

Discussion

Brucellosis diagnosis cannot be determined based on clinical symptoms because the symptoms shown by the patients are relatively similar to the other infectious diseases such as leptospirosis, trichomoniasis and toxoplasmosis. Laboratory tests using bacteriological and serological method are essential to identify cases of brucellosis.[10,11] Immune response for eliminating brucellosis involve between humoral and cellular immune response. Humoral immune response shaped by antibodi which induce by limfosit B and cellular immune response is immunity system which induce by limfosit T.[12,13] *Brucella* has lipid component known as lipoprotein. That lipid component can change or modified which play role in pathogenicity of *Brucella*. The lipoprotein can induce cytokine and has direct impact with non specific immunology reaction.[14,15]

B. abortus has a potential virulence factor of VirB protein. In the class of smooth colonies, *Brucella* can enter into the host cell through the interaction of cell surface that is composed of lipid bonds. The bond containsmost of the glycosylphosphatidylinositol, glycophingolipids and cholesterol that are believed to have an importantrole in the process of infection and bacterial replication in cells.[16] Observations in cellular interactions and the inclusion of *Brucella* bacteria in macrophages have shown that these bacteria are associated with the phagosome acid system. These acid conditions are important for the stimulation of virulence expression ofthe VirB protein associated with the emergence of the *B.abortus* type IV secretion system.[17] *Brucella* is an intracellular pathogen bacteria in many wild and domestic animals that can cause zoonotic disease in humans. *Brucella* can survive in the phagocyte cells of the host and is able to avoid the normal mechanism of bacterial degradation by altering the vacuoles intracellular pathway. *Brucella* ability can avoid fusion of phagosome with lysosomes requires *Vir*B proteins that allow bacteria to live in the vacuoles of the endoplasmic reticulum, thereby enhancing survival and bacterial replication. *Brucella* bacteria in macrophage

cells can perform oxidative reactions then can infect other macrophage cells that can not mechanically explain the exact process. *Vir*B protein expenditure interacts with the endoplasmic reticulum that causes the pH to be neutral, the nitrate ion is used for anaerobic respiration, so *Brucella* can multiply intracellulary.[13]

VirB4 protein is known to be inside Type IV Secretion System(T4SS) and it can be used as a reference for classification purposes. VirB4 protein attach in inner membrane and divide into one or three segment or directly bind with membrane in random way through interaction with other protein component of T4SS. Purification of VirB4 protein known to have variation in oligomerisation condition depend on membrane and solution in monomer, dimer and hexamer form.[4]Several different classification schemes have been proposed to T4SS of phylogenetic analysis. Phylogenetic classification is largely based on the analysis of homologous genes with VirB10, VirB4 and Vir D4. VirB10 has not been found in Gram-positive bacteria, so it can only help in defining the functions of T4SS on Gram-negative bacteria. Vir D4 is found in most T4SS but less appropriate as homologous reference when compared with VirB4 due to higher sequence variability.[18] T4SS usually has three special ATPases that form a center of secretion energy. ATPase is a protein composing the secretion system called Vir D4, VirB11 and VirB4. These proteins are essential for the secretion system in Gram-negative bacteria. VirB11 and VirB4 are also required for the biogenesis process of T4SS pilus (known as the T-pilus on the bacteria *A. tumefaciens*). Vir D4, VirB4 and Vi*r*B11 proteins interact with each other as ATPase. Therefore, these proteins tend to form large complex ATPase which supplies substrate transport energy from the cytoplasm through the mechanism of translocation. The complex structure and the contributions of each of ATPase in the secretion system or pilus biogenesis is not widely known. VirB10 interacts directly with VirB4 and Vi*r* D4 involving domain near the central area of the two proteins that are in or near the inner membrane.[19]

The ATPase role in T4SS also needs to be studied further. Vir D4 acts as a receptor that brings the substrate for translocation. Vir D4 may also act as a molecular motor to provide the substrate through the system. VirB11 and VirB4 are necessary to transfer substrates across the membranes and may function in a coordinated manner with Vir D4. VirB11 and VirB4 also play a role in the formation of the core of T4SS. The protein mechanism of VirB4 and VirB11 coordinates the functions with Vir D4 to transfer substrates and has an independent function in the assembly of the secretion system directly which is basically unknown. T4SS on Gram-negative bacteria and in some Gram-positive bacteria lack of VirB11, while VirB4 always exists and is a T4SS core subunit on all species of bacteria. VirB4 has a tendency to have an important role in strengthening the function or formation of T4SS.[20]

Conclusion

This study concludes that the molecular characterization of VirB4 gene can be considered when confirming *B. abortus* at species level as it can differentiate *B. abortus* wild strains from vaccine strains. Furthermore, it can be used during the waiting period for culture and identification as the VirB4 is able to identify *B. Abortus*from local isolate specificly compared to culture identification which can take up longer periods.

Conflict of Interest: The authors declare no conflict of interest in this study.

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References

1. Noor SM. Brucellosis: Penyakit zoonosis yang belum banyak dikenal di Indonesia. Balai Penelitian Veteriner. Bogor. 2006
2. Boschiroli ML, Foulongne V, O'Callaghan D. Brucellosis: a worldwide zoonosis. Journal of Microbiology. 2001; 4:58–64.
3. Moriyon I, Grillo MJ, Monreal D, Gonza´lez D, Marı´n C, Lo´pez-Gon˜ i I, Mainar RC, Moreno E, Blasco JM. Rough vaccines in animal brucellosis:

Structural and genetic basis and present status. Veterinary Research. 2004; 35:1–38.

4. Celli J, de Chastellier C, Franchini DM, Pizarro-Cerda J, Moreno E. Brucella evades macrophage killing via VirB-dependent sustained interactions with the endoplasmic reticulum. Journal ExperimentalMedicine. 2003; 198:545–556.
5. Pitt A, Mayorga LS, Stahl PD, Schwartz AL. Alterations in the protein composition of maturing phagosomes. Journal of Clinical Investigation. 1992; 90:1978–1983.
6. Pizarro-Cerda J, Meresse S, Parton RG, van der Goot, Sola-Landa A. Brucella abortus transits through the autophagic pathway and replicates in the endoplasmic reticulum of nonprofessional phagocytes. Infectious Immunology. 1998; 66:5711–5724.
7. Billard E, Cazevieille C, Dornand J, Gross A. High susceptibility of human dendritic cells to invasion by the intracellular pathogens Brucella suis, B. abortus and B. melitensis. Infectious Immunology. 2005; 73:8418–8424.
8. Tcherneva E, Rijpens N, Jersek B, Herman LMF. Differentiation of Brucella species by Random Amplified Polymorphic DNA analysis. Journal of Applied Microbiology. 2000; 88:69–80.
9. Harini SS, Leelombika M, Shiva MN, Satyanarayana N. Optimization of DNA isolation and PCRRAPD method for molecular analysis of Urginea Indica Kunth. International Journal Integrative Biology. 2008; 2:138 – 144.
10. Bellaire BH, Elzer PH, Baldwin CL, RoopRM. Production of the siderophore 2,3-dihydroxybenzoicacid is required for wild-type growth of Brucella abortus in the presence of erythritol under low-iron conditions in vitro. Infection and Immunology. 2003; 71:2927–2932.
11. Munir R, Afzal M, Hussain S, Naqvi MS, Khanum A. Outer membrane proteins of Brucella abortus vaccinal and field strains and their immune response in buffaloes. Pakistan Veterinary Journal. 2010; 30:110-114.
12. Quinn PJ, Markey BK, Carter ME, Donelly WJ, Leonar FC. Veterinary microbiology and Microbial Dissease. Backwell Publishing. Great Britain. 2002.
13. Cellini J, Salcedo SP, Gorvel JP. From the cover: Brucella coopts the small GTPase Sar1 forintra cellular replication. Journal of National Science. 2005; 102:1673–1678.
14. Giambartolomei GH, Zwerdling A, Cassataro J, Fossati CA. Lipoproteins, not lipopolysaccharide, are the key mediators of the proinflammatory response elicited by heat-killed Brucella abortus. The Journal of Immunology. 2004 173:4635–4642.
15. Pasquevich A, Samartino CG, Coria L.M, Estein SM, Zwerdling A(2010). Self-Adjuvanting Vaccine against Systemic and Immune Response and Is a Promising Activates Dendritic Cells In Vivo, Induces a Th1 Pathogen-Associated Molecular Pattern That Membrane Protein 16 Is a New Bacterial and Oral Acquired Brucellosis. Journal Immunology. 2010; 184:5200 – 5212.
16. Sangari FJ, AgueroJ, Garcia-Lobo JM. The genes for erythritol catabolism are organized as an inducible operon in Brucella abortus. Microbiology. 2000; 146:487–495.
17. Rouot B, Martinez A, Marius C, Menanteau P, Guilloteau L, Boigegrain RA, Zumbihl R, O'CallaghanD. Production of the type IV secretion system differs among brucella species as revealed with VirB5- and VirB8-specific antisera. Infection and Immunology Journal. 2003; 71:1075–1082.
18. Comerci DJ, Martinez-Lorenzo MJ, Sieira R, Gorvel JP, Ugalde RA. Essential role of the Vir Bmachinery in the maturation of the Brucella abort us containing vacuole. Journal of Microbiology. 2001; 3:159–168.
19. Taminiau B, Daykin M, Swift S, Boschiroli ML, Tibor A. Identification of a quorum-sensing signal molecule in the facultative intracellular pathogen Brucella melitensis. Infectious Immunology. 2002; 70:3004–3011.
20. Nijskens C, Copin R, De Bolle X, Letesson JJ. Intracellular rescuing of a B. melitensis 16 M virBmutant by co-infection with a wild type strain. Journal of Pathogen Microbiology. 2008; 45:134–141.

The Relation between Self-Efficacy and Quality of Life of Patients with Type 2 Diabetes Mellitus in Pelamonia Hospital Makassar

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Abstract

Objective: The purpose of this study was to determine the relationship between self-efficacy and quality of life of patients with type 2 Diabetes Mellitus at Pelamonia Hospital Makassar.

Method: This Quantitative research using correlation design with a cross-sectional study approach. The sample in this study was 54 respondents who met the inclusion criteria.

Result: The results showed that there was a relationship between self-efficacy and quality of life of patients with type 2 diabetes mellitus (p = 0.006).

Conclusion: This finding suggests to nurses for educating their patients about self-efficacy. Nurses have to enhance their patient's self-efficacy so that they help patients improve their quality of life better.

Keywords: *Self-efficacy, quality of life, diabetes mellitus.*

Introduction

Diabetes mellitus (DM) is a chronic metabolic disorder with the characteristics of hyperglycemia. Various complications can arise due to uncontrolled blood sugar levels, such as neuropathy, hypertension, coronary heart disease, retinopathy, nephropathy and gangrene.[1]

The reported prevalence of diabetes mellitus in Indonesia based on the physician's interviews and diagnoses at 1.5%. DM was diagnosed by a physician and the symptom at 2.1%. The highest prevalence of diagnosed diabetes mellitus was found in DI Yogyakarta (2.6%). South Sulawesi was the third-highest prevalence of DM in diagnosed or symptomatic 1.6%.[2]

Patients with diabetes mellitus in Indonesia are large in number. They need treatment from all health teams and have to involve individuals with diabetes mellitus themselves. Diabetes mellitus is a chronic disease that will sustain for a lifetime. Diabetes mellitus has an impact on the quality of human resources and a considerable increase in health costs. Management of diabetes mellitus must be arranged by physicians, nurses, nutritionists and other health workers. The role of patients and families becomes very important.[3]

People with diabetes mellitus must have efficacy about the conditions they experienced and all recommended therapies. According to Bandura (1994), efficacy is self-assessment, whether a person can do well or poor actions, right or wrong, able or unable to work according to what is required. This efficacy is different

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from aspirations (ideals) because ideals describe something ideal that should be (achievable), while efficacy describes self-worthiness assessment.[4]

One study over 85 respondents found that 67 respondents of diabetes mellitus had a poor quality of life.[5] In general, respondents felt their lives were not satisfied due to physical changes experienced. A small scale study stated that most respondents were very satisfied with the current treatment, duration of patient treatment of diabetes mellitus. The results collected from the impact and concern of respondents were having poor sleep quality.[6]

A recent study reports that most respondents have no complications, moderate anxiety and low quality of life. There was a significant relationship that affects the quality of life of DM patients. The World Health Organization (WHO) predicts that Indonesia will experience an increase in the number of people with DM from 8.4 million in 2000 to around 21.3 million in 2030. International Diabetes Federation (IDF) also predicts in 2009 to be 12.0 million in the year 2030. Based on the data obtained it is concluded 2-3 times in 2030.[4]

Increased cases of DM also occur at the district level, especially in Makassar. Diabetes mellitus occupies the fifth-ranked out of ten main causes of death in Makassar in 2007 with a total of 65 cases. Based on data from the Makassar Health Office, the incidence of diabetes mellitus in 2011 was 5700 cases. In 2012 the incidence of DM cases increased to 7000 cases.[7] Based on data collected from Pelamonia Hospital Makassar, 228 cases were diabetes mellitus in the last three months. People with DM had uncontrolled blood glucose.

Patients behave a negative attitude towards diabetes mellitus, will have complications and eventually lead to death. Interventions needed to maintain quality of life and avoid complications in patients with diabetes mellitus. Based on these descriptions the researchers need to examine how self-efficacy affects the quality of life of patients with diabetes mellitus.

Method

This research was conducted in June-September 2018 at Pelamonia Hospital Makassar. This study used quantitative research by correlation design with a cross-sectional study approach. This was intended to gain an overview relation between two or more research variables.

The population was all Diabetes Mellitus patients treated at Pelamonia Makassar Hospital. The population was infinite. The sample in this study comprised 54 respondents who meet the inclusion criteria. The sampling technique is accidental sampling.

Data collection was carried out in two ways, namely primary data and secondary data collection, primary data collected by direct observation of patients using the self-efficacy questionnaire. the quality of life data collected using standard questionnaires adapted from the diabetes self-efficacy scale[8] which comprises 15 questions with the Likert scale.

Data analysis was intended to answer the research objectives and examine the research hypotheses to determine the association of independent variables toward the dependent variable by using a statistical test with a significance level (α) = 0.05. The statistic test used was Chi-square with an alternative is the Fisher exact test (if the expected value of one or more cells less than 5).

Results

Univariate analysis in this study aims to see an overview of frequency distribution based on the characteristics of respondents (age, gender, education level and occupation).

Table 1. Characteristic of respondents

Characteristics	Frequency n=54	Percent
Gender		
Male	18	33,3
Female	36	66,7
Age Group		
40-50 years	1	1,9
51-60 years	2	3,7
61-70 years	15	27,8
71-80 years	36	66,7
Education Level		
Not school	2	3,7
Elementary	8	14,8
Yunior high school	9	16,7
Senior high scholl	22	40,7
Higher education	13	24,1
Occupation	32	59,3
Unemployed		
Private sector	9	16,7
Civil servant	13	24,1

It is apparent from Table 1 that the majority of

respondents were female 36 subjects (66.7%), most of the respondents aged 71-80 years were 36 subjects (66.7%), with the highest level of education was senior high school or equivalent level, there were 22 subjects (40.7%) and most of them were unemployed by 32 subjects (59.3%).

Table 2. Characteristics respondents based on variables

Variables	Frequency n=54	Percent
Self-efficacy		
High	43	79,6
Low	11	20,4
Quality of life		
High	39	72,2
Low	15	27,8

As Table 2 shows, from 54 respondents participated in this study, 43 respondents (79,6%) showing had high self-efficacy dan 39 respondents (72,2%) revealed a high in quality of life. This result shows that most of the subjects in this study dominantly experienced high self-efficacy and high in quality of life.

Evaluation of the relationship between self-efficacy and quality of life in patients with diabetes mellitus in this study carried out by data analyses using Chi-square statistical tests with a significance level 95% (α=0.05) or confidence interval p<0.05. The result of data analysis can be seen in Table 3 below:

Table 3. The Relation between Self-efficacy and Quality of life patients with Type 2 Diabetes Mellitus

Self-efficacy	Quality of life				Total		p
	High		Low				
	n	%	n	%	n	%	
High	35	81,4	8	18,6	43	100,0	0,006
Low	4	36,4	7	63,3	11	100,0	

Based on the analysis results of the relationship between variables self-efficacy and quality of life in Table 3 above, it shows that out of 43 subjects with high self-efficacy, 35 respondents (81,4%) had a high quality of life and 8 others subjects had a low quality of life. Besides, out of 11 respondents with a low quality of life, 4 respondents (36,4%) still had a high quality of life, while 7 respondents (63,3%) presenting a low quality of life. Referred to the Chi-square test, the analysis of the results shows a significant relationship between self-efficacy and quality of life among type 2 Diabetes mellitus patients in Pelamonia Hospital Makassar (p=0,006<α0,05).

Discussion

An overview of the self-efficacy of type-2 diabetes mellitus patients at Pelamonia Hospital Makassar based on the analysis results found that 43 respondents (79.6%) had high self-efficacy and 39 respondents (72.2%) with high quality of life. Among the respondents who had high self-efficacy, 35 respondents (81.4%) had a high quality of life. The results of the statistical analysis using the Chi-square test in this study showed a significant relationship between self-efficacy and quality of life toward type-2 diabetes mellitus patients (p = 0.006) in Pelamonia Hospital Makassar. The higher the self-efficacy of patients with diabetes mellitus, the higher the quality of their life, while the lower the self-efficacy of patients with diabetes mellitus, the lower the quality of their life.

Based on the theory[9], self-efficacy according to social cognitive theory by Albert Bandura states that self-efficacy is a person's belief that he will be able to carry out the required behavior. Self-efficacy can be formed and developed through four processes, specifically cognitive, motivational, affective and selection. The cognitive process of patients with diabetes mellitus required in determining the treatment to maintain blood sugar levels within normal. Patients should set their goals to be achieved for preventing complications in this case to get a normal life. Patients have to perform some preventive intervention by checking their sugar levels, choosing foods that are right according to diet diabetes, able to maintain ideal body weight, regular exercise and taking medication according to physician regiments.

The cognitive function allows people with diabetes mellitus to predict events that will affect the future. People with diabetes mellitus have the confidence to improve their lives by being able to meet the needs in normal life activities. The impact of illness on the quality of life associated with their disease appropriately can be improved. For achieving a high quality of life, patients need to do several activities according to daily needs such as enjoying and feeling life more meaningfully, being able to do activities well, accepting their body image, having the opportunity to reflect, sleeping well, feeling comfortable and satisfied with his abilities.

Respondents with low self-efficacy tend to have a lower quality of life. This is because some respondents

do not have confidence and motivation for themselves in their ability to perform something for achieving a goal. This statement is also supported by Bandura stated that self-efficacy can be influenced by several functions including the cognitive function. Strong self-efficacy will affect a patient's personal goals. Motivational function explains that a person will motivate themselves and guide action by using thoughts about the future, therefore, the individuals will form beliefs regarding what they can do.[9]

Most of the respondents aged 71-80 (66.7%), wherein this period, it easier to receive and participate in programs to improve health, therefore their confidence is higher. The results of the interview on respondents showed that they were more careful in setting patterns to eat, participate in healthy activities such as Prolanis gymnastic, diligently control sugar levels in the nearest health service. The more mature age the higher their self-efficacy and the higher the quality of life be. In addition, the education level of a person supports high self-efficacy and a high quality of life. This can be seen that the majority of respondents were graduated from high school education/equivalent as many as 22 respondents (40.7%) and higher education as many as 13 respondents (24.1%). Education is not the main point in increasing self-confidence in patients with diabetes mellitus but the impact of respondents with higher education will be easier get an information and knowledge about everything that needs to be performed in keeping the blood sugar level stable and prevent complications of diabetes mellitus, therefore patients with diabetes mellitus can undergo daily activities normally and have high self-efficacy in improving their quality of life.

Based on the study results, there were 8 respondents (18.6%) with high self-efficacy while low in quality of life. Most of the respondents were female as many as 36 respondents (66.7%). Gender factor has no influence on the improvement of self-efficacy, but there were other determinants due to female respondents who tend to have engaging activities and easily stressed make them would be difficult to regulate diet, control blood glucose levels in the normal range. If this occurs continuously in a long period of time, this can result in unhealthy behavior that affects their self-efficacy who contribute to improving their quality of life.

Based on the results of interviews randomly. Respondents with high self-efficacy but have a low quality of life due to other factors that influence for example a person has the confidence to achieve a goal but lack of support from family or closest people so that it will affect their quality of life. Likewise, conversely, the respondents who have low self-efficacy but have a high quality of life due to the lack of confidence and motivation in themselves to do something besides the support and caregivers of the family or from the closest person.

Behavioral change will only occur if any changes in efficacy in the individual concerned. Someone with high self-efficacy will encourage taking action to achieve success so that it can strengthen the efficacy of a person.[9] Self-efficacy will regulate one's emotions in several ways. Someone who believes they will be able to manage threats will not be easily pressured by themselves, but vice versa if someone has high efficacy, it can reduce stress and anxiety. A person performs an action and a suitable environment will help establish themselves and achieve goals.

Based on the above research result, this study is supported research[10] about the relationship of self-efficacy with quality of life in patients with type II Diabetes mellitus in Labuang Baji Hospital Makassar, the study showed a significant correlation between self-efficacy and quality of life (p=0.001). A small study[11] in PKU Muhammadiyah Yogyakarta Hospital showing that there was a significant relationship between self-efficacy and quality of life (p=0,000) with a correlation value (r=0.745). The results of this study are also in line with the research[12] showing a significant relationship between self-efficacy, adherence, education level and depression with quality of life in patients with Diabetes mellitus where self-efficacy affected the quality of life significantly (p=0.005).

Based on the results of studies, theoretical reviews and previous studies, the researchers concluded that there was a relationship between efficacy and quality of life in patients with diabetes mellitus in Pelamonia Hospital Makassar. Respondents who have high self-efficacy, have a high quality of life and respondents with low self-efficacy have a low quality of life.

Conclusion

Based on the results of research and discussion that have been conveyed previously in this study, to determine the relationship between self-efficacy and quality of life patients with diabetes mellitus in Pelamonia Hospital Makassar, the researchers conclude

that most respondents have high efficacy and a high quality of life. There was a relationship between self-efficacy and the quality of life patients with diabetes mellitus in Pelamonia Hospital Makassar.

Respondents are expected to increase their knowledge about diabetes mellitus, maintain a healthy lifestyle based on a given diabetic diet, maintain good physical activity in achieving a fit condition, control blood sugar levels to keep in the normal range and prevent complications to improve quality of life. Pelamonia Hospital Makassar, as a health service provider, is expected to maintain and improve the quality of nurse services provided especially towards patients with diabetes mellitus by increasing the health education program.

Conflict of Interest: There was no conflict of interest regarding this study and publication.

Ethical Clearance: This study has been ethically approved and allowed by the Regional Investment and Coordination Board of South Sulawesi in Makassar.

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References

1. PERKENI, Consensus on Management of Type 2 Diabetes Mellitus in Indonesia. Jakarta: PERKENI, 2011.
2. RISKESDAS, Basic Health Research. Jakarta: Health Development and Research Board; Ministry of Health Republic of Indonesia, 2013.
3. Ernawati. Integrated Nursing Management on Diabetes Mellitus. Jakarta: Mitra Wacana Media, 2013.
4. Al Wilson. Personality Psychology. Malang: UMM Press, 2014.
5. Putu I.R.S. Relationship between Diabetes Self Care and Quality of Life of DM Type 2 Patients in the Internal Polyclinic at Badung Regional General Hospital. Denpasar: Medical Faculty of Udayana University; Thesis, Unpublished, 2014.
6. Chaidir R, Wahyuni A.S, Furkhani D.W. Relationship of Self Care with the Quality of Living Patients of Diabetes Melitus. Journal Endurance. 2017;2(2):132-144.
7. Dinkes Sulsel, South Sulawesi Provincial Health Profile in 2012. Makassar, 2013.
8. Kott Kathryn B. Self-efficacy, outcome expectation, self-care behavior and glycosylated hemoglobin level in persons with type 2 diabetes. Marquette University, ProQuest Dissertations Publishing; 2008:1962-2010.
9. Bandura A. Self Efficacy. In V.S. Ramachaudran (Ed.), Encyclopedia of Human Behavior New York: Academic Press.1994; Vol. 4,77-81.
10. Afrida. Relationship between self-efficacy and quality of life in type II diabetes mellitus patients at Labuang Baji Hospital Makassar. Jurnal Ilmiah Kesehatan Diagnosis. 2017;10(6):595-599.
11. Ratnawati N, Sutrisno, Resti Y. Relationship of efficacy to the quality of type 2 diabetes mellitus patients at PKU Muhammadiyah Hospital Yogyakarta. UMY Repository. Thesis Publishing; 2016. Published.
12. Rahman F.F, Yulia Y, Sukmarini L. Self Efficacy, Adherence and Quality of Life of Patients with Type 2 Diabetes. Pustaka Kesehatan. 2017;5(1):108-113.

Nasal Versus Oral Feeding Tube Placement: Selected Outcomes among Preterm Infants

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Abstract

Background: Enteral feeding tubes for preterm infants may be placed via either the nose or mouth. Nasal tube placement may compromise respiration, however, orally placed tubes may be more prone to displacement.

The Aim: The aim of the current study was to determine the effect of nasal versus oral placement of enteral feeding tubes on weight and the incidence of adverse events among preterm infants.

Method: A descriptive comparative study design was utilized.

Sample: A convenient sample of sixty physiologically stable preterm were assigned to two equal groups within six months (between July 2018 – Jan. 2019). They were recruited from neonatal intensive care units of both Kasr Alainy and El-Monira Pediatric Hospitals-Cairo University.

Tools: Three tools were developed by the researchers: preterm infant's characteristics, observational checklist for incidence of adverse events and recording sheet for daily weight and time to sustain full oral feeding.

Procedure: The researches recorded preterm infant's characteristics, any adverse events, weight and time to sustain full oral feeding in the morning shift twice a week for two weeks.

Results: Orogastric tube feeding was statistically significant different compared to nasogastric tube feeding regarding displacement. There was no difference among two groups in weight gain, time to reach full feeds and frequency of adverse events. Orogastric tube feeding group had lesser duration of hospital stay than nasogastric and orogastric tube feeding group reached to full oral feeds quickly compared to nasogastric with no statistical significant differences.

Recommendation: Further researches with a larger population would probably be required to know the significance of this outcome.

Conclusion: This study concluded that no differences were found between both orogastric and nasogastric tube feeding on preterm infants' weight, incidence of adverse events and time to sustain full oral feeding.

Keywords: *Nasogastric tube, orogastric tube, Preterm Infants, outcomes.*

Introduction

When preterm infants are too immature or unwell to suck feeds they can receive their milk through a feeding tube passed via either the nose or the mouth. The establishment of safe oral feeding in preterm infants may be delayed because of poor co-ordination of sucking and swallowing, neurological immaturity and respiratory

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compromise. Enteral feeds may be delivered through a catheter (feeding tube) passed via the nose or via the mouth into the stomach or upper small intestine[1].

Neonates are obligate nose breathers. Feeding tubes placed via the nose can cause partial nasal obstruction, increased airway resistance and increased work of breathing[2,3]. This increase in energy expenditure may potentially affect growth and development. Nasogastric intubation through the larger nare may increase airway resistance as the preterm infant is forced to breathe through an airway of smaller calibre. In addition, individual differences in nasal size may be acquired secondary to the effects of nasogastric tubes [4].

Incorrect placement, or subsequent displacement, of feeding tubes into the lower oesophagus or into the lung can lead to aspiration, respiratory compromise and increased energy expenditure[5]. Orally placed tubes may be easier to displace as they can loop inside the mouth. Repetitive movement of the orally placed tube may result in mucosal trauma and may increase the incidence of apnea and bradycardia due to vagal stimulation [6]. There is not enough data to make any recommendation regarding the superiority of either routes of feeding [7].

Aim of the study: To determine the effect of nasal versus oral placement of enteral feeding tubes on weight and the incidence of adverse events among preterm infants.

Research Question: What are the differences between nasal and oral placement of feeding tube on weight and the incidence of adverse events among preterm infants?

Material and Method

Research Design: A descriptive comparative study design was utilized.

Participants: A convenient sample of 60 preterm infants were assigned to two equal groups within six months (between July 2018 – Jan. 2019).

Tools of Data Collection: Three tools were developed by the researchers after extensive review of related literature: preterm infant's characteristics, observational checklist and recording sheet for weight and time to sustain full oral feeding.

Tool Validity and Reliability: Data collection tools were submitted to three panel of experts in the field of high risk neonates to test the content validity. Reliability was done by cronbqch's alpha test and the result was 0.82.

Procedure: After the preterm infants had initial physiological stable state, they assigned to receive either nasogastric or orogastric feeding, the researchers' recorded preterm infant's characteristics once from admission sheet using tool I. They assessed any adverse events such as apnea, displacement and injury (trauma) in the morning shift twice a week for two weeks using tool II. All infants were weighed each morning, naked, before feeding and bathing, on one same time and time to sustain full oral feeding was recorded for all preterm infants using tool III.

Results

It was evident from table (1) that there were no statistically significant differences between orogastric and nasogastric groups regarding their gender, diagnosis and gestational age ($p > 0.05$).

Table (1): Characteristics of Preterm Infant's Characteristics For Both Groups In Percentage Distribution (N=60)

Preterm infant's characteristics	Groups				P
	Orogastric (n=30)		Nasogastric (n=30)		
	N	%	N	%	
Gender					
- Male	17	56.7	13	43.3	
- Female	13	43.3	17	56.7	0.219

Preterm infant's characteristics	Groups				P
	Orogastric (n=30)		Nasogastric (n=30)		
	N	%	N	%	
Diagnosis:					
- RDS	27	90	25	83.3	
- M.A	3	10	3	10	
- Sepsis	-	-	2	6.7	0.729
G.A					
- <32 Weeks	9	30	13	43.3	
- 32-37 Weeks	21	70	17	56.7	0.284

Note: RDS = Respiratory distress syndrome M.A = Meconium Aspiration, C.S = Cesarean Section NVD = Normal Vaginal Delivery, G.A: Gestational Age

It was revealed from table (2) that there were no statistically significant differences between orogastric and nasogastric groups regarding their hospital stay ($p > 0.05$).

Table (2) Hospital Stay For Both Groups In Percentage Distribution (N=60)

Hospital stay:	Groups				P
	Orogastric (n=30)		Nasogastric (n=30)		
	N	%	N	%	
- One-<two weeks	1	3.3	-	-	
- Two-<three weeks	6	20	3	10	
- Three-<four weeks	2	6.7	5	16.7	
- Four weeks and more	21	70	22	73.3	
Mean±SD	41.27±18.984		41.47±17.190		0.346

It was illustrated from table (3) that there were no statistically significant differences between both groups regarding their daily weight at the four measures.

Table (3) Daily Weight At 1st, 2nd, 3rd And 4th Measures In Percentage Distribution (N=60).

Daily weight	Groups		P
	Orogastric Mean±SD	Nasogastric Mean±SD	
1st measure	1699.17±340.018	1606.50±354.951	0.190
2nd measure	1693.83±332.586	1621.33±357.247	0.598
3rd measure	1724.00±329.897	1693.00±351.027	0.211
4th measure	1740.00±327.246	1712.00±337.062	0.270

It was represented from table (4) that there was no statistically significant difference about time to sustain full oral feeding for both groups ($p > 0.05$).

Table (4) Time To Sustain Full Oral Feeding For Both Groups At 1st, 2nd, 3rd And 4th Measures In Percentage Distribution (N=60)

Time to sustain full oral feeding	Groups				P
	Orogastric		Nasogastric		
	N	%	N	%	
-< a week	2	6.7	4	13.3	
-Week-<two weeks	11	36.7	9	30	
-Two weeks-<three weeks	4	13.3	2	6.7	0.287
-Three weeks-<four weeks	3	10	7	23.3	
-Four weeks and more	10	33.3	8	26.7	

Discussion

There was limited data available on the effect of the nasal versus the oral route for placing feeding tubes in preterm or low birth weight infants.

In relation to preterm infant's characteristics. The current study revealed that more than half of the preterm infants were males in the orogastric group, while more than half were females in nasogastric group. This findings goes in the same line with [8], who reported that more than half of preterm infants in both orogastric and nasogastric groups were males. While [9]contradicted these findings and reported that more than half of nasogastric group were males, while in orogastric group, a relatively high percentage of preterm infants were females.

The result of the current study revealed that more than three quarters of preterm infants were diagnosed with RDS in both groups. This study goes in the same line with [10], who found that more than two thirds of neonates had RDS.

Regarding gestational age, [8] who studied Mode of gavage feeding: does it really matters, reported that the highest percentage of preterm infants in both orogastric and nasogastric groups their gestational age were ≥30 - <32 weeks and this contradicted with the result of the current study which revealed that more than two thirds of orogastric group and more than half of nasogastric group preterm infants were born between 32-37 weeks of gestation with no statistically significant differences of both groups.

Hospital stay was slightly longer in nasogastric group than orogastric group but with no statistically significant differences among both groups, as mean duration of hospital stay was 41.47 days in orogastric group and 41.47 days among nasogastric group. This result contradicted with the study of (9). Who revealed that there was no much difference among two groups. Mean Duration of hospital stay was 35.38 days with standard deviation of 7.60 among Nasogastric tube feeding group and 37.54 days with standard deviation of 9.45 among Orogastric tube feeding group.

Preterm infants in orogastric group gained weight more than those in nasogastric group at 1st, 2nd measures, 3rd and 4th measures. As mean of weight were (1699.17, 1693.83, 1724.00 and 1740 respectively) in orogastric group and (1606.50, 1621.33, 1693.00 and 1712.00 respectively) in nasogastric group but there was no statistically significant differences. This findings supported by [9], who demonstrated that mean time to regain birth weight was 19.38 days among Nasogastric tube feeding group and 19.23 days among Orogastric tube feeding group. Also (11), who studiedcontinuous feeding promotes gastrointestinal tolerance and growth in very low birth weight infants, reported no statistically significant difference in the time taken to regain birth weight.

Regarding adverse events of both orogastric and nasogastric tube placement, the results of the current study delineated that, there was no statistically significant differences between both orogastric and nasogastric groups about injury at the 1st, 2nd, 3rd and 4th measure. This findings supported by [9], who concluded that there were no significant differences among two groups to frequency of adverse effects.

Concerning displacement, the current study illustrated that there was statistically significant difference between both orogastric and nasogastric groups at the 2nd measure (p= 0.050), while there were no statistically significant differences between both groups about displacement of the feeding tube at the 1st, 3rd and 4th measures. This findings supported by [8] who reported that the episodes of non-intentional removal and displacement are more in OGT group and it statistically significant (p = 0.012 and p<0.0001 respectively). Also, [9], reported thatfrequency of tube displacement was more common among Orogastric tube feeding compared to Nasogastric tube feeding. Which was statistically significant with a p-value of 0.001, mean difference of -0.4462 times/day.

In the matter of apnea, the results of the current study showed that there were no statistically significant differences between both orogastric and nasogastric groups about episodes of apnea at the 1st, 2nd, 3rd and 4th measures. This findings goes in the same line with [8], who reported that episodes of apnea, bradycardia, desaturation and oxygen requirement are more in NGT group as compared to OGT group but statistically Insignificant OGT versus NGT (p = 0.86).

For time to sustain full oral feeding, the highest percentage of both orogastric and nasogastric groups reach to full oral feeding by one week to less than two weeks from starting oral feeding. There were no statistically significant differences about time to sustain full oral feeding for both orogastric and nasogastric

groups. This finding was in agreement with [8] who found that orogastric tube group neonates required (6.18±0.61) days as compared to Nasogastric tube group neonates as they required (6.47±0.59) days to achieve full feeding but it is statistically insignificant (P =0 .368).

Based on clinical observation. The differences between both groups in terms of outcome measures like duration of hospital stay, time to reach oral feeds were not statistically significant which may be due to small sample size and there is need of larger samples and also further continuation of this study to know the significance of these outcomes.

Conclusion

This study concluded that no differences were found between both orogastric and nasogastric tube feeding on preterm infants' weight, incidence of adverse events and time to sustain full oral feeding.

Ethical Clearance: Acceptance of ethical committee at faculty of nursing, in Cairo University was gained. All studied neonates' parents were informed about the aim, procedure, benefits and nature of the study and the written consent was obtained from them. The confidentiality of information was assured.

Conflict of Interest: the authors declare that there is no conflict of interest.

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References

1. Shiao, S.Y & DiFiore, T.E. A survey of gastric tube practices in level II and level III nurseries. Issues of Comprehensive Pediatric Nursing. 1996; 19(3):209-20.
2. Stocks, J. Effect of nasogastric tubes on nasal resistance during infancy. Arch Dis Child. 1980; 55(1):17-21.
3. Greenspan, J.S., Wolfson, M.R., Holt, W.J. & Shaffer, T.H. Neonatal gastric intubation: differential respiratory effects between nasogastric and orogastric tubes. Pediatric Pulmonology.1990; 8(4):254-8.
4. Gowdar, K., Bull, M.J., Schreiner, R.L., Lemons, J.A. & Gresham, E.L.Nasal deformities in neonates. American Journal of Diseases of Children. 1980; 134(10):954-957.
5. Watson, J. & Mcguire, W. Nasal versus oral route for placing feeding tubes in preterm or low birth weight infants. Cochrane Database of Systematic Reviews. (2013). Available at: http://onlinelibrary.wiley.com.
6. Sands T,Glasson M, Berry A. Hazards of nasogastric tube insertion in the newborn infant. Lancet. 1989;2(8664):680.
7. Hawes, J., McEwan, P. & McGuire, W. Nasal versus Oral route for placing feeding tubes in preterm or low birth weight infants. Cochrane Database of Systematic Reviews. 2007; issue 4. Art. No.:CD003952. DOI: 10.1002/14651858.CD003952.pub2.
8. Ambey, R., Gogia, P. & Manager, K. Mode of gavage feeding: does it really matters. International journal of contemporary pediatrics. 2018; 5(4): 1222-1225. Available at: http://www.ijpediatrics.com.
9. Kamalakar, R. & Udaykanth, S. Nasal versus oral route for placing feeding tubes in preterm or low birth weight infants.MRIMS Journal of Health Sciences. 2015;3(3): 190-195. Available at: http://www.evidenceaid.org.
10. El behairy, S.A. Leading causes of neonatal mortality in Neonatal Intensive Care Unit in Kasr Alainy Hospital during 2011. (Master dissertation in pediatrics) Faculty of Medicine, Cairo University. 2013 pp: 96-97.
11. Dsilna A, Christensson K, Alfredsson L, Lagercratz H, Blennow M. Continuous feeding promotes gastrointestinal tolerance and growth in very low birth weight infants. JPediatr. 2005; 147(1):43-9.

Law Enforcement on Tobacco Control and Smoking among Youths in the Northeast of Thailand

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Abstract

Thailand has imposed strong tobacco control policies to reducing smoking. The effectiveness of those measures towards reducing smoking especially among youths still unknown. This study aimed to determine the effectiveness of law enforcement on tobacco control among youth in the Northeast of Thailand. This cross-sectional study was conducted among 1,147 youths who were recruited by using a multistage random sampling from 6 universities in the Northeast of Thailand. A self-administered structured questionnaire was used to collect the data. The Generalized Linear Mixed Model was used to determine the association between law enforcement on tobacco control and smoking when controlling for other covariates. The results show that 20.1% were current smokers. Law enforcement on tobacco control and smoking that were significantly associated with smoking among youths were had low level of awareness on tobacco raising price, anti-smoking campaign, smoke-free in public areas, not showing pack, price and brand of cigarette at point of sale product, pictorial health warnings and not distributing cigarette with tax avoidance/tax evasion. The other covariates were male gender, alcohol drinker, had low level of attitude on not smoking, had smokers close friend and had smoker father. One-fourth of youths in the Northeast of Thailand were current smokers. Legal measures had influence on youths' smoking as well as gender, family and friends.

Keywords: *Law enforcement, Smoking, Tobacco Control, Youths.*

Introduction

Cigarette smoking is harmful to the health of both smokers and non-smokers. The burdens of tobacco-related illness and death are very high. The figures in 2008, indicated that cigarettes killed more than 5 million people or 1 person every 8 seconds, which was more than the deaths from infectious diseases. The global situations estimated that there will be 150 million smokers with increasing trends, especially among female teenagers. Most of the smokers start to smoke before the age of 18 and a half of them will die prematurely[1]. In 2019, half of the tobacco users were killed, of which more than 8 million were killed annually. In addition, more than 7 million of those deaths were the result of direct tobacco use, whereas around 1.2 million were non-smokers being exposed to second-hand smoking, especially those with low and middle incomes[2]. Furthermore, tobacco use contributes to poverty by diverting household spending from basic needs such as food and shelter to tobacco.

The tobacco consumption situation of Thai people aged 15 years and older between 1991 and 2015 had been decreasing. The prevalence of smoking was continually decreasing from 32% in 1991 to 20.7% in 2009. However, between 2009 and 2014 the smoking rates were unclear. The rate of smoking was increased to 21.4% in 2011, then was dropped to 19.9% in 2013 and increased again to 20.7% in 2014. It was slightly decreased to 19.6% in 2015. Among youths the smoking rate during 2004-2015, were increased from 6.6% to 7.9% with the average age at first smoking of 17.8 years

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old[3]. The Global Youth Tobacco Survey (GYTS) survey observed that the rate of smokers in Thai schools was 11.7%, which was higher than the average global figures of 9.5% among 140 countries. It was also higher than the average rate of 5.9% among the South East Asian countries[4].

Thailand has developed and enforced strong measures on tobacco control for almost 3 decades. Laws and regulations have been issued and enforced. Two acts were developed as the essential foundation of tobacco control measures, they were the Tobacco Product Control Act 1992 and the Non-Smoking Health Protection Act 1992[5]. In addition to the laws, Thailand has guidelines for tobacco control based on the "Framework Convention on Tobacco Control" of WHO[6] and the National Tobacco Control Strategy Plan 2010–2014[7]. Concerning tobacco control among youth in Thailand, the control measures starting from controlling manufacturing industry and smoking behaviors[3] followed by legal measures. From 2007, the prevalence of smoking in people aged 15 to 24-year-olds trends have been increasing. This was reflecting that despite strict tobacco control measures, smoking among youths were still problems. Therefore, this study aimed to describe smoking behaviors and perceived law enforcement on tobacco control as well as to determine the association between tobacco control law enforcement and smoking among the youth in the Northeast of Thailand.

Material and Method

Study Design: This cross-sectional study was conducted among 1,147 participants who were recruited by using a multistage random sampling from 6 universities in the Northeast of Thailand. The inclusion criteria were being undergraduate students, aged 18 to 24-year-old, currently studying in 6 universities in the Northeast of Thailand and voluntarily to join the study. Those who absence on the time for data collection and having critically illness were excluded. A self-administered structured questionnaire was used to for data collection on demographic and socioeconomic factors, knowledge and attitude towards smoking, perceived law enforcement on tobacco control and smoking behaviors.

Data Analysis: A simple logistic regression was used to identify association between each independent variable and smoking. The independent factors that had p-value <0.25 were processed to the multivariable analysis using the generalized linear mixed model (GLMM) to identify the association between perceived tobacco control law enforcement and smoking when controlling the effect of other covariates. We used 6 universities as random effects. The magnitude of association was presented as adjusted odds ratio (Adj. OR), 95% confidence interval (CI). P-value <0.05 was a statistically significant level.

Results

Among the total of 1,147 youths, 52.9% were female with the average age 20.32±1.51 years old. About one-third were second year undergraduate students. The average monthly income was 6,991.28 ± 2219.50 baht. Almost all did not work part time (88.4%). Almost 40% staying with friends or were alone and 44.7% lived in rental room of dormitory. About one-fifth of the youths were current smokers (20.1%; 95% CI: 18-21-23.34). Almost 0ne-fourth of the respondents start smoking at the age of 11-13 years old. At present 10.1% smoked 6-10 rolls per day and 15.2% smoked at less 7 day a month. More than one-fourth were current drinker. Most of the participants had high level of awareness on tobacco control's law enforcement concerning increase tobacco prices (69.9%), anti-smoking campaign (71.0%), smoke-free in public areas (58.0%). About half and lower well aware of quite smoking service (51.1%), pictorial health warnings (47.5%), not distributing cigarette with tax avoidance/tax evasion (41.2%). However, less than one-third had high level of awareness on legal measures about not showing the pack (29.4%), price (33.8%) and brand (31.5%) of cigarette at point of sale product displays.

The GLMM indicated factors that were significantly associated with smoking among youths in the Northeast of Thailand were had low level of awareness on tobacco control's law enforcement on increased price of tobacco products, anti-smoking campaign, smoke-free in public areas legal measure, not showing pack, price and brand of cigarette at point of sale product displays, pictorial health warnings, quit smoking services and not distributing cigarette with tax avoidance/tax evasion. The other covariates were being male, current drinkers, had low level of attitude toward no smoking practices, had smoker father, had close friend smoker when controlling the effect of universities (Table 1).

Table 1. The multivariable analysis of factors associated with smoking among youth in the Northeast of Thailand using the GLMM. (n= 1,147)

Factors	Number	% Smoking	Crude OR	Adjusted OR	95% CI	p-value
Awareness on tobacco raising price						<0.001
High	802	14.3	1			
Average	181	21.0	1.59	1.14	1.02-2.57	
Low	164	47.6	5.42	4.73	2.96-6.51	
Awareness on anti-smoking campaign						<0.001
High	815	14.5	1			
Average	134	29.1	2.43	1.95	1.13 – 3.29	
Low	198	37.4	3.53	2.87	1.49 – 3.59	
Awareness on smoke-free in public areas						<0.001
High	666	8.7	1			
Average	307	27.7	4.01	2.37	1.38 – 4.80	
Low	174	50.6	10.73	5.63	4.18 - 9.02	
Awareness on not showing pack						<0.001
High	338	11.2	1			
Average	433	16.4	1.55	1.11	1.01 –2.68	
Low	376	32.4	3.79	2.43	1.94 –3.86	
Awareness on not showing price						<0.001
High	388	4.9	1			
Average	482	23.0	5.81	4.58	2.91 –8.35	
Low	277	36.5	11.15	7.23	5.12 - 8.68	
Awareness on not showing brand						<0.001
High	361	7.2	1			
Average	404	24.0	4.07	2.68	1.37 –4.91	
Low	382	28.3	5.08	3.15	2.12 –5.09	
Awareness on pictorial health warnings						<0.001
High	545	11.6	1			
Average	338	18.3	1.72	1.34	1.09 –2.96	
Low	264	40.2	5.13	4.17	2.78 –5.87	
Awareness on quit smoking services						<0.001
High	586	12.1	1			
Average	362	19.9	1.80	1.45	1.16 –2.93	
Low	199	44.2	5.75	3.21	1.96 –6.45	
Awareness on not distributing cigarette with tax avoidance/tax evasion						<0.001
High	472	6.1	1			
Average	368	25.3	5.16	3.97	2.46 –7.33	
Low	307	35.5	8.41	4.19	3.28-8.15	
Gender						<0.001
Female	607	4.9	1			
Male	540	37.2	11.404	6.74	4.60 – 9.12	
Alcohol Use						<0.001
No	715	4.1	1			
Drinker	432	32.5	8.93	5.59	3.16-7.98	

Factors	Number	% Smoking	Crude OR	Adjusted OR	95% CI	p-value
Attitude toward not smoking						<0.001
High	882	11.8	1			
Average	138	17.4	1.58	1.27	1.03-2.95	
Low	127	41.1	3.21	5.64	3.73-8.56	
Smoker Father						<0.001
No	444	10.4	1			
Used to smoke/Quit	514	22.6	2.52	1.83	1.24-3.29	
Yes	189	36.5	4.975	3.28	2.14-5.92	
Smoker Close friend						<0.001
No	1,000	13.9	1			
Yes	147	62.6	10.36	4.95	2.29-8.56	

Discussion

Our study observed that about one-fifth of youth aged 18-24 years old studying in undergraduate programs of universities in the Northeast of Thailand were current smokers. This finding was in line with a study of the National Statistical Office in 2017 reported 20.7% of young aged between 20-24 years old were smokers[8]. The study indicated that youths with low level of awareness on tobacco control law enforcement measures including; raising price, anti-smoking campaign, smoke-free in public areas, pictorial health warnings, quit smoking services, not distributing cigarette with tax avoidance/ tax evasion, not showing the pack, price and brand of cigarette at point of sale product were more likely to smoke when compared with those with average or high level of awareness. Increased price of tobacco products could help reducing smoking among youth. The possible reason was that they were young and relied on families for financial supports, they were less likely of afford that much expensive cigarette[9]. Advertisement play importance role on youth behaviors especially smoking. Display in sealing spots as well as media could initiate and stimulate youth smoking practices[10]. In the past, misleading of information that stated that cigarette is soft with light flavor as well as create enjoy friendship atmosphere leaded many youths into smoking. The law and enforcement on information of health have been widely perceived by youth. The pictorial health warnings on the packaging of cigarette is a policy which aimed to educate about the harmful effects of cigarettes on health, to motivate for quitting smoking and to prevent the youth from experimenting with smoking from their fear of severe health consequences as well as deterioration of their beauty and appearances. After implementing the pictorial health warnings label, the results vary according to the policy of each country. For example, Australia's pictorial health warnings label occupied 90% of the image area at front of the envelope and 30% of the area behind the envelope, while China's pictorial health warnings label is an image type only 30% of the area on both the front and back of the envelope[11]. As some as some studies showed that pictorial health warning label content is associated with greater awareness of smoking-related risks and toxic tobacco constituents[12-14]. Smoke free areas have influences on smoking behaviors. Many countries such as Ireland set a policy intervention in population level with smoke-free law which can achieved the public health goals as well as achieving a high level of acceptance among smokers[15,16]. This study also reported that young males had 6.74 times higher chances of smoking than young females. This finding was similar to a cross sectional study among GYTS reported smoking rates among Vietnamese aged 13-15 years old males were 6 times higher than female teenagers[17]. This study also observe that those who drank alcohol were more likely to smoke which was similar with other previous studies[18, 19]. This may be due to Thai culture that more open to males than females. Therefore, females are cultivated to prohibition of both smoking and drinking[20]. However, when compared to the results of teen smoking in Europe, some countries report similar smoking rates among male and female adolescents[21]. In addition, among Scandinavian countries, female teenagers had higher smoking rates than male[22]. Environment especially family and friends had influencing on youths' smoking behaviors. Youth who had smoker close friends or smoker father were 4.95

and 3.28 times more likely to smoke than those no have close friends and father smokers. It might be that youths usually follows the practices of their idols get acceptance as well as to form their images and personalities. This finding is supported by many studies which stated parental smoking associated with smoking[23-26].

Conclusion

One-fourth of youths in the Northeast of Thailand were current smokers. Law enforcement had high impact on reducing smoking among these youth especially the legal measures on price, display, advertisement, anti-smoking campaign, smoking-free areas, health warning as well as gender, influence family and friends. Systematic measures to increase awareness of youths concerning tobacco and smoking legal control measures are essential especial among vulnerable groups, male youths with poor attitude on not smoking and lived in high risk environment of having father and friend smokers.

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References

1. World Health Organization. WHO report on the global tobacco epidemic, 2008: the MPOWER package: World Health Organization; 2008.
2. World Health Organization. Key Facts: Tobacco 2019 [Available from: https://www.who.int/news-room/fact-sheets/detail/tobacco.
3. Mahidol University. Knowledge and Knowledge Management Center for Tobacco Control: Summary of 25 years on the country's tobacco control. Bangkork Mahidol University.; 2017.
4. Warren CW, Jones NR, Asma S. Global youth tobacco surveillance, 2000--2007. MMWR Surveill Summ. 2008;57(1):1-28.
5. Saranya Benjakun. MK, Pradad Kengpanich., Dusit Sujirarat.,. Prognosis and health hazards report: Tobacco consumption trends of Thai population. Faculty of Public Health Mahidol University; 2014.
6. World Health Organization. WHO framework convention on tobacco control. WHO Regional Office for South-East Asia; 2004.
7. Ministry of Public Health Thailand. National Tobacco Control Strategy Plan 2010 - 2014. In: Academic Support Group Bureau of Tobacco Control Do DC, editor. 2011.
8. National Statistical Office. Survey of National Statistical Office year 2017. 2017.
9. The financial impacts of smoking on families and children: information for client [press release]. Tackling tobacco: action on Smoking & Disadvantage 2013.
10. World Health Organization . Encouraging People to Stop Smoking: DEPARTMENT OF MENTAL HEALTH AND SUBSTANCE DEPENDENCE; 2001 [Available from: https://www.who.int/mental_health/evidence/stop_smoking_whomsdmdp01_4.pdf.
11. Hammond D, Fong GT, McNeill A, Borland R, Cummings KM. Effectiveness of cigarette warning labels in informing smokers about the risks of smoking: findings from the International Tobacco Control (ITC) Four Country Survey. Tobacco control. 2006;15(suppl 3):iii19-iii25.
12. Swayampakala K, Thrasher JF, Hammond D, Yong H-H, Bansal-Travers M, Krugman D, et al. Pictorial health warning label content and smokers' understanding of smoking-related risks—a cross-country comparison. Health education research. 2015;30(1):35-45.
13. Hammond D, Thrasher J, Reid JL, Driezen P, Boudreau C, Santillán EA. Perceived effectiveness of pictorial health warnings among Mexican youth and adults: a population-level intervention with potential to reduce tobacco-related inequities. Cancer Causes & Control. 2012;23(1):57-67.
14. Borland R, Hill D. Initial impact of the new Australian tobacco health warnings on knowledge and beliefs. Tobacco Control. 1997;6(4):317-25.
15. Fong GT, Hyland A, Borland R, Hammond D, Hastings G, McNeill A, et al. Reductions in tobacco smoke pollution and increases in support for smoke-free public places following the

implementation of comprehensive smoke-free workplace legislation in the Republic of Ireland: findings from the ITC Ireland/UK Survey. Tobacco control. 2006;15(suppl 3):iii51-iii8.

16. Cunningham R. National and subnational legislation requiring 100% smokefree restaurants and bars. Report by the Canadian Cancer Society. 2006;1.
17. Page RM, Huong NT, Chi HK, Tien TQ. Social normative beliefs about smoking among Vietnamese adolescents. Asia Pacific Journal of Public Health. 2012;24(1):68-81.
18. Viana T, Camargo C, Gomes NP, Felzemburgh R, Mota RS, Lima C. Factors associated with cigarette smoking among public school adolescents. Revista da Escola de Enfermagem da USP. 2018;52:e03320-e.
19. Rudatsikira E, Abdo A, Muula AS. Prevalence and determinants of adolescent tobacco smoking in Addis Ababa, Ethiopia. BMC public health. 2007;7(1):176.
20. Sasidhorn Chidnayee. WY. Factors Related with Smoking Behaviors of Youth at Uttaradit. Boromarajonani College of Nursing, Uttaradit Journal. 2018;10(1).
21. Sovinová H, Csémy L. Smoking behaviour of Czech adolescents: results of the Global Youth Tobacco Survey in the Czech Republic, 2002. Central European journal of public health. 2004;12(1):26-31.
22. Braverman MT, Aarø LE. Adolescent smoking and exposure to tobacco marketing under a tobacco advertising ban: findings from 2 Norwegian national samples. American Journal of Public Health. 2004;94(7):1230-8.
23. Rachiotis G, Muula AS, Rudatsikira E, Siziya S, Kyrlesi A, Gourgoulianis K, et al. Factors associated with adolescent cigarette smoking in Greece: results from a cross sectional study (GYTS Study). BMC public health. 2008;8(1):313.
24. Duko B, Melese Y, Ebrahim J. Determinants of cigarette smoking among adolescents in Ethiopia: A cross-sectional study. Tobacco induced diseases. 2019;17.
25. Lin Y-S, Wu D-M, Chu N-F, Lai H-R, Shi Z-P, Chen H-I. Factors associated with cigarette smoking among young military conscripts in Taiwan. Journal of the Chinese Medical Association. 2008;71(11):559-65.
26. Sureerut Wiangkamon PH, Rungrat Srisuriyawet., . Life Assets and Factors Related to Early Smoking Stage among Male Upper Primary School Students, Kalasin Province. Journal of Public Health Nursing. 2017;13(2).

Workers Involvement in Improving the Effectiveness OSH in PT. Wijaya Karya (Wika) Beton Makassar (Case Study the Pettarani Elevated Toll Contruction Project)

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Abstract

Work accidents that occur in the world of construction in 2017-2018 have increased, so the government requires all company management to improve the OSH Management System (OSH). All work accidents are seen and felt by workers. The implementation of the Occupational Safety and Health Management System based on ISO 45001: 2018 . The purpose of this study is to obtain in-depth information about the processes and factors that influence worker involvement in improving OSH effectiveness. This research uses descriptive qualitative method. Qualitative data collection is done through observation, interviews and document review. There are three informants in this research, they are the SHE Manager, Safety Officer and WikaBetonLayang Toll Project Worker. The results of the study were obtained that the work engagement process starts from safety induction, safety talk and toolbox meetings, the next process is implementation, where the implementation starts from the prevention of work accidents, environmental pollution, work-related diseases, reporting of hazardous situations and delivery of information. After the implementation phase, the next stage is consultation with workers both in terms of OSH program planning and changes in OSH implications. And the final process is the granting of authority, roles and responsibilities to workers. For the factors that influence the involvement of workers is first the organization, the vision and culture of the organization. Second is management and leadership, meaning communication techniques and techniques to provide feedback to workers.

Keywords: *Work Accidents, Construction, OSHMS, ISO 45001, Work Involvement and OSH Effectiveness.*

Introduction

Infrastructure development is one of the priorities of the Government of Indonesia, seeing its very strategic role in driving the pace of economic growth.[1,2,3] To carry out the construction of the infrastructure required reliable construction services sector[1], while the reliable construction services sector itself is highly influenced by various aspects, one of which is the safety aspect in the implementation of construction projects [4,5,9,10]. The construction industry is one of the industries most at risk for worker safety. The International Labor Organization (ILO) states that one in six fatal injuries in the workplace occur at construction sites. Furthermore, no less than 60,000 fatal accidents occur at construction sites around the world each years[6,7,9]. This counts as one fatal accident in ten minutes. In 2015, 2,375 people died in work accidents. According to Juan Somavia, ILO Director General, the construction industry was among the most vulnerable to accidents [(6)].

The construction sector shows 3.8 times higher rates of severe accident incidents and 12 times higher rates of fatal accident incidents than all industry levels.

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According to the annual report the labor inspectorate stated that in the construction sector in Serbia contributed a lot of fatal work accidents in 2016. The main cause of fatal accidents is falling from a height. Other causes are electric shock, falling objects, moving machinery parts, buried in the ground, sinking, explosion, choking and others [4].

In the records of the Ministry of Public Workers and Public Housing, the Directorate General of Construction of Indonesia there have been 15 work accident incidents between 2017-2018. The work accident caused casualties from falling from a height to falling down. This is a warning to relevant parties regarding safety and work accident aspects [8].

The high number of accidents requires all management of a company to pay serious attention to the program and implementation of Occupational Safety and Health (OSH) in the company's environment through the existing Occupational Safety and Health Management System (SMOSH) by always monitoring and evaluating its performance[1].

In the previous research, where a construction company had a commitment that was implemented by the leadership of the company in an effort to prevent occupational accidents namely the OSH Policy in writing but the application was not carried out optimally because not all were involved in its formation [12]. Yet according to Minister of Public Works Regulation Number 05 of 2014[12] and Republic of Indonesia Government Regulation Number 50 of 2012[14] that before the OSH policy is prepared it must first involve and consult with workers.

The involvement of workers in OSH effectiveness is very much needed and is one of the company's obligations in increasing OSH effectiveness. This is in accordance with research RahmiYuningsih (2014)[15] one of which influences the formulation of a policy is human resources (HR). Actors and/or human resources in the process of policy formation can be divided into two groups, namely the cast and official and the cast as well as unofficial. Included in the cast as well as the official are those who have powers that are legally recognized by the constitution and are binding. Meanwhile, those included in the cast group as well as unofficial, are parties who do not have legal authority.

This is also in line with the most recent ISO 45001: 2018, where in this ISO adds one thing that can affect SMK3 running well so that the effectiveness of OSH is increased namely leadership and worker participation. ISO 45001: 2018 emphasizes the obligation to implement labor participation and consultation. The obligation to carry out participation and consultation is not only at the managerial level, but is also required at the lowest level (workers). For the participation of Non-Managerial Workers [7].

Method

This type of research used in this research is a qualitative descriptive design. According to Burhan Bungin qualitative descriptive design can also be called quasi qualitative or pseudo qualitative design. That is, this design is not yet truly qualitative because its shape is still influenced by quantitative tradition, especially in placing theory on the data obtained. This research is an in-depth study of certain social units, the results of which provide broad and in-depth overview of certain social units [5]. With data collection techniques with in-depth interviews, observation and documentation. As for this study, researchers used 3 types of informants. research informants included three types namely key informants (Manager SHE), key informants (18 Field Workers) and supporting informants (4 Safety Officers)

Result

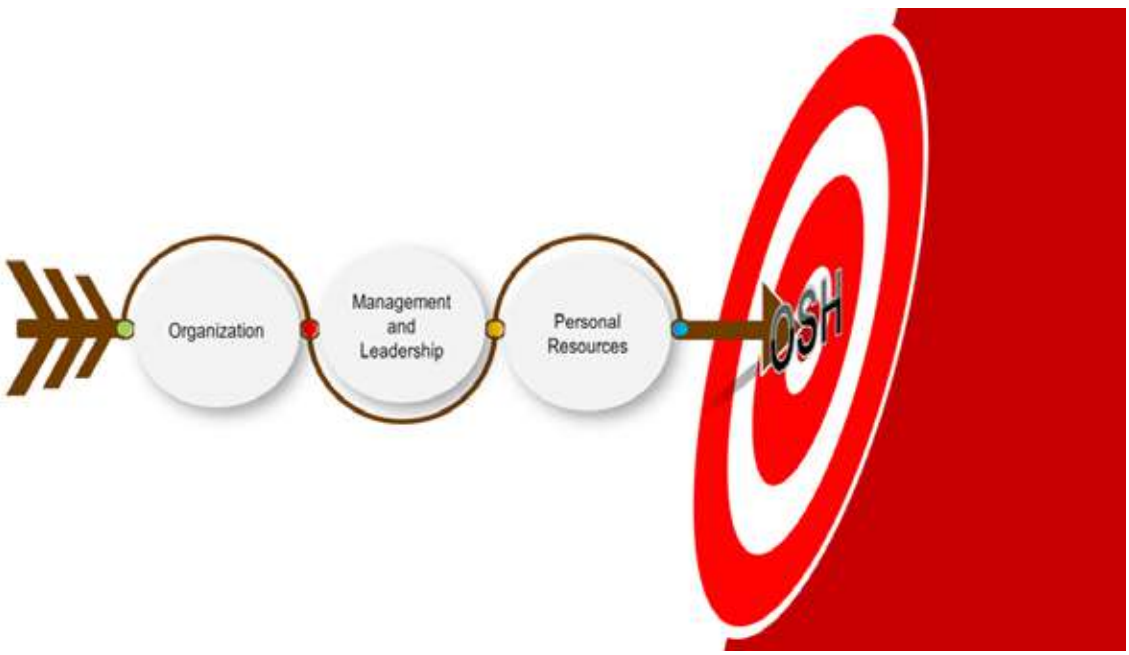
The process of employee involvement means that here is a systematic step or a clear stage in involving workers at all levels of the organization. Based on the results of in-depth interviews about the involvement of workers, obtained information about the initial process of employee involvement is safety induction. In this case before workers are involved in construction, it is necessary to provide safety guidance that must be known and OSH policies owned by the company.

Then followed by a safety talk and toolbox meeting. Where workers must follow this activity in order to inform more deeply about the work to be done today, the occurrence of unsafety at the work site and remind workers to always pay attention to safety and health at work. The next stage of employee involvement is implementation. In this case the implementation is related to work accident prevention problems, prevention of environmental pollution, prevention of occupational diseases, reporting of hazard situations and delivery of information. Where workers apply OSH rules and policies.

After the implementation phase, the next process of employee involvement is the consultation stage with the worker, for example the planning of the OSH program and changes to the implications of the OSH. Where workers are involved in finding solutions to OSH problems, in this case the company asks the workers what to do in improving construction OSH. The final process in the involvement of workers is the granting of authority, roles and responsibilities to workers who in the sense that management gives the role of authority to admonish, remind and terminate work temporarily if the worker and someone whose position is above him (top management) violates OSH rules or takes action unsafety.

Picture 1: Process of Worker Involvement

Factors That Influence Worker Involvement: Based on in-depth interviews and field observations obtained results that can be an influence in the involvement of workers first is the Organization. An organization can bring about involvement in workers because of the organizational culture, vision and values adopted by the organization. Then the second is Management and Leadership. The consistency of leaders in guiding workers can create employee involvement, organizational leaders are expected to have some skills such as communication techniques, techniques to provide feedback and good job appraisal techniques for their employees. Next to the third and the last is Personal Resources. In terms of worker characteristics, what the researchers found was that there were two characteristics that influenced the involvement of workers, namely experience and knowledge and caring attitudes.



Picture 2: Factors That Influence Worker Involvement

Discussion

Based on the results of in-depth interviews, document review and observations found that the process of employee involvement starts from safety induction. Where this is done at the beginning of the worker after being hired on this project. In safety induction, things related to OSH are conveyed. After safety induction is done, then the process also takes place in the field, where WikaBeton organizes a program called TBM (Toolbox meeting) and Safety talk. TBM or commonly called toolbox meetings are held every day in the morning before starting work, this is done in the work area. According to information obtained from all informants[5], TBM was run every morning. However, there was some information and field observations found that there were times when TBM was not implemented because workers arrived late and workers were lazy to follow TBM. It was also found that those who attended TBM were only unskilled workers[2], implementers and foremen did not participate in this TBM, even though their opinions as workers' representatives were needed, where as workers expressed their appreciation to the foreman or executor. Furthermore, there is the name of safety talk, disafety talk containing OSH evaluation submissions about what happened in the previous field and a prohibition against repeating the same thing. The safety talk is held every Monday morning and the SHE coordinator is the direct manage[11].

For the prevention of work accidents, wika concrete workers in the Pettarani elevated toll road project are good enough to participate in its implementation, although sometimes there are still workers who do not use PPE, especially working at the high. For the prevention of environmental pollution, it was found that all informants stated that the prevention of environmental pollution has been categorized as being implemented well.

According to all informants that the delivery of information usually focuses on safety talk and toilet meeting. Whereas in the implementation of hazard reporting, according to informants both the main informants, supporting informants and key informants they stated that workers were included in hazard reporting. It is also known that the management has attached a hazard reporting procedure at each gathering point and there is a safety officer number that can be contacted. As for the investigation itself, the management included workers in the work accident investment[9].

These perceptions complement the more objective, job-oriented characteristics and worker differences as it is focused at the level of the operatives and supervisors in relation to their work environment[(9)]. Where if it is related in this research, safety induction, safety talk and toolbox meetings are in the stages of knowing, implementation both in the OHS policy, delivery of information and reporting of hazards are included in the stage of conducting, while for consultation entering in the stage of making decisions, as well as granting authority, the roles and responsibilities are in the influencing stage.

According to Mc Brain, organization is one of the factors that influence worker involvement. In this case the culture, vision and values adopted by an organization influence the involvement of workers [(11)]. The organization has an important role in facilitating the involvement of workers to be involved in increasing the effectiveness of OSH. Based on ISO 45001 that consultation and participation of workers, and, if any, worker representatives, can be a key success factor for the OSH management system and about that must be encouraged through the process established by the organization. In WikaBeton the Pettarani overpass toll project does not yet have values and visions that prioritize the involvement of workers in each line. This can be seen from the fact that ISO certification has not yet shifted. WikaBeton has not yet switched to 45001: 2018 certification. Where this ISO is an ISO that is centered on consultation and participation of workers.

Based on ISO 45001 states that leadership and commitment from top management of the organization, including awareness, responsiveness, active support and feedback, is very important for the success of the OSH management system and achieving desired results [(7)]; therefore, top management has specific responsibilities that they need to be personally involved or that they need to direct. The top management of the Wika Concrete Layang Pettarani Toll Road project lacks communication techniques and the technique of providing feedback to workers. This can be seen from the courage of workers giving input to top management related to OSH, workers are only pressured to obey the rules even though it is their indirect emphasis. For example, a worker who used to work in oil and gas or in the sense of experience related to OSH problems has a lot, where OSH in oil and gas and OSH in the construction world are very different. In oil and gas (Oil and Gas) pay more attention to the issue of OSH than in the construction world[(11)]. At WikaBeton the organization's leaders do not reward workers if they succeed in implementing good OSH. The

management only gives punishment to workers if they break the rules. Though it should be noted that reward and punishmen are a form of positive reinforcement in changing behavior.

Personal Resources or personal resources is a positive evaluation related to excitement and leads to individual feelings of their ability to control and positively impact their environment[(2)]. Based on observations and in-depth interviews, researchers found that Personal Resources also influences their involvement in everything. Personal Resources here, means knowledge and caring attitude. Worker involvement can increase organizational effectiveness depending on the degree to which employees have the knowledge needed to make good decisions and a caring attitude to take immediate action as possible. In the world of construction, including this project has a different Personal Resources.

Conclusion

The employee involvement process is divided into several sections namely

1. Safety induction: is carried out by PT WikaBeton to inform the OSH rules and jobdesks of each worker.
2. Safety talk and Toolbox meeting:
3. Implementation: The implementation here is divided into five namely implementation of work accident prevention, implementation of prevention of environmental pollution, implementation of prevention of occupational diseases, implementation of reporting of hazard situations, implementation of information delivery.
4. Consultation is divided into two, namely OSH program planning and OSH implications. In this project workers are not involved in the planning of the OSH program because the OSH program was in place before the project started.
5. Granting Authority, Roles and Responsibilities..

The factors that influence the involvement of workers in improving the effectiveness of OSH are:

1. Organization: The organization here sees the culture and vision that exists in the company.
2. Management and Leadership: Management and leadership here are seen from work assessment, communication and feedback techniques.
3. Personal Resource: Personal Resource in this case is knowledge and attitudes of caring workers.

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References

1. Alamsyah, FA, 'Studi Pengaruh Penerapan Kebijakan Sistem Manajemen Keselamatan Dan Kesehatan Kerja (SMK3) Terhadapkepuasan Kerja Tenaga Kerja Konstruksi', Jurnal Tugas Akhir. 2018
2. Bulat, P, Kenichi H & Jovan P. Occupational Safety and Healht in the Contruction Sector in Serbia, International Labour Organization (ILO), 2019
3. Bunging, B, Penelitian Kualitatif: Komunikasi, Ekonomi, Kebijakan Publik, dan Ilmu Sosial Lainnya, Jakarta, Kencana Prenada Media Group. 2007.
4. Indah, A, Evaluasi Penerapan Keselamatandan Kesehatan Kerja (K3) Pada Proyek Bangunan Gedung di Kabupaten Cirebon', Jurnal Teknik Sipildan Perencanaan, Vol 19, no. 1, 2017
5. ISO 45001, Occupational heath and safety management system-Requirements with guidance for use.2018
6. Lawani, K, Billy H & Iain 'Empowerment As A Construct of Worker Engagement And Wellbeing'. Proceedings of the Joint CIB W099 and TG59 Conference, Brazil, 1-3.2018.
7. Lukman, F & Rosmariani, Pembinaan Konstruksi Melalui Peningkatan Kapasitas Aparatur Sipil Negara, KONTRUKSI (Media Informasi & Komunikasi Direktorat Jendral Bina Kontruksi Kementerian Pekerjaan Umumdan Perumahan Rakyat) 2018
8. Kementerian PUPR, 'Kebijakan K3 Konstruksi Kementerian PUPR', Workshop Pengembangan Keprofesian Berkelanjutan (PKB) Bidang K3 Konstruksi, Bali, 8. 2018
9. Anggraini, L, Endang SA & Arik, 'Faktor-Faktor Yang Mempengaruhi Employee Engagement Generasi Y (Studi Pada Karyawan PT Unilever Indonesia Tbk-Surabaya)', Jurnal Administrasi Bisnis, Vol.37, no. 2.2016

10. Bugong, S, Metode Penelitian Sosial, Jakarta, Kencana Prenanda Media Group. 2005.
11. Noviastuti, TK, Ekawati & Bina, K, 'AnalisisUpaya Penerapan Manajemen K3 dalam Mencegah Kecelakaan Kerja di Proyek Pembangunan Fasilitas PenunjangBandaraOleh PT.X (Studi Kasus di Proyek Pembangunan Bandara di Jawa Tengah)'. Jurnal Kesehatan Masyarakat, 2018, vol. 6, no. 5.
12. Pemerintah Indonesia, Peraturan Pemerintah Republik Indonesia No. 50 tentang Penerapan Sistem Manajemen Kesehatan dan Keselamatan Kerja, Lembaran Negara Republik Indonesia No.100, Jakarta, 2012
13. Yuningsih, R, Analisis Segitiga Kebijakan Kesehatan Dalam Pembentukan Undang-Undang Tenaga Kesehatan', Pusat Pengkajian, Pengolahan Data danInformasi (P3DI) Sekretariat Jenderal DPR.2014.
14. Maslikhah, E, 'Pengaruh Kepuasan Kerja Dan Keterlibatan Karyawan Terhadap Kinerja Karyawan PT Pegadaian (Persero) Cabang Pegadaian Syariah Blauran Surabaya', Program Study Ekonomi Syariah. 2018.
15. Menteri Pekerja Umum RI, Peraturan Menteri Pekerjaan Umum No: 05/PRT/M/2014 tentang Pedoman Sistem Manajemen Kesehatandan Keselamatan Kerja (SMK3) Konstruksi Bidang Pekerjaan Umum, Berita Negara Republik Indonesia Tahun 2014 No. 628, Jakarta 2014.

The Association of Perceived Neighborhood Environment Factors and Methamphetamine Use among Drug Addicts in Northern, Thailand

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Abstract

Background: Neighborhood environment factors influence health-related behavior, including substance use. Many researches have focused on the effect of neighborhood factors with drug use in general population; a few studies have focused on vulnerable group like drug addicts. This study aimed to investigate the association between neighborhood environment factors and methamphetamine use among drug addicts.

Method: This cross-sectional study was conducted among 364 drug addicts at drug treatment center in Northern Thailand. The data collection by using structured interview, including substance use and perceived neighborhood environment, which conducted by standardized interviewers. Multivariate logistic regression was applied to interpret the neighborhood environment factors related with methamphetamine use.

Results: The results revealed that most of respondents (65.4%) used methamphetamine and 34.6% used other illicit drugs. The greater of perceived neighborhood crime (adjusted OR= 2.99, 95% CI: 1.64, 5.49) and stigma of addiction (adjusted OR= 2.23, 95% CI: 1.23, 4.05) were associated with increased risk of methamphetamine use. Drug addicts who were male, unemployed and had peers or family used drug were more likely to use methamphetamine.

Conclusions: The neighborhood factors influence methamphetamine use. Thus, the better understanding of neighborhood context is important to developing prevention and intervention to reduce substance use. health-related behavior.

Keywords: *Methamphetamine; Crime; Neighborhood; Thailand.*

Introduction

Methamphetamine make up the group of drugs known as amphetamine-type stimulants (ATS). In 2016, the United Nations Office on Drugs and Crime estimated 34.2 million ATS users worldwide[1]. In Thailand, Methamphetamine epidemic remains a steadily. In 2011, an estimated 125000 Thais had ever used methamphetamines [2]. The government began a "compulsory drug treatment" in an attempt to control this epidemic. From 2015 to 2016, the people who use drugs (PWUD) were treated in compulsory drug detention centers (CDDCs) from 108638 to 66271 cases and 90% of PWUD were methamphetamine users. Northern Thailand remains the main regions for methamphetamine trafficking and approximately

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67% of all PWUD reported using methamphetamine [3]. Besides, the high relapse rates as a major problem in drug treatment, which found that about 20 % of PWUD relapsed within 2 months and 96.3% of injecting drug users relapsed within 1 week after released from CDDCs [4-5]. Because of they are released to their neighborhoods which have predisposing factors such as high crime rates, remained stigma of addiction and greater availability of drugs and drug users [6-7], then some of them returned to use drugs. Therefore, neighborhood environment factors may influence residents' substance use.

The social epidemiology studies found that neighborhood environment factors play an important role in determining substance use. Much research has considered with negative neighborhood factors (e.g., neighborhood disorganization, perceived neighborhood crime and stigma of addiction) were related with increasing of substances use [7,8]. Regarding, perceived neighborhood crime was important indicators of the residential social environment. Prior study suggests that neighborhood with social disorganization including crime, violence and drug dealing may lead to substance use via stress and also perceived crime were chronic environmental stressors [9-10]. Thus, residing in greater disorganized neighborhoods with crime can lead to stress, then substances may use to cope with stressful environments [9]. In term of addiction stigma, some studies illustrated that after rehabilitation, then individuals return to their community with remains the stigmatized attitudes and be labeled toward people with substance abuse as bad, weak and dangerousness. These attitudes make them feel worthless, discriminate and social condemn may induced them at risk of relapsing [7,11].

In Thailand, prior researches of social factors influence of substance use focused more on individual, peer and family factors than neighborhood environment characteristics [12]. Also, to date, there have no studies examining the association of neighborhood environments factors with substance use among drug offender population. Thus, these represent a gap in the literature. This current study the primary exposures of interest were two neighborhood factors (e.g., perceived neighborhood crime and stigma of addiction) and we hypothesized that methamphetamine use would be influenced by neighborhood factors. These findings may be useful to develop prevention or intervention approaches to reducing drug addiction by consider with neighborhood environments in their community.

Objectives: This study aimed to investigate the association between neighborhood environment factors and methamphetamine use among drug addicts.

Materials and Method

Study Population: A cross-sectional study with 364 drug addicts who were treated in two compulsory drug detention centers located in northern (Chiangmai and Maehongson provinces), that operated by Ministry of Public Health of Thailand during January 2017-May 2018. The eligible drug addicts were enrolled into treatment during the study period, resided in Northern provinces at least three months and willingness to participate in this study and excluded if any response is not completed. A consecutive sampling technique was used to select participants who met the eligibility criteria.

We adapted the socio-ecological model which is a multi-level framework for understanding the interactions between individuals and environment factors that shaped their behaviors that we focused on the interplay among individual, interpersonal and neighborhood-level variables[13]. The data were collected by structured interviews administered by 8 trained standard interviewers from two centers. After explaining the study information, all respondents obtained informed consents and were interviewed in private room.

Measurements: The structured interviews questionnaire was developed based on literature review, which composed of socio- ecological factors and types of substance use.

The individual-level variables included sex, age, educational, occupational status and monthly income. The interpersonal-level variables assessed by 2 items reflecting the extent of peers and family illicit drugs used. All of these variables were classified as dichotomous variable. Both of individual and interpersonal variables were potential covariates which were adjusted in the analysis of this study.

Neighborhood-level variables were assessed individual's perception of their neighborhoods in past 3 months prior to detention. Perceived neighborhood crime was measured by questionnaire adapted by Rosenberg et al.[14] and Martinez et al.[15], included two parts such as (i) concern about crime (9 items) and (ii) neighborhood crime problems (9 items). The responses of concern about crime ranged from "strongly disagree" to "strongly agree" (1-4) on a 4-point scale and possible

responses of neighborhood crime problems ranged from 1 (rarely/not worried) to 10 (frequency/very). The response scores were summed across all eighteen items (rang 18-126), with higher scores represented high perceived neighborhood crime (Cronbach alpha, 0.85), The stigma of addiction was assessed using a scale of addiction stigma for Thai population; developed by Kanato and Leyatikulm[16] which summed rating scale comprised 30 items with the 5 dimensions of familiarity, perceptions of dangerousness, fear, social distance and community responsiveness. The total scores were created by summary across all items (rang 16-120), with higher scores indicated a greater perceived stigma of addiction (Cronbach alpha, 0.81). The overall scores of perceived neighborhood crime and stigma of addiction were categorized into three groups (low, moderate, high) based on tertiles of its natural distribution.

The primary outcome of this study was illicit substance use. The respondents were asked whether or not they had used of 9 illicit substances in last 3 months including methamphetamine, cannabis, inhalants, heroin, cocaine, kratom (or *Mitragyna speciose*), ectasy, ketamine and opioid. We divided substance use into two categories; (i) methamphetamine use (MET-AMP), (ii) other illicit drugs use (OID).

Data Analysis: Descriptive statistics were applied to analyze all socio-ecological factors. Next, binary logistic regression was conducted to estimate strength of association between neighborhood-level variables, each of the covariates and MET-AMP use. A series of models was developed. First, in model 1 included only neighborhood-level variables. Then, in model 2, the individual-level variables were entered in model 1. Finally, in model 3, we add all individual-level and interpersonal-level variables into model 1 that examined the association between neighborhood-level variables and MET-AMP use after adjusted for all covariates. All of models, a reference group of outcome variable was OID. The statistical significant level was p-value< 0.05 and SPSS software was used to conduct of all statistical analyses.

Results

Almost all subjects (55.2%) were male and age average was 27.36 years old (standard deviation, 9.17 years). About half (51.9%) of drug addicts had completed primary school or lower, 53.3% were unemployed, 53.6% had monthly income less than 6000 Thai baht (200 US$) and had peer (61.8%) or family (56.0%) used drugs. Regarding substance used, the most frequently (65.4%) was MET-AMP and 34.6% was OID. Bivariate models, in both the moderate to high levels of perceived neighborhood crime and stigma of addiction were significantly associated with increased MET-AMP use. Respondents who were male, unemployed and those whose peer or family used drugs were more likely to use MET-AMP. Multivariate models, in model 1 revealed that a higher likelihood of MET-AMP use was related with moderate to high levels of both perceived neighborhood crime and stigma of addiction. In model 2, adjusted for individual-level covariates, the results showed similar associations of perceived neighborhood crime and stigma of addiction with MET-AMP as in model 1. Finally, in model 3, perceived neighborhood crime and stigma of addiction were remained significantly related with increased MET-AMP use after adjusted for all covariates. Its effects stronger among respondents who reported higher levels of both perceived neighborhood crime (aOR= 2.99, 95% CI: 1.64, 5.49) and stigma of addiction (aOR= 2.23, 95% CI: 1.23, 4.05). Also, male sex, unemployment and reporting drug use by peers and family appeared to increase MET-AMP use.

Discussion

The results showed that residents who indicated greater perceived neighborhood crime was associated with an increase of MET-AMP. This finding consistent with those of Shareck and Ellaway[10] and Looze et al.[17]. It possible that the disordered neighborhood environment such as high crime rates or perceived neighborhood crime and drug use and dealing as stressors in neighborhood [9]. Also, stress is one of the strongest predictors of drug using or relapse, residents who exposed to a greater of stressors in their neighborhood may use substances as a coping mechanism for stressful conditions [9,18]. One possibility is neighborhood surrounding with drug activity may be initiate drug abuse behaviors by increasing access to drugs, expanding drug user network and increasing likelihood of relapse[19]. Nevertheless, our findings inconsistent with those of Yabiku et al. [20] and Kepple and Freisthler[21] showed that neighborhood crime was no significantly related with substance use. These inconsistent may be difference in study population and neighborhood measurements. Regarding, stigma of addiction, the results indicated that living in higher perceived stigma of addiction neighborhoods was more likely to use MET-AMP. Consistent with findings of Tomori et al.[7] and Livingston et al.[11] reported that a

higher of substance use influenced by stigmatization and the illicit drug use is more highly stigmatized than other health conditions. The possible explanation is drug users were stigmatized and labeled in their neighborhoods that remained negative attitudes toward them as bad, weak, dangerousness and unreliable, which contributes to negative effects such as social alienation, delayed recovery and risk of substance use [7,22]. Moreover, people who experienced stigma may be continue or increase their used of drugs for coping with stigma or turned to their peer who use drugs for social support, because of they had similar experiences and better understand what they were on going through, which increases the likelihood of drug use as well [22]. Covariates such as male, unemployed, peer and family substance use were related to MET-AMP. This result consistent with those of Galea et al. [23] and Henkel [24] showed that male had higher rates of substance use. It is possible that male greater exposure to opportunities to try drugs, which probability to progress to actual use [25]. Moreover, unemployed persons were more likely to use drug, because of the increasing of distress and psychosocial problems related with losing jobs. They may be more likely to use drugs in response to cope with these problems [24]. In addition, peers and family influences on substance use; in particular, peer network affect substance use behavior through promote and share drug use, share social network norms towards substance use and acceptance of drug use [23,26]. Furthermore, previous studies showed that addictive behaviors higher among the families with members using substances [23,27]; specifically, parent's substance abuse habit that might be negative modeling behavior and members may be learning the substance use as a usual family pattern [27].

The limitation, our cross-sectional study used acting for causality or temporal relationships cannot be inferred from our findings. The subjects were recruited from 2 CDDCs in only Northern of Thailand. Thus, the results cannot be generalized. Although with limitations, this study has strength of controlling for a wide range of covariates and provides better understanding of negative neighborhood factors influence on drugs use among hard-to-reach groups. Future longitudinal research is need to evaluate the potential causal link between neighborhood factors and substance use and should be recruit samples from multi-center for representative of drug abuse population.

Conclusion

In conclusion, this study provided that neighborhood environment factors were associated with MET-AMP use. The understanding these neighborhood contexts and how they influence of illicit drug use is important to establishing prevention and intervention to reduce substance use.

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Ethical Clearance: This ethical study was approved by the Research Ethics Boards of Khon Kaen University and the Princess Mother National Institute on Drug Abuse Treatment (ref no. HE581318).

Conflicts of Interests: The authors have no conflicts of interest associated with the material presented in this paper.

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References

1. United Nations Office on Drugs and Crime (UNODC). (2018). World drug report 2018 [cited 2018 Jan 3]. Available from: https://www.unodc.org/wdr2018/.
2. Macdonald V, Nacapew S. Drug control and harm reduction in Thailand; 2013 [cited 2016 Oct 5]. Available from: http://fileserver.idpc.net/library/IDPC-briefing-paper-Thailand- drug-policy-THAI.pdf (Thai).
3. Department of Probation. Statistics of drug offenders in Thailand; 2016 [cited 2016 Oct 10]. Available from: http://164.115.41.115/doc_dop/ (Thai).
4. Thomson N. Detention as treatment: detention of methamphetamine users in Cambodia, Laos and Thailand; 2010 [cited 2019 Oct 25]. Available from: https://www.issuelab.org/resources/7094/7094.pdf
5. Csete J, Kaplan K, Hayashi K, Fairbairn N, Suwannawong P, Zhang R, et al. Compulsory drug detention center experiences among a community-based sample of injection drug users in Bangkok, Thailand. BMC Int Health Hum Rights 2011; 11:12.
6. Rogers JD, Ramaswamy M, Cheng CI, Richter

K, Kelly PJ. Perceptions of neighborhood social environment and drug dependence among incarcerated women and men: a cross- sectional analysis. Subst Abuse Treat Prev Policy 2012; 7(1):39.

7. Tomori C, Go VF, Tuan le N, Huong NM, Binh NT, Zelaya CE, et al. "In their perception we are addicts": social vulnerabilities and sources of support for men released from drug treatment centers in Vietnam. Int J Drug Policy 2014; 25(5):897-904.
8. Hayes-Smith J, Whaley RB. Community characteristics and methamphetamine use: A social disorganization perspective. Journal of Drug Issue 2009; 39(3): 547-576.
9. Boardman JD, Finch BK, Ellison CG, Williams DR, Jackson JS. Neighborhood disadvantage, stress and drug use among adults. J Health Soc Behav 2001; 42(2):151-165.
10. Shareck M, Ellaway A. Neighbourhood crime and smoking: the role of objective and perceived crime measures. BMC Public Health 2011; 11:930.
11. Livingston JD, Milne T, Fang ML, Amari E. The effectiveness of interventions for reducing stigma related to substance use disorders: a systematic review. Addiction 2012; 107(1):39-50.
12. Kunarak K. (2012). The development of a recidivism prevention on drug users model: a case study of the juvenile observation and protection department, [dissertation]. Bangkok: Silpakorn University; 2012 (Thai).
13. Bronfenbrenner U. Ecological models of human development. Int Encycl Educ 1994; 3(2): 1643-47.
14. Rosenberg D, Ding D, Sallis JF, Kerr J, Norman GJ, Durant N, et al. Neighborhood Environment Walkability Scale for Youth (NEWS-Y): reliability and relationship with physical activity. Prev Med 2009; 49(2-3):213-8.
15. Martinez SM, Blanco E, Delva J, Burrows R, Reyes M, Lozoff B, et al. Perception of neighborhood crime and drugs increases cardiometabolic risk in Chilean adolescents. J Adolesc Health 2014; 54(6):718-23.
16. Kanato M, Leyatikul P. Thai addiction stigma scale. Community Health Dev2014; 2(2):1-18 (Thai).
17. Looze M, Janssen I, Elgar FJ, Craig W, Pickett W. Neighborhood crime and adolescent cannabis use in Canadian adolescents. Drug Alcohol Depend 2015; 146:68-74.
18. Hassanbeigi A, Askari J, Hassanbeigi D, Pourmovahed Z. The relationship between stress and addiction. Procedia - Social and Behavioral Sciences 2013; 84:1333-40.
19. Theall KP, Sterk CE, Elifson KW. Perceived neighborhood fear and drug use among young adults. Am J Health Behav 2009; 33(4):353-65.
20. Yabiku ST, Dixon Rayle A, Okamoto SK, Marsiglia FF, Kulis S. The effect of neighborhood context on the drug use of American Indian youth of the Southwest. J Ethn Subst Abuse 2007; 6(2):181-204.
21. Kepple NJ, Freisthler B. Exploring the ecological association between crime and medical marijuana dispensaries. J Stud Alcohol Drugs 2012; 73(4):523-30.
22. Lee N, Boeri M. Managing stigma: women drug users and recovery services. Fusio 2017; 1(2):65-94.
23. Galea S, Nandi A, Vlahov D. The social epidemiology of substance use. Epidemiol Rev 2004; 26(1):36-52.
24. Henkel D. Unemployment and substance use: a review of the literature (1990-2010). Curr Drug Abuse Rev 2011; 4(1):4-27.
25. Van Etten ML, Neumark YD, Anthony JC. Male-female differences in the earliest stages
26. Jorge KO, Ferreira RC, Ferreira EFE, Kawachi I, Zarzar PM, Pordeus IA. Peer group influence and illicit drug use among adolescent students in Brazil: a cross-sectional study. Cad Saude Publica 2018; 34(3):1-14.
27. Matthew KJ, Regmi B, Lama LD. Role of Family in Addictive Disorders. International Journal of Psychosocial Rehabilitation 2018; 22(1):65-75.

Medication Adherence in Patients of Diabetes Mellitus Type 2: Status of Depression and Working Status

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Abstract

The development of the era into this modern era, people's lifestyles are now shifting towards the less good, causing more consumptive people and lead unhealthy lives. This triggers the emergence of non-communicable diseases in Indonesia, one of which is Diabetes. Most Diabetes patients will obey and follow the advice and advice of doctors when they feel unwell and if they feel they are in good condition will tend to be disobedient. The method used in this research is analytic observational with cross sectional design. The sample in this study amounted to 76 respondents taken by accidental sampling technique. The study was conducted at the Mojo Public Health Center in Surabaya by giving respondents questionnaires. The analysis used in this study is descriptive and count of prevalence ratio. The results showed that there was a relationship between work and medication adherence($p = 0.009$), age ($p = 0.368$), sex ($p = 0.518$), education (0.560), knowledge ($p = 0.619$), duration of illness ($p=0.513$) and the tendency for depression (0.326). Tendency of depression indicates no relationship with medication adherence. The conclusion of this study is that there is a relationship between work and medication adherence. Patients with diabetes who do work have risk of being disobedient to treatment than patients who no work. Although depression and adherence to treatment did not show a meaningful relationship, but the results of the study showed that most of the medication adherence groups were depression

Keywords: *Depression, Medication adherence, Working Status, Diabetes Mellitus Type 2.*

Introduction

The development of the era into this modern era, people's lifestyles are now shifting towards the less good. Society is increasingly consumptive and many individuals lead unhealthy lives. These things trigger the emergence of non communicable diseases in Indonesia, even though the problem of infectious diseases has not yet been resolved. One of the non communicable diseases whose prevalence is increasing every year is diabetes.

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Diabetes prevalence in Indonesia in 2019 was 6.7%. Nearly 79% of adults with diabetes were living in low- and middle- income countries [(1)]. Diabetes is a major cause of blindness, kidney failure, heart attacks, stroke and lower limb amputations [(2)].

Most diabetes patients will obey and follow the advice and advice from health workers when they are hospitalized or in hospital. When they are at home and carry out their routine as usual, they tend to return to their previous lifestyle, forget their previous physical condition, feel healthy so they don't get routine medical treatment, so the pain can recur even worse[(3-5)]. Adherence to treatment can be influenced by several factors, including age, sex, level of education, type of work, duration of illness and depression experienced.

Material and Method

This research is an analytic observational research using cross sectional research design. The study uses

secondary data in the form of data on the visit of Diabetes Mellitus 2 patients who seek treatment at Mojo Puskesmas Surabaya and primary data in the form of a Beck Depression Inventory (BDI) given to respondents. The population in this study were all type 2 Diabetes Mellitus patients in Surabaya Mojo Health Center. The sample used is part of the population, which is 76 respondents. The way to take sample in this research is accidental sampling. Variables are analyzed descriptively and analytically using a prevalence ratio.

Result and Discussion

Compliance with respondent's medication adherence can be seen from the routine of whether the respondent visits a health facility. It is said routinely if the respondent visits a health facility at least once a month. The age of most respondents is the elderly is 47 respondents (61.8%). Awodele's research shows that most respondents are 61-70 years old [(6)].The sex of most respondents is the female. Patients with female sex tend to be more obedient compared to male sex [(7)]. The education level of the most respondents was the level of higher education of 40 respondents (52.6%). The level of knowledge of most respondents is good category with 42 respondents (55.3%). Most respondents were in the category of not working with 57 respondents (75.0%).

Result of this research known that the most respondents was adherence (90.8%). Adherence to treatment can be influenced by the side effects of drugs such as lactic acidosis, nausea[(8)].The duration of illness for most respondents was in the category ≥ 5 years with 48 respondents (63.2%). Most respondents' tendency of depression is non-depression category (94.7%).

Respondents who were the most compliant to seek treatment were the adult 3 (100%). Medication adherence of diabetics is the same between men and women. The level of education that is routinely treated most is middle level. Medication adherence from respondents is the same between poor and good knowledge. Respondents who did not work had more compliance with treatment. Respondents who are not depressed have more compliance with treatment. The results showed the incidence of depression in the group that did not routinely seek treatment more than depression in the group that routinely treated. Salinero-Fort dan Madkhali dalam penelitiannya menyatakan bahwa depresi merupakan hal yang sangat umum ditemui di pasien DM tipe 2 sehingga penting untuk mendeteksi depresi pada pasien tersebut dan diperlukan penerapan dari manajemen diri DM untuk menjadi komponen rutin perawatan DM [(9-10)]. Gemeay in his study stated that of 37.9% of research respondents who were diagnosed with type 2 DM experiencing depression and most of the respondents did not comply with glucose checks and diet compliance[(11)].

Table 1: Health Characteristics of Respondents

Health Caracteristic	Frequency (n)	Precentage (%)
Duration of illness		
< 5 year	28	36,8
≥ 5 year	48	63,2
Total	76	100,0
Depression		
Depression	4	5,3
No Depression	72	94,7
Total	76	100,0
Medication adherence		
Noadherence	7	9,2
Adherence	69	90,8
Total	**76**	**100,0**

Table 2: Risk Factors Affecting Medication Adherence

Risk Factor	Non -Adherence n (%)	Adherence n (%)	Total n (%)	P value
Age				
Adult	0 (0,0)	3 (100,0)	3 (100,0)	0,368
Elderly	5 (10,6)	42 (89,4)	47 (100,0)	
Old	2 (7,7)	24 (92,3)	26 (100,0)	
Gender				
Male	2 (7,4)	25 (92,6)	27 (100,0)	0,518
Female	5 (10,2)	44 (89,8)	49 (100,0)	

Risk Factor	Non -Adherence n (%)	Adherence n (%)	Total n (%)	P value
Level of education				
Middle	3 (8,3)	33 (91,7)	36 (100,0)	0,560
High	4 (10,0)	36 (90,0)	40 (100,0)	
Level of knowledge				
Poor	3 (8,8)	31 (91,2)	34 (100,0)	0,619
Good	4 (9,5)	38 (90,5)	42 (100,0)	
Type of work				
No work	2 (3,5)	55 (96,5)	57 (100,0)	0,009
Work	5 (26,3)	14 (73,7)	19 (100,0)	
Duration of illness				
< 5 year	3 (10,7)	25 (89,3)	28 (100,0)	0,513
≥ 5 year	4 (8,3)	44 (91,7)	48 (100,0)	
Depression				
Depression	1 (25,0)	3 (75,0)	4 (100,0)	0,326
No Depression	6 (8,3)	66 (91,7)	72 (100,0)	

The results of the statistical analysis that showed significantly correlated were working status (p = 0.009) with medication adherence, while those not related were age (p = 0.368); gender (p = 0.518); education level (p = 0.56); level of knowledge (p = 0.619); duration of illness (p = 0.513); depression (p = 0.326) in type 2 diabetes patients.

The results of the analysis of age distribution according to adherence to type 2 DM treatment showed that the age category that was not routinely treated was the elderly age category and the age category that most routinely treated was adults. The relationship test results obtained results that there is no relationship between age and compliance with treatment in patients with type 2 DM. Bezie stated that younger ages tend to be disobedient compared to older ages [12] . This is supported by Zhang, stating that there is no relationship between age and adherence to type 2 DM patients with p value of 0.274 [13].

In the group of men and women mostly adhered to treatment. The results showed that there was no relationship between sex and medication adherence (p = 0.518).The results of Alsous's research show that there is a relationship between female gender and medication adherence [14]. This contrasts with Srikartika, who in his research said that there was a relationship between sex with adherence to DM type 2 patients with a p value of 0.011 [13].

In research that has been done shows that the most non-routine treatment is the work category while the most routine treatment group is the non-working category. The test results of the relationship between work with medication adherence obtained results that there is a relationship between work with medication adherence in patients with type 2 diabetes. In the Zhang research stated that there is relationship between the type of work with adherence to treatment of patients with type 2 diabetes with a p value of 0.001 [15].

In the research that has been done, it is known that group of higher education category show not routinely seek treatment while group of middle education level were routinely treated. The results of the test of the relationship between education and treatment adherence showed that there was no relationship between education with medication adherence in patients with type 2 diabetes. Bagonza stated that health education can also increase compliance in treatment[16].

Both people with poor and good levels of knowledge are mostly obedient to treatment. The results of this study stated that there was no relationship with medication adherence. This is different from the results of the National Health Research which states that there is an influence of knowledge on medication compliance [17]. Knowledge is very important for adherence because by having good knowledge patients can take care of themselves [18].In the research that has

been done shows that in the group that is not routinely the duration of illness is the long duration of illness duration <5 years while in the group that is routinely treated for the duration of illness duration ≥ 5 years. The results of the analysis test between the duration of illness and respondent compliance showed that there was no relationship between the duration of illness with adherence to treatment in patients with type 2 diabetes. Guénette states that patients with illness duration of more than one year are less likely to be obedient compared to patients who have just been diagnosed [19]. Elsous in his study stated that the long duration of illness was also a predictor of medication adherence. The results did not show statistical significance between long duration of illness and medication adherence with a value of p> 0.05 [14-15].

The results of the statistical analysis that showed significantly correlated between depression and medicatication adherence (p = 0.326) in type 2 diabetes patients. This is not in line with Gonzales research which states that depression is significantly associated with non-compliance with diabetes treatment [20]. The results showed depression was not related to medication adherence. This happens because the respondent is a Diabetes Mellitus patient who has not experienced complications.

Conclusion

Job status which is significantly related to medication adherence in patients with type 2 Diabetes Mellitus. There is a relationship between the tendency of depression with adherence to treatment in patients with type 2 Diabetes Mellitus in Surabaya Health Center because patients in health centers tend to have no other disease complications compared to patients in hospitals that tend to be high in patients who have other disease complications. It is recommended that the puskesmas establish a program of routine visits to Diabetes Mellitus patients at least once a month so that these patients can avoid complications of other diseases.

Conflict of Interest: In carrying out this research, researcher do not have conflict of interest with research informants and between participants

Source of Funding: This research was conducted with self funds

Ethical Clearance: This research was conducted on the awareness of respondents as volunteers in filling out the quistionaire. Before the study, respondents were given an explanation and signe informed consent.

References

1. IDF. 2019 [cited 2020Jan17] . Available from : https://idf.org/our-network/regions-members/western-pacific/members/104-indonesia.html
2. WHO. 2019 [cited 2020Jan17]. Diabetes. Available at: https://www.who.int/news-room/fact-sheets/detail/diabetes (Accessed: 17 January 2020).
3. Joseph N, Unnikrishnan B, Babu RYP, Kotian MS, Nelliyanii M. Proportion of Depression and Its Determinants Among Type 2 Diabetes Mellitus Patients In Various Tertiary Care Hospitals In Mangalore City of South India. Indian Journal of Endocrinology and Metabolism. 2013 Jul [cited 2019 December 29];17(4): 681-8. Available from: file:///D:/Artikel/5.%20Skripsi%20Retno%20W/12.%20joseph.epub. doi: 10.4103/2230-8210.113761.
4. Rezaei M, Valiee S, Tahan M, Ebtekar F, Gheshlagh RG. Barriers of Medication Adherence In Patients With Type-2 Diabetes: A Pilot Qualitative Study. Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy. 2019 May 1[cited 2019 December 29]; 12: 589–99. doi: 10.2147/DMSO.S197159
5. Jin J, Sklar GE, Oh VMS, Li SC. Factors Affecting Therapeutic Compliance: A Review From The Patient's Perspective. Therapeutics and Clinical Risk Management. 2008 Feb [cited 2019 December 29]; 4(1): 269–86. doi: 10.2147/tcrm.s1458
6. Awodele O, Osulale JA. Medication adherence in type 3 diabetes patients: study of patients in Alimosho General Hospital, Igamdo, lagos, Nigeria. African Health Sciences. 2015 Jun [cited 2019 Nov 30]; 15(2): 513-22. doi: 10.4314/ahs.v15i2.26.
7. Rao CR, Kamath VG, Shetty A, Kamath A. Treatment Compliance Among Patients With Hypertension And Type 2 Diabetes Mellitus In A Coastal Population of Southern India. International Journal of Preventive Medicine. Isfahan University of Medical Sciences (IUMS).2014 Aug [cited 2019 December 29]; 5(8): 992–8.
8. Triplitt C. Drug Interactions of Medications Commonly Used in Diabetes. Diabetes Spectrum 2006 Oct.[cited 2019 December 28]; 19 (4): 202-

11. DOI: 10.2337/diaspec.19.4.202.

9. Madkhali JM, Hakami AA, Dallak AH, Hakami RM, Yatimi AA, Hamdi ME, Bakkari HA, Kariri KI, Abbiri JM, Ahmed AE, Mashi AH. Prevalence and Associated Factors of Depression among Patients with Diabetes at Jazan Province, Saudi Arabia: A Cross-Sectional Study. Psychiatry Journal.2019 Jan 6 [cited 2019 December 29]; Article ID 6160927: 1–6. doi: 10.1155/2019/6160927.
10. Salinero-Fort MA, Gomez-Campelo P, Andres-Rebollo FJS, Cardenas-Valladolid J, Abanandes-Herranz JC, Pau ECDS, Chico-Moraleja RM, Beamud-Victoria D, Miguel-Yanes JMD, Jimenez-Grazia R, Lopez-de-Andreas A, Ramallo-Farina Y, Bburgos-Lunar C. Prevalence of Depression In Patients With Type 2 Diabetes Mellitus In Spain (The DIADEMA Study) : Results From The MADIABETES Cohort. BMJ Open. BMJ Publishing Group. 2018 Sep 4 [cited 2019 December 29]; 8,e020768. doi: 10.1136/ bmjopen-2017-020768.
11. Gemeay EM, Moawed SA, Mansour EA, Ebrahiem NE, Moussa IM, Nadrah WO. The association between diabetes and depression. Saudi Medical Journal. 2015 Oct [cited 2019 December 28]; 36(10): 1210–15. DOI: 10.15537/smj.2015.10.11944.
12. BezieY, Molina M, Hernandez N, Batista R, Niang S, Huel D. Therapeutic Compliance: A Prospective Analysis of Various Factors Involved in The Adherence Rate In Type 2 Diabetes. Diabetes and Metabolism. Elsevier Masson SAS. 2006 Dec [cited 2019 December 28]; 32(6): 611–6. doi: 10.1016/ S1262-3636(07)70316-6.
13. Zuberi SI, Syed EU, Bhatti JA. Association of Depression With Treatment Outcomes In Type 2 Diabetes Mellitus: A Cross-Sectional Study From Karachi, Pakistan. BMC Psychiatry, 2011Feb 15 [cited 2019 December 29];11(27): . doi: 10.1186/1471-244X/11/27.
14. Elsous A, Radwan M, Al-Sharif H, Abu Mustafa A. Medications Adherence and Associated Factors among Patientswith Type 2 Diabetes Melitus in the gaza Strip, Palestine. Frontiers in Endocrinology. 2017 Jun 9 [cited 2019 Nov 11]; 8 (100): 1-9. DOI: 10.3389/fendo.2017.00100.
15. Zhang Y, Li X, Mao L, Li K, Zheng Y, Cui W, Yin H, He Y, Jing M. Factors affecting medication adheence in community-managed patients with hypertension based on the principal component analysis: evidence from Xinjiang, China. Patient Prefer Adherece. 2018 May 11 [cited 2019 December 29]; 12: 803-12. DOI: 10.2147/PPA. S158662
16. Bagonza J, Rutebemberwa E, Bazeyo W. (2015). Adherence To Anti Diabetic Medication Among Patients With Diabetes In Eastern Uganda; A Cross Sectional Study. BMC Health Services Research. 2015 Apr 19 [cited 2019 December 29]; 15(168) : 1–7. doi: 10.1186/s12913-015-0820-5.
17. Kyngas HA, Kroll T, Duffy ME. Compliance in Adolescents With Chronic Diseases: A Review. Journal of Adolescent Health.2000 Jun [cited 2019 Nov 11];26 (6): .379-88.
18. Santhanakrishnan I, Lakshminarayanan S, Kar SS. Factors Affecting Compliance To Management of Diabetes In Urban Health Center of A Tertiary Care Teaching Hospital of South India. Journal of Natural Science, Biology and Medicine. Medknow Publications, 2014 Jul [cited 2019 December 29];5(2): 365–68. doi: 10.4103/0976-9668.136186.
19. Guénette L, Moisan J, Breton MC, Sirois C, Gregoire JP. Difficulty Adhering To Antidiabetic Treatment: Factors Associated With Persistence And Compliance. Diabetes and Metabolism. 2013 May [cited 2019 December 29]; 39(3) : 250–57. doi: 10.1016/j.diabet.2012.12.005.
20. Gonzalez JS, Peyrot M, McCarl LA, Collins EM, Serpa L, Mimiaga MJ, Safren SA. Depression and Diabetes Treatment Nonadherence: A Meta-Analysis. Diabetes Care. 2008 Dec.[cited 2019 December 28]; 31(12) : 2398–2403.DOI: 10.2337/ dc08-1341.

Potential Hazards of Antibiotics Resistance On Escherichia Coli Isolated From Cloacal Swab In Several Layer Poultry Farms, Blitar, Indonesia

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Abstract

Objective: The study was isolated Escherichia coli from cloacalswab of layer poultry farms in Blitar area to investigate their antibiotic sensitivity pattern.

Materials and Method: Fourty swab cloacal samples were collected from 8 farms where located in Blitar for 3 months. In order for MacConkey agar to be a medium for inoculation and biochemical tests to identify isolates such as IMViC and TSIA test were performed. The method of antibiotic sensitivity pattern of Escherichia coli was tested by disk diffusion.

Results: The result revealed40 samples, 34 samples were exposed to contaminationbyE.coli. The pattern of antibiotic sensitivity showed high resistance against ampicillin (62%), ciprofloxacin (56%), tetracycline and trimethrophim sulfamethoxazole (53%). Sensitive antibiotics were also observed for amoxicillin clavulanic acid, cefepime, ampicillin sulbactam, amikacin and meropenem. The presence of MDR and ESBL-producing *Escherichia coli* isolated from cloacal swabs of layer poultry farms in Blitar were 47.1% (16/34) and 5.9% (2/34), respectively.

Conclusion: This research to find out exposed the layer poultry farms to consider critical antibiotic resistance of E. coli and regarded potential public health hazards.

Keywords: *Layer poultry farms, Escherichia coli, public health hazards, MDR, ESBL.*

Introduction

Antibiotic resistance is major global health in worldwide especially in poultry, such as treatment failure economic losses and source of resistant organism that may represent a risk to human health. Antimicrobial usage in animal production raised with intensive conditions using large amount of antimicrobial to prevent and treat disease(1). Enterobacteria especially Escherichia coli is the pathogenic bacteria who receive antibiotic treatment in the gastrointestinal tract of animals and humans into the environment which not only devolvement of the bacterial but antimicrobial affect more than one antibiotic and become multi drug resistance(2). Antimicrobials are commonly used in animals which human consume the animalsproduct and antimicrobial resistance can controlled by reduce antibiotics use for animals, overuse of antibiotic and residues can lead to more drug resistance among microbe(3).

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Escherichia coli is a Gram-negative bacterium commonly found in animal and human intestinal tract. Exposure of antibiotic use in animals to inhibit microbial can cause resistance to antibiotics, antibiotics resistance appearance of Escherichia coli in poultry is main purpose to reduce transmission of resistance in the region. Observation ofantibiotics resistance especially investigate the resistance appearance of microba commonly found in poultry. The bacteria commonly detected in the environment so that it can enter the digestive tract of animals is Escherichia coli[4].

Antibiotics resistance is caused by a factor already arise on the bacteria. E. coli bacteria which genes that preserve to imunity from the influence of antibiotics derived from the plasmid. E. coli was detected possess plasmids to some drug resistance genes [5]. Plasmids can carrying the resistance genes in bacteria sensitive to antibiotics [6]. This study usedsome antibiotics that were often associated with data about the problem of resistance in E. coli and then the antibiotic sensitivity test to determine the profile antibiotics resistance of E. coli. The purpose of this study were also to exhibit occurence of multidrug resistant (MDR) of E. coli and extended spectrum beta-lactamase (ESBL) producing E. coli from layer poultry farms.

Materials and Method

Isolation and Identification of E. coli: The study collected 40 samples and taken from 8 layer poultry farms in Blitar, East Java, shown on table 1. Purposive sampling of layer farm was based on some specification such as low sanitation, lack of cleanliness and proper hygiene management by the farm and low maintenance [7]. Samples obtained from cloacal swab brought to the laboratory in Amies medium transport wrapped sterile conditions and were taken using a cool-box[8]. Samples were inoculated streaked onto MacConkey media agar and incubated at 37 ° C for 18 ± 24 hours [9]. Colonies that showed lactose-fermenting was purified and continued positive presumptive test of E. coli. Identification of bacteria were performed using morphological and biochemistry. Biochemical tests include tests Indole, Methyl Red, Vagos-Pasteur, Simon Citrate (IMViC) and TSIA to determine the level of genus and continued until the sugar fermentation test to determine the species of E. coli[10].

Antibiotic Sensitivity Test: Antibiotic sensitivity testing was done using Kirby-Bauer disc diffusion assay on medium Mueller-Hilton agar[11,12]. Antibiotics and concentration used was ampicillin (10 µg), chloramphenicol (30 µg), gentamicin (10 µg), ciprofloxacin (10 µg), trimethoprim-sulfamethoxazole (25 µg), ceftazidime (30 µg), amoxicillin clavulanic acid (30 µg), cefepime (30 µg), ampicillin sulbactam (20 µg), cephazolin (30 µg), amikacin (30), tetracycline (30 µg), levofloxacin (5 µg) and meropenem (10 µg). Interpretation of the antibiotic resistance use the recommendation of the Clinical and Laboratory Standards Institute was through measurement of inhibitory zone diameter formed in study [13].

Confirmation ESBL using Double Disc Synergy Test (DDST): Test for ESBL in E. coli by used disk antibiotic CAZ/Ceftazidime 30µg, AMC/Amoxicillin Clavulanic Acid 30µg, CTX/Cefotaxime 30µg, ATM/ Aztreonam 30µg and inoculation on Muller-Hinton agar plate, shown on figure 2. The result showed measuring inhibition of the diameter inhibitory zone formed on Clinical and Laboratory Standards Institutions [13].

Results and Discussion

In this study, a total of 40 cloacal swab samples were collected from chickens in layer poultry farms in Blitar and screened for the presence of multidrug resistant (MDR) and Extended Spectrum Beta-lactamase (ESBL)-producing E. coli, shown on table 2. Total prevalence of 47.1% of E. coli was obtained with the MDR casesand ESBL cases was 5.9%inlayer chicken, shown on table 3. This agrees with the findings of Kwoji et al. where a similar occurrence of E. coli from chickens was also reported[14].

This study used fourteen antibiotics against Escherichia coli, the results of antibiotic sensitivity test of Escherichia coli showed that the antibiotic ampicillin occurrence of resistance higher at (62%), ciprofloxacin (56%), tetracycline and trimethrophim sulfamethoxazole (53%), levofloxacin (35%), gentamycin (18%), ceftazidime and cefepime (6%) cephazolin and chloramphenicol (3%) but in this study Escherichia coli sensitive to the antibiotic amoxicillin clavulanic acid, ampicillin sulbactam, amikacin and meropenem, shown on table 2 and figure 1. Sensitivity of microbes to antibiotic can resistant depend on commonly used of antibiotics [15]. These results are ampicillin which the highest of antibiotic resistance against Escherichia coli[16].

Table 1. Location of samples, sample size, results of isolation of E. coli and results of MDR and ESBL cases.

Location	Number of samples	PositiveE.coli	Positive MDR	Positive ESBL by DDST
Farm 1	5	4	0	0
Farm 2	5	4	2	0
Farm 3	5	5	3	0
Farm 4	5	5	5	0
Farm 5	5	4	1	0
Farm 6	5	4	1	1
Farm 7	5	4	2	1
Farm 8	5	4	2	0
Total	40	34	16	2

Table 2. Antibiotic susceptibility profiles of 34 E. coli from cloacal swabs of layer poultry farms in Blitar.

Antibiotic	Resistant (%)	Intermediate (%)	Sensitive (%)
Ceftazidime (CAZ)	2 (6%)	0	32 (94%)
Amoxicillin Clavulanic Acid (AMC)	0	0	34 (100%)
Cefepime (FEP)	2(6%)	0	32 (94%)
Ampicillin Sulbactam (SAM)	0	0	34 (100%)
Cephazolin (KZ)	1(3%)	0	33 (97%)
Gentamycin (GN)	6(18%)	0	28 (82%)
Amikacin (AK)	0	0	34 (100%)
Tetracycline (TE)	18(53%)	5(15%)	11 (32%)
Ciprofloxacin (CIP)	19 (56%)	3(9%)	12 (35%)
Levofloxacin (LEV)	12 (35%)	6(18%)	16 (47%)
Meropenem (MEM)	0	0	34 (100%)
Chloramphenicol (C)	1(3%)	0	33 (97%)
Trimethrophim-sulfamethoxazole (SXT)	18(53%)	0	16 (47%)
Ampicillin (AMP)	21 (62%)	0	13 (38%)

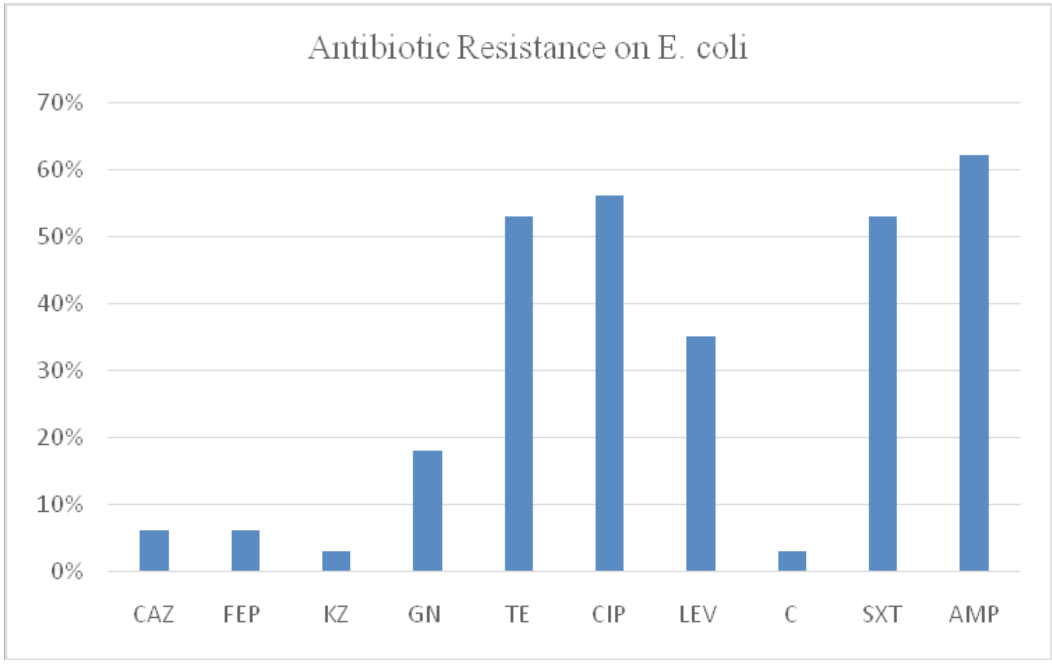

Figure 1. Percentage of antibiotic resistance on E. coli

Multidrug resistant (MDR) as an organism that is resistant to three or more antimicrobial classes [17]. One method that is often used by various researchers to characterize organisms as MDR is based on in vitro antimicrobial susceptibility test results, when researchers tested resistance to multiple antimicrobial agents, classes or subclasses of antimicrobial agent[18]. The most commonly used definitions for Gram-positive[19] and Gram-negative bacteria that are resistant to three or moreantimicrobial class [20]. An overview of this variability of definitions is given in a comprehensive review of MDR [21], which is used as a reference by some researchers that a large number of studies do not propose specific definitions for MDR.

There were 16 multidrug resistant (MDR) and 2 extended spectrum beta lactams (ESBL) in this study, shown on table 3.The consume of antibiotics raised antibiotics resistance contain important MDR organisms in poultry. These MDR organisms can transmission to the human through direct contact or consumption and *E. coli* is the most caused high economic losses and food contamination rates which obtained antibiotic-resistant genes with the potential to spread to other populations. The abundant use of antibiotics in poultry farms has been associated with treatment failure and the development of antibiotic resistance itself. A study showed that *E. coli* from poultry in China were resistant to at least 18 different antibiotics [22].

Table 3. Cases of MDR and ESBL of E. coli from cloacall swabs of Layer poultry

Sample Code	Phenotipe Resistance	Type of Resistance
L2A	TE, CIP, SXT	MDR
L2B	CIP, LEV, SXT	MDR
L3A	CIP, LEV, SXT	MDR
L3D	TE, SXT, AMP	MDR
L3E	TE, SXT, AMP	MDR
L4C	TE, CIP, SXT	MDR
L7E	TE, CIP, AMP\	MDR
L8B	TE, SXT, AMP	MDR
L8C	TE, CIP, LEV	MDR
L5C	TE, CIP, SXT, AMP	MDR
L7B	TE, CIP, LEV, AMP	MDR
L4B	GN, CIP, LEV, SXT, AMP	MDR
L4D	GN, CIP, LEV, SXT, AMP	MDR
L4E	GN, CIP, LEV, SXT, AMP	MDR
L6B	TE, CIP, LEV, SXT, AMP	MDR
L4A	GN, CIP, LEV, C, SXT, AMP	MDR
L6A	CAZ, FEP, GN, TE, CIP, LEV, AMP	ESBL
L7D	CAZ, FEP, KZ, GN, TE, CIP, LEV, SXT, AMP	ESBL

In our research findings, 100% of ESBL-producing isolates showed multi-drug resistance to various families of antibiotics. This finding correlates with other studies in other countries such as Switzerland[23], Zambia[24] and in Turkey[25] almost all ESBL-producing E. coli isolates found in animals are multi-resistant.

The nature of multidrug resistance of these isolates may be explained by the fact that ESBL is mediated by plasmids carrying multiresistant genes by plasmids, transposons and integrons and also they are ready to be transferred to other bacteria, not necessarily same species. Bacteria with various resistance to antibiotics are widely distributed in animals and the environment[14]. The facts supported by recent surveys from China[22], Thailand[26] and Indonesia[27], have illustrated an alarming trend related to resistance among ESBL-producing organisms isolated from animals and the environment. Our results support the fact that ESBL producers provide a high level of resistance to not only third generation cephalosporins but also other non beta-lactam antibiotics groups, shown on table 3.

This study also revealed that all ESBL producers

and almost isolates that MDR showed resistance to ampicillin. In contrast, better susceptibility was observed to amikacin and no resistance was observed with meropenem. Better susceptibility to amikacin and meopenem were also noted and can be explained by the absence of routine use of amikacin as empirical therapy on poultry farms and the absence of sufficient cross resistance with the beta-lactam antibiotic group.

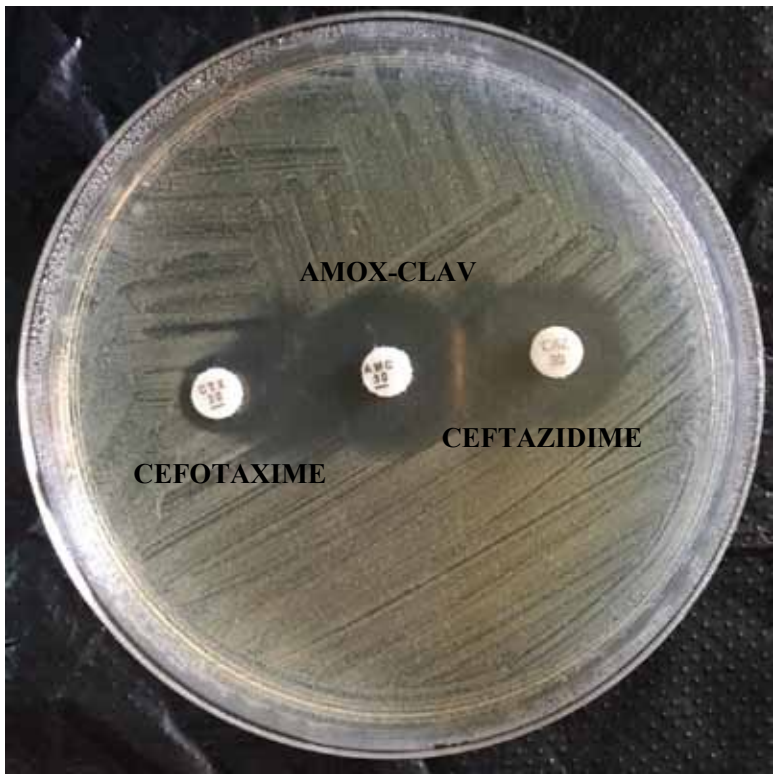

Figure 2. Confirmation of ESBL by Double Disc Synergy Test (DDST)

Conclusion

The high percentage of drug resistance in E. coli isolates were detected ampicillin, ciprofloxacin, tetracycline and trimethrophim sulfamethoxazole more than 50%. The number of MDR of E. coli isolates was significantly higher in healthy poultry, namely 16 isolates and found also 2 ESBL producing E. coli isolates. This general description of the antimicrobial resistance of these poultry bacteria creates the basis for future investigations and analyzes of resistance development in Blitar, East Java, Indonesia. In view of this, we strongly recommend assessing treatment plans in the poultry industry in Blitar to ensure prudent antimicrobial use and to minimize the potential for the spread of resistant bacteria from poultry to the environment and humans.

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Ethical Clearance: Cloacal swabs were used in this study, hence ethical clearance was not necessary. Cloacal swab samples were collected from Blitar area in East Java province, Indonesia.

Conflict of Interest: Nil.

References

1. World Health Organization. Antimicrobial Resistance: Global Report on Surveillance. World Health Organization. France. 2014.
2. Woolhouse M, Ward M, van Bunnik B, Farrar J.

Antimicrobial resistance in humans, livestock and the wider environment. Phil. Trans. R. Soc. B.2015;370: 20140083.

3. Lee, C.R., Cho, I.H., Jeong, B.C., Lee, S.H. Strategies to minimize antibiotic resistance. Int J Environ Res Public Health. 2013;12(Sep):10(9):4274-305. doi: 10.3390/ijerph10094274. PubMed PMID: 24036486; PubMed Central PMCID: PMC3799537.
4. Hussain HI, Iqbal Z, Seleem MN, Huang D, Sattar A, Hao H, Yuan Z. (2017). Virulence and transcriptome profile of multidrug-resistant Escherichia coli from chicken. Sci Rep. 21;7(1):8335. doi: 10.1038/s41598-017-07798-1. PubMed PMID: 28827616; PubMed Central PMCID: PMC5567091.
5. Costa M.M., Drescher, G., Maboni, F. Weber, S.S., Schrank, A., Vainstein, M.H.Schrank, I.S and Vargas, A.C. Virulence factors, antimicrobial resistance and plasmid content of Escherichia coli isolated in swine commercial farms. Arq. Bras. Med. Vet. Zootec. 2010;62: 30-36.
6. Pyatov, V., I. Vrtkova and A. Knoll. Detection of Aminoglycoside, Sulfonamide and Tetracycline Resistance Genes in Escherichia coli Isolated from Bovine Milk Sampels. Mendel University. Brno. 2014.
7. Effendi MH, Harijani N, Yanestria SM and Hastutiek P. Identification of Shiga Toxin-Producing Escherichia coli in Raw Milk Samples from Dairy Cows in Surabaya, Indonesia. Philipp. J. Ved. Med. 2018; 55(SI): 109-114.
8. Dahms, C, Hübner, N-O, Kossow, A, Mellmann, A, Dittmann, K, Kramer, A. Occurrence of ESBL-Producing Escherichia coli in Livestock and Farm Workers in MecklenburgWestern Pomerania, Germany. PLoS ONE. 2015;10(11): e0143326.
9. Al Humam, N.A. Special biochemical profiles of Escherichia coli strains isolated from humans and camels by the VITEK 2 automated system in Al-Ahsa, Saudi Arabia. African Journal of Microbiology Research. 2016; Vol. 10(22): 783-790.
10. Kavitha, J.R and Devasena, T. Molecular and Bacteriological examination of cow milk in coliform mastitis. J.Pharmay and Biological Science. 2013;6(2):2319- 7676.
11. Nassar, M.SM, Hazzah, W.A., Bakr, W.M.K. Evaluation of antibiotic susceptibility test results: how guilty a laboratory could be? J Egypt Public Health Assoc.2019;94(1):4. doi: 10.1186/s42506-018-0006-1. Epub 2019 Jan 11. PubMed PMID: 30686832; PubMed Central PMCID: PMC6329728.
12. Effendi, M.H., Harijani, N., Budiarto, Triningtya, N.P., Tyasningsih, W. and Plumeriastuti, H. (2019). Prevalence of Pathogenic Escherichia Coli Isolated from Subclinical Mastitis in East Java Province, Indonesia. Indian Vet. J. 2019;96(03): 22-25.
13. Clinical and Laboratory Standarts Institute. Performances Standards for Antimicrobial Susceptibility Testing. M100 27th ed. 2017.
14. Kwoji, I.D., Musa, J.A., Daniel, N., Mohzo, D.L., Bitrus, A.A., Ojo, A, A, and Ezema, K.U. Extended-spectrum beta-lactamase-producing Escherichia coli in chickens from small-scale (backyard) poultry farms in Maiduguri, Nigeria. Int J One Health. 2019;5:26-30.
15. Vranic, S.M. and Uzunovic, A. Antimicrobial Resistance of Escherichia Coli Strains Isolated From Urine At Outpatient Population: A Single Laboratory Experience. Mater Sociomed. 2016;25(Mar):28(2):121-124. doi: 10.5455/msm.2016.28.121-124. PubMed PMID: 27147918; PubMed Central PMCID: PMC4851537.
16. Gregova, G., Kmetova, M., Kmet, V., Venglovsky, J. and Feher, A. Antibiotic resistance of Escherichia coliisolated from a poultry slaughterhouse. Annals of Agricultural and Environmental Medicine. 2012;19(1):.75-77.
17. Magiorakos, A.P., Srinivasan, A., Carey, R. B., Carmeli, Y., Falagas, M. E.,Giske, C. G.,Harbarth, S.,Hindler, J. F., Kahlmeter, G., Olsson-Liljequist, B., Paterson, D. L,. Rice, L. B., Stelling, J., Struelens, M. J., Vatopoulos, A., Weber, J. T., and. Monnet. D. L. Multidrug-resistant, extensively drug-resistant and pandrug-resistant bacteria: an international expert proposal for interim standard definitions for acquired resistance. Clin Microbiol Infect. 2012;18: 268–281. 10.1111/j.1469-0691.2011.03570.x
18. Kallen, A.J., Hidron, A.I., Patel, J., Srinivasa,n A. Multidrug resistance among gram-negative pathogens that caused healthcare-associated infections reported to the National Healthcare Safety Network, 2006-2008. Infect Control Hosp Epidemiol. 2010;31: 528–531.
19. Cohen, A.L., Calfee, D., Fridkin, S.K. Recommendations for metrics for multidrug-

resistant organisms in healthcare settings: SHEA/ HICPAC Position paper. Infect Control Hosp Epidemiol. 2008;29: 901–913.

20. Gould, I.M. The epidemiology of antibiotic resistance. Int J Antimicrob Agents. 2008;32 (suppl 1): 2–9.
21. Falagas, M.E., Koletsi, P.K., Bliziotis, I.A. The diversity of definitions of multidrug-resistant (MDR) and pandrug-resistant (PDR) Acinetobacter baumannii and Pseudomonas aeruginosa. J Med Microbiol. 2006;55:1619–1629.
22. Gao, L., Tan, Y., Zhang, X., Hu, J., Miao, Z., Wei, L and Chai, T. Emissions of Escherichia coli carrying extended-spectrum β-lactamase resistance from pig farms to the surround ing environment. Int J Environ Res Pub Health. 2015;12: 4203-13.
23. Kraemer, J.G., Pires, J., Kueffer, M., Semaani, E., Endimiani, A. and Hilty, M. Prevalence of extended-spectrum β-lac tamase-producing Enterobacteriaceae and Methicillin- Resistant Staphylococcus aureus in pig farms in Switzerland. Sci Total Environ. 2017;Vol 603-604; 401-405
24. Chishimba, K., Hangombe, B.M., Muzandu, K., Mshana, S.E., Matee, M.I., Nakajima, C. Detection of extend ed-spectrum beta-lactamase-producing Escherichia coli in market-ready chickens in Zambia. Int J Microbiol. 2016;17(Apr); 5:5275724. doi: 10.1155/2016/5275724.
25. Gundogan, N., Avci, E. Prevalence and antibiotic resistance of extended-spectrum beta-lactamase (ESBL) producing Escherichia coli and Klebsiella species isolated from foods of animal origin in Turkey. Afr J Microbiol Res. 2013;7: 4059-64.
26. Runcharoen, C., Raven, K.E., Reuter, S., Kallonen, T., Paksanont, S., Thammachote, J. Whole-genome sequencing of ESBL producing Escherichia coli isolated from patients, farm waste and canals in Thailand. Gen Med. 2017;9:81-93.
27. Effendi, M.H., Bintari, I.G., Aksono, E.B. & Hermawan, I.P. Detection of bla_{TEM} Gene of Klebsiella pneumoniae Isolated from Swab of Food-Producing Animals in East Java. Tropical Animal Science Journal. 2018;41(3):174-178

Analysis of Carbon Monoxide (CO) in Blood or Carboxyhemoglobin (COHb) on Psychological Stress in Public Transport Drivers (City Transportation) (Case Study in Depok in 2019)

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Abstract

Carbon monoxide, in general, can cause hypoxia and lead to inflammation and stress. This study aims to look at the relationship of carbon monoxide with stress on city transportation drivers. The study design used a cross-sectional study. The sample in this study was 73 city transportation drivers who met the inclusion criteria, a man, smoking, having health insurance and willing to draw blood. Research data were obtained by interview for stress measurement and laboratory testing of blood samples to determine carboxyhemoglobin levels. Data analysis uses simple linear regression for bivariate analysis. The results showed there was a relationship between carboxyhemoglobin and stress (p-value = 0.003), the level of weak relationship was r = 0.344. The line equation is obtained 0.118, that iscarboxyhemoglobin affects stress by 11.8%, while the rest is influenced by other variables. Exposure to carbon monoxide increases carboxyhemoglobin levels so that it can increase stress. It is hoped that public transport drivers can reduce smoking behavior and conduct periodic testing of vehicle engines.

Keyword: *Carbon Monoxide, carboxyhemoglobin, COHb, stress.*

Introduction

Air pollution refers to the release of pollutants into the air that damage human health and the earth as a whole.[1] It is known that 2016 WHO data shows there are 4.2 million premature deaths as a result of exposure to ambient air pollution. As many as 91% of the world's population lives in places where air quality exceeds WHO guidelines. In urban areas, one of the air pollution comes from motor vehicle fumes. of the several types of pollutants produced, carbon monoxide is one of the most pollutants issued by motorized vehicles.[2] Carbon monoxide (CO) is an odorless and colorless gas that kills without warning. He snatches hundreds of people every year and makes thousands more sick.[3]

Carbon monoxide enters the human body and then binds with hemoglobin to defeat oxygen, because the ability of carbon monoxide to bind red blood cells is higher than oxygen.[4] Hemoglobin which is supposed to bind oxygen will first bind to carbon monoxide, thus forming a carboxyhemoglobin (COHb) bond. Carboxyhemoglobin bonds cause blood to lack oxygen.[5] This results in the body's tissues or cells lacking oxygen, resulting in inflammation that results in oxidative stress on the tissue.[6]

Lack of oxygen due to carbon monoxide gas causes a person to get tired easily so that it can affect psychological conditions.[4] People will become irritable,

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upset and sometimes difficult to make decisions and have difficulty in controlling emotions to stay in control. Stress experienced will affect the physical environment (work, household and friendship) and health conditions. This is prone to be experienced by city transportation drivers who spend their time working on highways crowded with vehicles and most of them have smoking habits. This study measures the level of carbon monoxide in the blood of public transportation drivers (city transportation) and is then associated with psychological stress levels.

Method

This study uses a cross-sectional design with analytic method. The population of this study is the driver of city transportation in the city of Depok, West Java, Indonesia, which passes the Margonda highway, which is known to be the most populous road in the city of Depok. A minimum sample of research was obtained by 75 people. Determination of participants is done when in the field, with the fulfillment of inclusion criteria, a man, smoking, having health insurance and being willing to draw blood. Determination of male partisans is due to almost all drivers of the male so that even if at the time of the study met women, this is very unlikely and the number of men and women will be out of balance, so it was decided to only take male participants. The smoking criteria are determined as a reference that COHb is obtained apart from ambient air from car exhaust fumes as well as from smoking, so it is assumed that participants are exposed to carbon monoxide. Measurements of carbon monoxide were not carried out in the environment but immediately looked at the levels of carbon monoxide in the blood/ carboxyhemoglobin (COHb) of the participants.

Measurement of carbon monoxide levels in the blood or carboxyhemoglobin (COHb) using the ELISA method, with venous blood sampling as much as 3cc for each respondent, testing was conducted in the integrated laboratory of the Faculty of Medicine, Universitas Indonesia in Salemba. Measurement of psychological stress was carried out using a Perceived Stress Scale (PSS) questionnaire consisting of 14 questions, with each question score 1-5 being based on the answer scale given. The higher the score obtained it is possible to have a higher stress level.

Data analysis using statistical tests (simple linear regression) looked at the relationship between carbon monoxide in the blood/carboxyhemoglobin (COHb) with psychological stress.

Result

All participants were men who consisted of various age groups and received different incomes. Participants were urban transport drivers with 75 people, but in the analysis, only 73 people, due to lysis blood samples so they could not be used in testing. All of the blood samples were taken for measurement of carboxyhemoglobin (COHb), this was done during the day, which is believed by the drivers to have been exposed to carbon monoxide from the environment both ambient air and cigarettes.

The results of the research are the assessment of carboxyhemoglobin with stress on urban transport drivers Case study in Depok using the univariate analysis to see the distribution of characteristics of urban transport drivers, the results are summarized in Table 1. Bivariate analysis to see the relationship of COHb with stress using correlation or regression analysis simple linear is summarized in table 2.

Table 1. Distribution of age, income, work duration, workload and carboxyhemoglobin in city transportation drivers in Depok

Variable	Mean	SD	Min-Max	95% CI	
				Under	Uper
Age	43	12,098	18-67	40,51	46,15
Income	2.000.000	1.067.219	400.000-6.000.000	2.029.081	2.527.082
Duration of work	10	2,127	4-20	9,48	10,94
Beban kerja	91,15	14,009	75-130	87,86	94,44
Carboxihemoglobin (COHb)	0,90	0,60	0,23-3,12	0,76	1,04

Based on table 1. It is known that the average age of a public transport driver is 42 years with a variation of 12,098 years (95% CI: 40.51-46.15). The average income of a city transportation driver is 2 million per month with a working duration of 10 hours per day (95% CI: 9.48-10.94). The workload of city transportation drivers receives an average of 91.15 beats/minute, the lightest workload is 79 beats/minute and the heaviest is 130 beats/minute. The average carboxyhemoglobin (COHb) level of the city transport driver was 0.90% with a variation of 0.60 and it was concluded that 95% believed that the average level of COHb of the city transport driver was between 0.76% to 1.04%.

Table 2. Relationship between carboxyhemoglobin and stress in city transportation drivers in Depok

Variable	r	R^2	Persamaan Garis	p-value
Carboxihemoglobin (COHb)	0,344	0,118	Stress = 40,055+4,452 *COHb	0,003

Based on table 2 it is known that the measurement of the relationship between carboxyhemoglobin (COHb) with psychological stress obtained significant results, but the relationship is known to be classified as moderate (r = 0.344) and positive patterned means that the higher the levels of carboxyhemoglobin, the higher the stress level of city transportation driver. The determinant coefficient value of 0.118 means that the obtained line equation can explain 11.8% of stress variation.

Discussion

The results of the study concluded that there is a relationship between carboxyhemoglobin levels with stress with a prediction of 11.8%. Not much research has directly linked carboxyhemoglobin with stress, especially humans. Previous studies have looked more at animals, but their quantity is still relatively small.[7–12] Generally, it will be difficult to connect COHb with stress, but if we explain the role of carboxyhemoglobin in the body, it can be seen how carboxyhemoglobin affects stress.

Carbon monoxide gas is very dangerous for human health, where a low concentration of <100 ppm can cause health problems in humans. Carbon monoxide is a metabolic poison, in which it also acts metabolically in the human body following blood circulation. If carbon monoxide is inhaled, it will enter the lungs and then enter the blood circulation, so that it blocks the path of oxygen to be distributed throughout the body. Carbon monoxide is easy to react with blood hemoglobin which is 200 times faster than oxygen, so that blood hemoglobin is more easily bound to carbon monoxide than oxygen and has an impact on the vital function of blood as a carrier of oxygen disturbed.[4,13] The result is vital organs, such as the brain, nerve tissue and heart, do not receive enough oxygen to work properly. No more than 2.5% of hemoglobin can be bound to carbon monoxide before some health effects appear. At very high concentrations of carbon monoxide, up to 40% of hemoglobin can be bound to carbon monoxide and at this level, it will almost certainly kill humans.[5]

Inhaling high levels of carbon monoxide can kill humans. Inhaling low CO concentrations may not produce obvious symptoms of CO poisoning, but exposure to low CO levels can cause long-term health damage, even after the source of CO is removed. These health effects include long-term neurological damage such as learning and memory disorders, emotional and personality effects and sensory and motor disorders.[3,4,6,14,15]

For most people, the first signs of low concentration CO exposure include mild headaches and shortness of breath when exercising lightly. Continuous or acute exposure can cause flu-like symptoms including more severe headaches, dizziness, fatigue, nausea, confusion, irritability and impaired judgment, memory and coordination. CO is called a "silent killer" because if these initial signs are ignored, a person may lose consciousness and cannot escape danger.[16]

Someone who lacks oxygen due to increased carboxyhemoglobin is easily affected by drowsiness and fatigue which causes the emotional condition to be difficult to stabilize so easily irritated and angry. First, most of the city transportation drivers behave on average, consuming 1 to 2 packs a day, which means that within 24 hours they can smoke 12 to 24 cigarettes. Cigarettes are a source of carbon monoxide, so they are directly exposed to CO. In addition, the source of exposure is also obtained from vehicle exhaust. The environmental conditions on the streets are congested, so at certain times there is often congestion which supports the incomplete combustion of vehicles that are the source of CO gas from the exhaust.

Stressful events experienced by city transport drivers will have an impact on the professionalism of their work. Working in the service sector requires good

mental and emotional health. If they are stressed then the service is not optimal and it might have an impact on their work. For example, a stressed driver is easily emotional, so that if there are other riders who cut the road, he will get angry easily, creating an awkward atmosphere with his passengers. Stressed drivers are also likely to be reckless due to uncertain emotions that are felt that endanger themselves and the passengers. Finally, if stress is experienced continuously it will have an impact on the rise in the hormone cortisol so that if this continues, cortisol has a slow time to return to normal. As a result, diseases such as high blood pressure decreased immunity, increased risk of heart disease, stroke, cholesterol and metabolic syndrome arise.[17–23]

In this study the relationship between COHb and stress is still classified as moderate, the prediction number is below 20% so it cannot be said the main factor influences stress. In this research there may be confusion that affects the results, namely the number of samples is small and the stress index is measured from the questionnaire, so it is possible to bias information. Although researchers have been very thorough in contracting bias such as skilled interviewers and blinding purposes. However, cortisol hormone levels are measured to get stress results from different perspectives and directly bind to stress hormones, so that more accurate results are obtained (these results will be displayed in a later journal).

This study was also not accompanied by measurements of carbon monoxide in the environment, making it difficult to determine the main source for environmental control.

Conclusion

The result provides carboxyhemoglobin (COHb) affects stress by 11.8% while the rest is influenced by other variables. The relationship between the two is known to have a positive pattern, meaning the higher levels of carboxyhemoglobin, the higher the level of stress on the driver. Exposure to carbon monoxide increases the levels of carboxyhemoglobin so that it can increase the incidence of stress. It is hoped that public transportation drivers can reduce smoking behavior and conduct periodic testing of vehicle engines. Future studies are suggested to measure carbon monoxide exposure in the environment and include confounding variables that can affect stress with a larger sample size.

Ethics Approval: The study protocol was approved by the Ethics Committee of Public Health Faculty, Universitas Indonesia, Depok, Indonesia.

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References

1. NRDC. Air Pollution: Everyhing You Need to Know [Internet]. 2016. Available from: https://www.nrdc.org/stories/air-pollution-everything-you-need-know#sec1
2. Sengkey SL. Tingkat Pencemaran Udara CO Akibat Lalu Lintas dengan Model Prediksi Polusi Udara Skala Mikro. J Ilm Media Eng [Internet]. 2011;1(2):119–26. Available from: https://media.neliti.com/media/publications/98114-ID-none.pdf
3. CDC. Carbon Monoxide Poisoning fact Sheet [Internet]. 2017. Available from: https://www.cdc.gov/co/copoisoningfactsheet.html
4. ATSDR. Toxicological Profile for Carbon Monoxide. U.S Department of Health and Human Services Public Health Services: Agency for Toxic Substances and Disease Registry; 2012.
5. EPA. Carbon Monocide in Air [Internet]. 2018. Available from: https://www.epa.vic.gov.au/your-environment/air/air-pollution/carbon-monoxide-in-air
6. Akyol S, Erdogan S, Idiz N, Celik S, Kaya M, Ucar F, et al. The role of reactive oxygen species and oxidative stress in carbon monoxide toxicity: An in-depth analysis. Redox Rep [Internet]. 2014 Sep 28 [cited 2019 Jul 1];19(5):180–9. Available from: http://www.tandfonline.com/doi/full/10.1179/1351000214Y.0000000094
7. Gorman D, Huang Y., Williams C. A narcotic dose of carbon monoxide induces neuronal haeme oxygenase and nitric oxide synthetase in sheep. Toxicology [Internet]. 2002 Sep [cited 2019 Jul 1];179(1–2):79–84. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0300483X02003396
8. Giussani DA, McGarrigle HH, Spencer JA, Moore PJ, Bennet L, Hanson MA. Effect of carotid denervation on plasma vasopressin levels during acute hypoxia in the late-gestation sheep fetus. J Physiol [Internet]. 1994 May 15 [cited 2019 Jul

3];477(1):81–7. Available from: http://doi.wiley.com/10.1113/jphysiol.1994.sp020173

9. Giussani DA, McGarrigle HH, Moore PJ, Bennet L, Spencer JA, Hanson MA. Carotid sinus nerve section and the increase in plasma cortisol during acute hypoxia in fetal sheep. J Physiol [Internet]. 1994 May 15 [cited 2019 Jul 3];477(1):75–80. Available from: http://doi.wiley.com/10.1113/jphysiol.1994.sp020172
10. Vyskočil A, Tušl M, Zaydlar K. The effect of carbon monoxide on hormone levels and organ weights in rats. J Appl Toxicol [Internet]. 1986 Dec 1 [cited 2019 Jul 1];6(6):443–6. Available from: http://doi.wiley.com/10.1002/jat.2550060611
11. Bjørlykke GA, Kvamme BO, Raae AJ, Roth B, Slinde E. Slaughter of Atlantic salmon (Salmo salar L.) in the presence of carbon monoxide. Fish Physiol Biochem [Internet]. 2013 Aug 21 [cited 2019 Jul 1];39(4):871–9. Available from: http://link.springer.com/10.1007/s10695-012-9747-5
12. Dallaire A, Chalifoux A. Premedication of dogs with acepromazine or pentazocine before euthanasia with carbon monoxide. Can J Comp Med Rev Can Med Comp [Internet]. 1985 Apr [cited 2019 Jul 1];49(2):171–8. Available from: http://www.ncbi.nlm.nih.gov/pubmed/4016584
13. Goldstein M. Carbon Monoxide Poisoning. US Natl Liblary Med Natl Ist Heal [Internet]. 2008;34(6):538–42. Available from: https://www.ncbi.nlm.nih.gov/pubmed/19022078
14. Osha. Carbon Monoxide Poisoning [Internet]. [cited 2019 May 22]. Available from: www.osha.gov/workers
15. Raff H, Goldmann RW, Kindwall EP. Adrenocortical function after acute carbon monoxide exposure in humans. Arch Environ Health [Internet]. 1985 [cited 2019 Jul 1];40(2):88–90. Available from: http://www.ncbi.nlm.nih.gov/pubmed/2988463
16. EPA. Preventing Carbon Monoxide Poisoning: Information for Older Adults and Their Caregivers [Internet]. 2009. Available from: https://www.epa.gov/sites/production/files/2015-08/documents/pcmp_english_100-f-09-001.pdf
17. Morris MC, Kouros CD, Mielock AS, Rao U. Depressive symptom composites associated with cortisol stress reactivity in adolescents. J Affect Disord [Internet]. 2017 Mar 1 [cited 2019 Aug 11];210:181–8. Available from: http://www.ncbi.nlm.nih.gov/pubmed/28049103
18. Black PH, Garbutt LD. Stress, inflammation and cardiovascular disease. J Psychosom Res [Internet]. 2002 Jan [cited 2019 Jul 1];52(1):1–23. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0022399901003026
19. Hannibal KE, Bishop MD. Chronic stress, cortisol dysfunction and pain: a psychoneuroendocrine rationale for stress management in pain rehabilitation. Phys Ther [Internet]. 2014 Dec [cited 2019 Sep 14];94(12):1816–25. Available from: http://www.ncbi.nlm.nih.gov/pubmed/25035267
20. Black PH. The inflammatory response is an integral part of the stress response: Implications for atherosclerosis, insulin resistance, type II diabetes and metabolic syndrome X. Brain Behav Immun [Internet]. 2003 Oct [cited 2019 Jul 1];17(5):350–64. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0889159103000485
21. Black PH. Stress and the inflammatory response: A review of neurogenic inflammation. Brain Behav Immun [Internet]. 2002 Dec [cited 2019 Jul 1];16(6):622–53. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0889159102000211
22. Marchetti B, C Morale M, Testa N, Tirolo C, Caniglia S, Amor S, et al. Stress, the immune system and vulnerability to degenerative disorders of the central nervous system in transgenic mice expressing glucocorticoid receptor antisense RNA. Brain Res Rev [Internet]. 2001 Nov [cited 2019 Jul 1];37(1–3):259–72. Available from: https://linkinghub.elsevier.com/retrieve/pii/S0165017301001308
23. Al'Absi M, Bongard S, Buchanan T, Pincomb GA, Liciano J, Lovallo WR. Cardiovascular and neuroendocrine adjustment to public speaking and mental arithmetic stressors. Psychophysiology [Internet]. 1997 May [cited 2019 Jul 9];34(3):266–75. Available from: http://doi.wiley.com/10.1111/j.1469-8986.1997.tb02397.x

Relationship between Serum Uric Acid and Lipid Profiles in Thai Adults

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Abstract

Although the link between serum uric acid, including hyperuricemia and metabolic syndrome had been reported, the relationship of lipid profiles with serum uric acid remains not comprehensively assessed in Thai adults. This current study was performed to examine the relation between serum uric acid and lipid profiles in Thai adults. A total of 192 blood samples were collected from Thai adults aged 20 years and over (men, n = 67 and women, n = 125). We analyzed serum uric acid levels and serum lipid profiles, including serum total cholesterol, triglycerides, low-density lipoprotein and high-density lipoprotein. Multiple linear regression analysis was used to evaluate the relationship between serum uric acid and lipid profiles. Our results found that triglycerides and total cholesterol was linearly related with serum uric acid levels (0.404, 95% CI, 0.578, 95% CI 0.164-0.993, respectively). Meanwhile an inverse relation was observed between serum uric acid levels and high-density lipoprotein (-0.042, 95% CI -0.015 - -0.067).

This study suggested that triglycerides, total cholesterol and obesity had a significant linear association with serum uric acid levels, whereas serum HDL cholesterol levels are significantly inversely associated.The early prevention of obesity and dyslipidemia can reduce the incidence of associated hyperuricemia and gout among Thai adults.

Keywords: *Serum uric acid, Lipid Profiles, Total cholesterol, Triglycerides, Low density lipoprotein, High density lipoprotein.*

Introduction

Uric acid (UA) is an end product of purine base metabolism. Excessive UA production and its decreased excretion are an independent causative or potential risk factor of mortality in patients with severe disease such as kidney disease, hypertension, cardiovascular events and diabetes mellitus.[1-3] Serum uric acid (SUA) level is a multi-factorial and influenced by environmental factors such as body mass index, purine-rich foods such as alcohol, meat, legumes and seafood, can influence SUA concentrations.[4,5] Several previous studies have also reported that single nucleotide polymorphisms (SNPs) in the SLC2A9 and ABCG2 genes are significant associated with SUA concentrations.[5-12] Moreover, the relation of SUA and dyslipidemia is complex and not fully elucidated yet. A few studies have been conducted to investigate the association between SUA and lipid profiles in the adult population of India,[13] Italy,[14] Korean[15] Saudi Arabia[16] Kuwait,[17] and the United States.[18] In a present study in Bangladeshi adults showed a significant positive relationship for SUA with TG, TC and LDL levels and an inverse relationship for SUA with HDL.[19] However, there is a lack of evidence on the relation of SUA with lipid profiles for the Thai

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adult population. In this study, we aimed to assess the independent relationship between SUA and lipid profiles in Thai adults.

Materials and Method

Study Population: This study was a cross-sectional design and conducted between June 2017 and June 2018. Urban people and individuals had participants in routine health check-up in the SWU-clinic, Faculty of medicine, Srinakharinwirot University (SWU). of the 192 subjects were individuals over 18 years of age and were apparently without any arthritis and any severe cardiovascular disease. However, subjects with acute heart disease, kidney disease, cancer, stress or anti-depression medication and those on lower the SUA concentrations therapy were excluded from the study.

Anthropometric measurements and blood sample collection: Anthropometric measurements taken were weight and height using the standard procedure. Body mass index (BMI) was calculated as the weight (kg) divided by the square of the height (m^2). General obesity was defined by a BMI $\geq$ 25.00 kg/m^2, regardless of gender. Five milliliters (ml) venous blood sample was collected from each participant after overnight fasting. Serum was separate for analysis of biochemical parameters. Serum uric acid and serum lipid profiles: total cholesterol (TC), triglyceride (TG) and high-and-low density lipoprotein cholesterol (HDL-C and LDL-C, respectively) were analyzed by automatic biochemical analyzer (Abbott CI 8200, United State) at the laboratory of the HRH Princess Maha Chakri Sirindhorn Medical Center (MSMC).

Statistical Method: Statistical analyses were performed using the STATA version 14 (Stata Corp, College Station, TX). Values are presented as mean ± standard deviation (SD) for continuous variables and as frequency and percentages (%) for categorical variables. The correlation between lipid profiles, BMI and SUA were assessed by Pearson's correlation coefficient test. One way ANOVA was performed to determine difference among BMI group. To indicate the relation of lipid profiles and SUA were assessed using multiple linear regression models adjusted by all covariates. Model 1 was adjusted age and sex. Model 2 was further adjusted age, sex, serum TG and TC. Model 3 was adjusted age, sex, serum TG, TC, HDL-C and LDL-C. The statistical tests were two-sided and a p-value less than 5% was estimated to indicate statistically significant.

Results

A total of 192 participants were 67 (34.90%) men and 125 (65.10%) women. The mean age of all participants was 47.40 ± 15.38 years (50.37 ± 14.68 years in men and 45.80 ± 15.58 years in women). The mean BMI for all participants was 24.90 ± 4.79 kg/m^2. The average SUA, TG, TC, HDL-C and LDL-C levels for all participants were 5.91±1.31, 127.84 ± 64.68, 208.78 ± 35.60, 59.14 ± 14.10 and 128.51 ± 33.75 respectively. In the gender group, Men subjects had a higher of BMI, SUA, serum TG and serum TC than women subjects. However, serum HDL-C and LDL-C levels were lower in men than women (**Table 1**).

In the current study, we analyzed the correlation between SUA levels with lipid profiles and BMI (**Figure 1**). SUA levels were positively correlated with serum TC, TG and BMI, but not serum LDL-C level, whereas a negatively correlated with serum HDL-C. Levels of serum uric acid in different body mass index are showed in Table 2. A level of serum uric acid was a statistically significant difference between BMI groups as demonstrated by one-way ANOVA (p-value < 0.001). A post hoc test showed that the obesity group was increases statistically further than the underweight group. Moreover, there was a statistically significant difference between the obesity and normal groups, including between the obesity and overweight groups. After adjusting for age and gender (Model 1), serum TG and TC levels were progressively increased (mean difference = 0.508, 95% CI = 0.262 - 0.755, 0.509, 95% CI = 0.071-0.948, respectively) and HDL-C level (mean difference = -0.062, 95% CI = -0.018 - -0.052) was progressively decreased serum uric acid level (**Table 3**). However, the relation remained unchanged after additionally adjusting for other covariates in model 2. Furthermore, after adjusting for age and gender (Model 1), BMI was also increased serum uric acid level. The relation remained unchanged after additionally adjusting for other covariates in model 2 and 3.

Discussion and Conclusion

To the best of our current knowledge, there are few studies which focused on the relationship of lipid profiles with serum uric acid in the urban representative sample of Thai adults. Our study demonstrated the serum uric acid was positively correlated with serum TC, TG and BMI even after additionally adjusting for confounders, while a level of uric acid is not associated with serum LDL-C level. A similar finding has been illustrated in

many ethnicities. There is positively linear association of serum uric acid with both triglyceride and total cholesterol.[13-18] A recent study in Bangladeshi adults, also, demonstrated that a positive relationship for serum uric acid with triglyceride and total cholesterol. Therefore, the synthesis of triglyceride and total cholesterol requires NADPH, which resulted in an increased serum uric acid production.[19] However, some previous studied indicated that serum LDL cholesterol is strongly associated with serum uric acid levels,[13, 18-20] while a level of uric acid is not associated with high level of total cholesterol.[21] Previous in vitro studies demonstrate that high serum uric acid levels can increase monocyte chemoattractrant protein and reduce the production of adiponectin, which contributes to insulin resistance and inflammation. However, these results indicated a complex interaction between SUA and lipids has remained unclear.[22,23] When we taking into account present study results, we are agreed with a previous study remarks that lipids may intensify several pathophysiological mechanisms that are associated with high serum uric acid, including may have synergistic interaction with other lipid profile causing gout.In addition, our present study showed that serum HDL-C, as known as a protective factor for cardiovascular disease (CVD), is inversely correlated with serum uric acid in line with some previous study. It has been lately noted that elevated serum HDL-C was a significant negatively related to serum uric acid, [13, 18-20] although the direct evidence of the role of HDL in reducing serum uric acid has not clearly understood yet. Furthermore, our present study also revealed that body mass index was increased serum uric acid level even after additionally adjusting for all covariates. The present results have the same direction as previous reports; SUA was found to be significantly associated with body mass index.[20, 24] Serum uric acid is intimately associated with obesity in many populations of young and adults [25], in addition, the reduction of weight leads to reduced serum uric acid.[26]

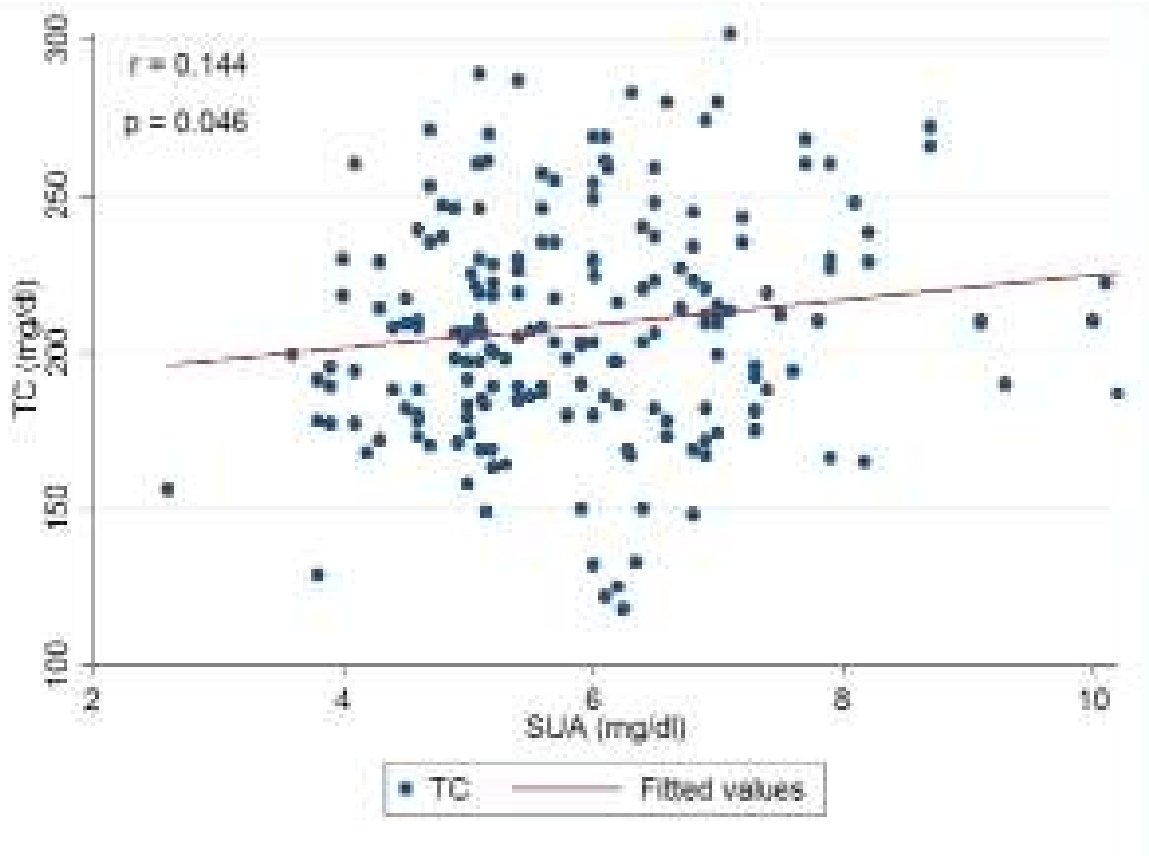
The current study had few limitations; this study was performed in an urban representative a small sample of Thai adults, which may not represent the observed findings for the entire population of Thai adults. However, the findings are likely to be generalizable to the Thai general population. Although previous reports suggest that lipid levels (serum triglycerides, total cholesterol and serum HDL cholesterol level) would be related to serum uric acid levels as observed, a cross-sectional study design may preclude the cause-effect relationships between SUA levels and lipid profile is assumed. Thus, confirming the relationship with a prospective longitudinal cohort study would be performed to confirm the observed association of SUA levels and lipid profiles. Finally, we did not collect individual food habits information, including apolipoprotein-B, lipoprotein, apolipoprotein AI, ratio of triglycerides to HDL cholesterol and ratio of apolipoprotein-B to AI which may affect lipid levels. Therefore, we should be investigated in future studies.

In conclusion, both general obesity and lipid profiles such as triglycerides, total cholesterol and serum HDL cholesterol level were a significant linear association with serum uric acid levels in Thai adults. Therefore, early prevention of obesity and dyslipidemia can reduce the incidence of associated hyperuricemia, gout and also cardiovascular disease.

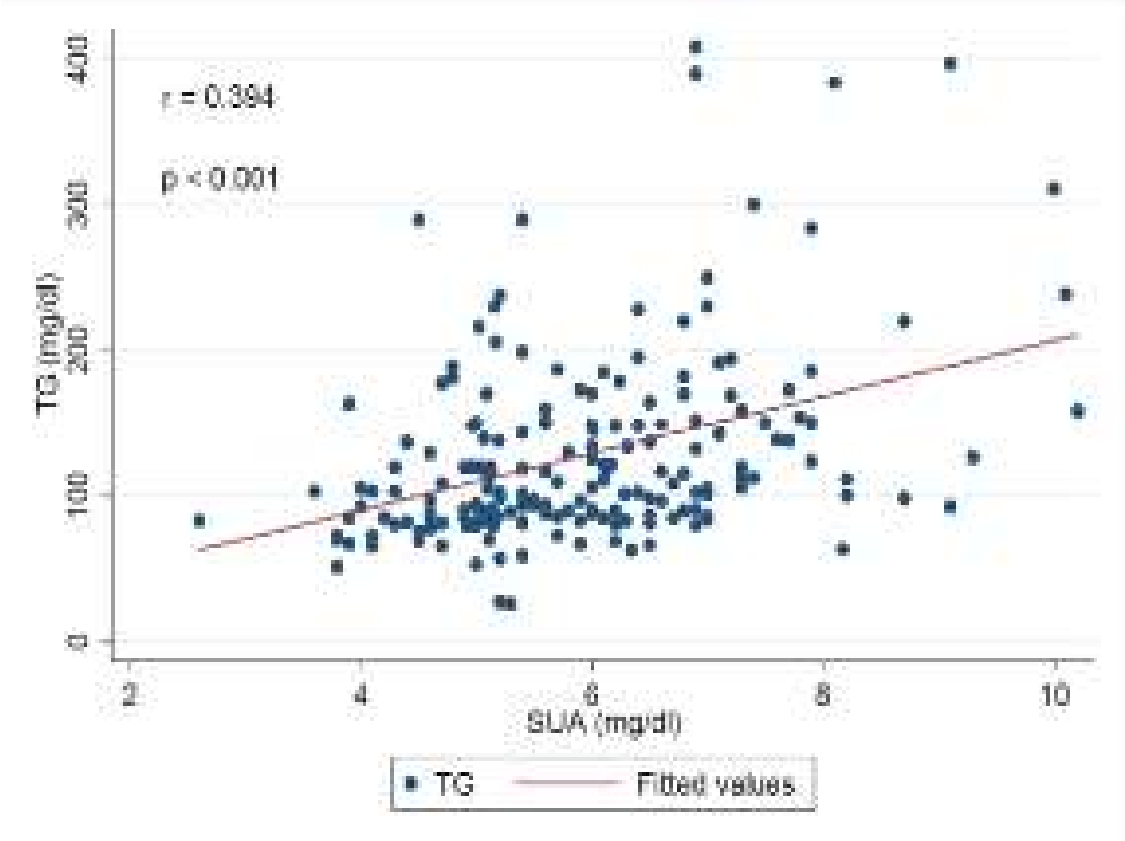
Table 1. Baseline characteristics and serum uric acid levels separated by gender

Variables	Total	Male	Female
Number (%)	192	67 (34.90)	125 (65.10)
Age (years)	47.40±15.38	50.37±14.68	45.80±15.58
Height (cm)	162.21±7.53	168.86±5.47	158.65±5.88
Weight (Kg)	65.71±14.48	74.99±14.22	60.73±11.99
BMI (Kg/m^2)	24.90±4.79	26.23±4.30	24.19±4.90
SUA (mg/dl)	5.91±1.31	6.88±1.27	5.38±1.00
TG (mg/dl)	127.84±64.68	155.00±84.78	113.27±44.78
TC (mg/dl)	208.78±35.60	209.25±41.63	208.53±32.09
HDL-C (mg/dl)	59.14±14.10	54.81±16.08	61.47±12.38
LDL-C (mg/dl)	128.51±33.75	126.89±3.97	129.38±30.72

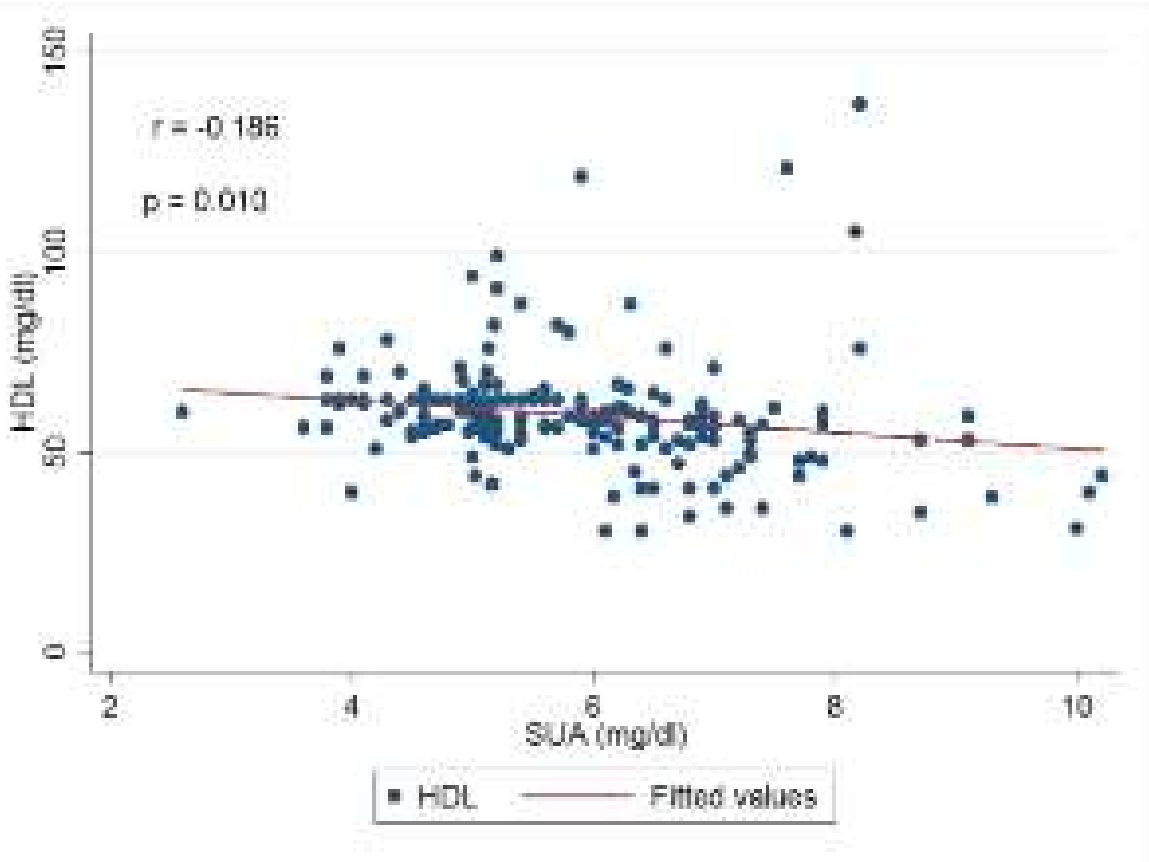
Continuous variables are presented as mean ± SD, BMI: Body mass index; HDL-C: high-density lipoprotein cholesterol; LDL-C: low-density lipoprotein cholesterol; TG: Triglycerides; TC: Total cholesterol; SUA: Serum uric acid levels


r = 0.144
p = 0.046
TC (mg/dl)
100
150
200
250
300
2
4
6
8
10
SUA (mg/dl)
TC
Fitted values

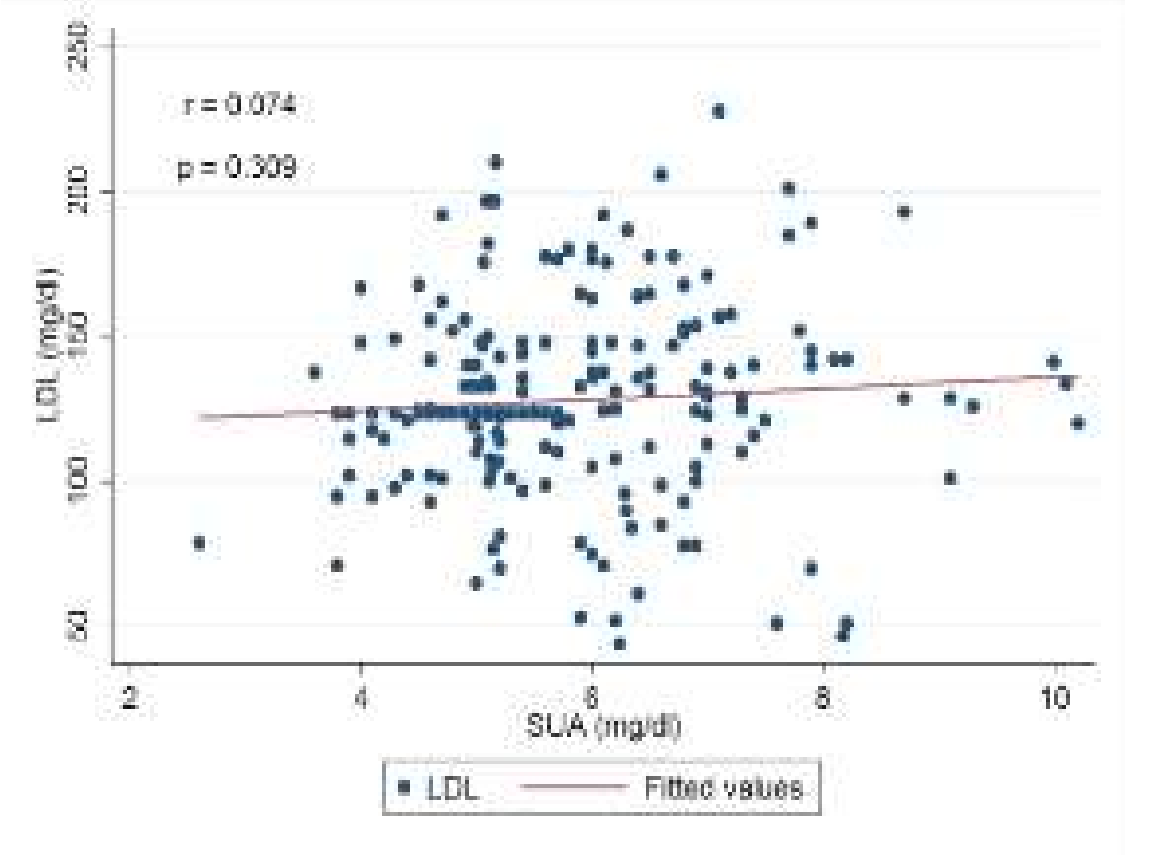
a


r = 0.394
p < 0.001
TG (mg/dl)
0
100
200
300
400
2
4
6
8
10
SUA (mg/dl)
TG
Fitted values

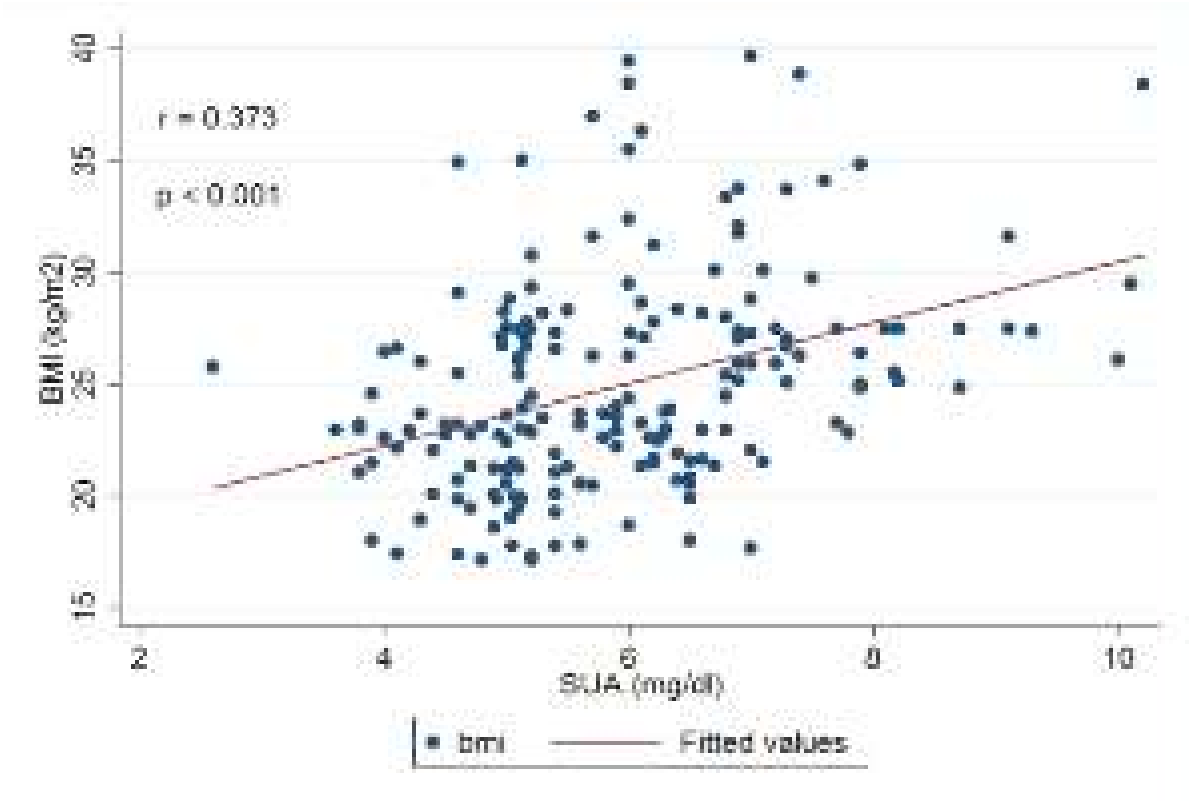
b


r = -0.186
p = 0.010
HDL (mg/dl)
0
50
100
150
2
4
6
8
10
SUA (mg/dl)
HDL
Fitted values

c


r = 0.074
p = 0.309
LDL (mg/dl)
50
100
150
200
250
2
4
6
8
10
SUA (mg/dl)
LDL
Fitted values

d



e

Figure 1. The correlation between serum uric acid and total cholesterol (a), Triglycerides (b), High-density lipoprotein cholesterol; HDL (c), Low-density lipoprotein cholesterol; LDL (d) and body mass index; BMI (e)

Table 2. Level of serum uric acid in different body mass index

Group	N	Mean± SD	p-value	Multiple comparison
				Mean diff.(95% CI)
Underweight	11	5.21±0.92	<0.001	1.25(0.21-2.29) [a]
Normal	67	5.46±0.89		1.00(0.47-1.53)[b]
Overweight	29	5.56±1.22		0.90(0.20-1.60)[c]
Obesity	85	6.46±1.45		

Mean diff: mean difference; (a) Obesity vs. Underweight (b) Obesity vs. Normal (c) Obesity vs. Overweight

Table 3. the association of serum uric acid with lipid profiles and obesity based on multiple linear regressions

Variables	Mean diff.	95% CI	p-value
Body mass index (kg/m^2) [a]			
Model 1	0.075	0.043-0.107	<0.001
Model 2	0.068	0.036-0.100	<0.001
Model 3	0.068	0.036-0.100	<0.001
Triglycerides (mg/dl)[b]			
Model 1	0.508	0.262-0.755	<0.001
Model 2	0.404	0.161-0.647	0.001

Variables	Mean diff.	95% CI	p-value
Total cholesterol (mg/dl)[b]			
Model 1	0.509	0.071-0.948	0.023
Model 2	0.578	0.164-0.993	0.007
High-density lipoprotein cholesterol (mg/dl)[b]			
Model 1	-0.062	-0.018 - -0.052	0.028
Model 2	-0.042	-0.015 - -0.067	0.045
Low-density lipoprotein cholesterol (mg/dl)[b]			
Model 1	0.036	-0.010-0.083	0.126
Model 2	0.045	-0.013-0.089	0.054

Mean diff: mean difference; [a]Adjusted covariates: Model 1 = age and sex; Model 2 = age, sex, triglycerides and total cholesterol; Model 3 = age, sex, triglycerides, total cholesterol, HDL and LDL, [b]Adjusted covariates: Model 1 = age and sex; Model 2 = age, sex, body mass index

Conflict of Interest: The authors declare no conflict of interest.

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Ethical Clearance: The ethics committee of Srinakharinwirot University, Thailand has approved the study protocol (MEDSWUEC-148/60E). All participants provided written informed consent for the study.

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References

1. Dawson J, Jeemon P, Hetherington L, Judd C, Hastie C, Schulz C, et al. Serum uric acid level, longitudinal blood pressure, renal function and long-term mortality in treated hypertensive patients. Hypertension. 2013;62(1):105-11.
2. Billiet L, Doaty S, Katz JD, Velasquez MT. Review of hyperuricemia as new marker for metabolic syndrome. ISRN Rheumatol. 2014;16(852954).
3. Aminiahidashti H, Bozorgi F, Mousavi SJ, Sedighi O, Gorji AMH, Rashidian H. Serum Uric Acid Level in Relation to Severity of the Disease and Mortality of Critically Ill Patients. J Lab Physicians. 2017 Jan-Mar;9(1):42-6.
4. de Oliveira EP, Burini RC. High plasma uric acid concentration: causes and consequences. Diabetol Metab Syndr. 2012;4(12):1758-5996.
5. Rivera-Paredez B, Macias-Kauffer L, Fernandez-Lopez JC, Villalobos-Comparan M, Martinez-Aguilar MM, de la Cruz-Montoya A, et al. Influence of Genetic and Non-Genetic Risk Factors for Serum Uric Acid Levels and Hyperuricemia in Mexicans. Nutrients. 2019;11(6).
6. Nakatochi M, Kanai M, Nakayama A, Hishida A, Kawamura Y, Ichihara S, et al. Genome-wide meta-analysis identifies multiple novel loci associated with serum uric acid levels in Japanese individuals. Communications Biology. 2019 2019/04/08;2(1):115.
7. Voruganti VS, Kent J, Debnath S, Cole S, Haack K, Goring H, et al. Genome-wide association analysis confirms and extends the association of SLC2A9 with serum uric acid levels to Mexican Americans. Frontiers in Genetics. [Original Research]. 2013 2013-December-16;4(279).
8. Nath SD, Voruganti VS, Arar NH, Thameem F, Lopez-Alvarenga JC, Bauer R, et al. Genome scan for determinants of serum uric acid variability. J Am Soc Nephrol. 2007;18(12):3156-63.
9. Yang Q, Guo CY, Cupples LA, Levy D, Wilson PW, Fox CS. Genome-wide search for genes affecting serum uric acid levels: the Framingham Heart Study. Metabolism. 2005;54(11):1435-41.
10. Li Z, Zhou Z, Hou X, Lu D, Yuan X, Lu J, et al. Replication of Gout/Urate Concentrations GWAS Susceptibility Loci Associated with Gout in a Han Chinese Population. Sci Rep. 2017;7(1):017-04127.
11. Matsuo H, Yamamoto K, Nakaoka H, Nakayama A, Sakiyama M, Chiba T, et al. Genome-wide

association study of clinically defined gout identifies multiple risk loci and its association with clinical subtypes. Annals of the Rheumatic Diseases. 2016;75(4):652-9.

12. Kottgen A, Albrecht E, Teumer A, Vitart V, Krumsiek J, Hundertmark C, et al. Genome-wide association analyses identify 18 new loci associated with serum urate concentrations. Nat Genet. 2013;45(2):145-54.
13. Sarmah D, Sharma B. A correlative study of uric acid with lipid profile. Asian Journal of Medical Sciences. 2013;4.
14. Lippi G, Montagnana M, Salvagno G, Targher G, Guidi G. Epidemiological Association between Uric Acid Concentration in Plasma, Lipoprotein (a) and the Traditional Lipid Profile. Clinical cardiology. 2010;33:E76-80.
15. Kim IY, Han K-D, Kim DH, Eun Y, Cha H-S, Koh E-M, et al. Women with Metabolic Syndrome and General Obesity Are at a Higher Risk for Significant Hyperuricemia Compared to Men. J Clin Med. 2019;8(6):837.
16. Pathania D, Alaql AB, Almousa AIS, Alonazi FS, Aldossari M. Association between Uric Acid Levels and Lipid Profiles in Adult Population of Alkharj City. The Egyptian Journal of Hospital Medicine. 2018 2018;71(7):3648-54.
17. Al-Meshaweh AF, Jafar Y, Asem M, Akanji AO. Determinants of Blood Uric Acid Levels in a Dyslipidemic Arab Population. Medical Principles and Practice. 2012;21(3):209-16.
18. Peng T-C, Wang C-C, Kao T-W, Chan JY-H, Yang Y-H, Chang Y-W, et al. Relationship between Hyperuricemia and Lipid Profiles in US Adults. Bio Med Research International. 2015;2015:7.
19. Ali N, Rahman S, Islam S, Haque T, Molla NH, Sumon AH, et al. The relationship between serum uric acid and lipid profile in Bangladeshi adults. BMC Cardiovascular Disorders. 2019 2019/02/21;19(1):42.
20. Mukhopadhyay P, Ghosh S, Pandit K, Chatterjee P, Majhi B, Chowdhury S. Uric Acid and Its Correlation with Various Metabolic Parameters: A Population-Based Study. Indian J Endocrinol Metab. 2019;23(1):134-9.
21. Deepak Pathania1. ABA, Abdulrahman Ibrahim Almousa1, Fahad Saleh Alonazi1, Mohammed Abdullah Aldossari1,. Association between Uric Acid Levels and Lipid Profiles in Adult Population of Alkharj City. The Egyptian Journal of Hospital Medicine. 2018;71(7):3648-54.
22. Baldwin W, McRae S, Marek G, Wymer D, Pannu V, Baylis C, et al. Hyperuricemia as a mediator of the proinflammatory endocrine imbalance in the adipose tissue in a murine model of the metabolic syndrome. Diabetes. 2011;60(4):1258-69.
23. Sartipy P, Loskutoff DJ. Monocyte chemoattractant protein 1 in obesity and insulin resistance. Proc Natl Acad Sci U S A. 2003;100(12):7265-70.
24. Hirschler V, Esteban M, Gonzalez C, Molinari C, Castano L. Association between waist circumference and magnesium and uric acid in indigenous Argentinean children living at high altitude. Cardiovasc Hematol Agents Med Chem. 2016;29(79383):EPUB-79383.
25. Zhou J, Wang Y, Lian F, Chen D, Qiu Q, Xu H, et al. Physical exercises and weight loss in obese patients help to improve uric acid. Oncotarget. 2017;8(55):94893-9.
26. Tanaka K, Ogata S, Tanaka H, Omura K, Honda C, Hayakawa K. The relationship between body mass index and uric acid: a study on Japanese adult twins. Environ Health Prev Med. 2015;20(5):347-53.

The Relationship of Intelligence and Health Perceptions

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Abstract

Perception is cognitive process. Perception influenced by intelligence. Until now there has been no research on intelligence and perception. The purpose of this study was to investigate on relationship between intelligence and health perception. The study was correlational descriptive . The sample consisted of 80 persons of Spiritual lectures at the Council of Dhikr, Sidoarjo, Indonesia. The Intelligence: Spiritual, Emotional and Adversity) Inventory were used as a research instrument. The Pearson correlation method were used for statistical analysis. The results show that there was a positive and significant relationship between spiritual intelligence and health perception. However, there were unsignificant relationship between emotional and adversity with health perception. Spiritual Intelligence most related with health perception.

Keywords: *Cognitive, Intelligence, Spiritual, Emotional, Adversity, Perception.*

Introduction

Perception is the knowledge we have of objects or of their movements by direct and immediate contact, while intelligence is a form of knowledge obtaining when detours are involved and when spatio-temporal distances between subject and objects increase. It is therefore essential that we should start with perceptual structures, to enquire whether we may not derive from them an explanation of the whole of thought, including groupings themselves[1].

Processing cognition and emotional experiences interact with each other to systematically raise your behavior[2]. Thoughts and feelings for oneself and surrounding environment are interconnected, so it can affect the kind of behavior it appears[3]. Perception is cognitive process[4]. Cognitive embraces intelligence (emotional, spiritual and adversities).

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Emotional intelligence (EI) is crucial in shaping perception. The better perception, understanding and management of emotion of those with higher emotional intelligence may prevent the development of maladaptive emotional states associated with mood and anxiety disorders[5].

Spiritual intelligence (SI) is considered as developmental in nature, built through the accumulation of separate experiences, as manifestations of spiritual intelligence appear in an individual's life in an increasing manner[6]. Spiritual intelligence is capable of forming and organizing our perceptions about some notions, including health and disease. Spiritual intelligence improves not only personal health and welfare, but also helps people to tolerate difficult experiences such as grief and loss.[7]

The concept of Adversity intelligence (AI) helps us in understanding how people react to challenges and different adversities in all the aspects of life. AI is the most widely used way of measuring and strengthening human resilience[8].

Perception of health will affect someone in taking a health-related decision. Incorrect or negative perception can lead to errors in action. Therefore the purpose of this

paper is to explain the relationship of intelligence with the perception of health.

Method

Study Design, Setting and Sampling: The study method was correlational descriptive. Statistical population was comprised of Spiritual lectures at the Council of Dhikr, Sidoarjo, Indonesia.

The sample was selected randomly. The sample size consist of 80 person that 12 questionnaires were omitted because of the deficiency and 68 one were used.

Study Variables: The variables of this study were the intelligence that consist of spiritual intelligence, emotional intelligence, adversity intelligence; and perception.

The Spiritual Intelligence Inventory is a 26-item scale that measures spiritual intelligent. Spiritual intelligence components are Iman, Islam and Ihsan. The alpha coefisien 0.894

The Emotional intelligence inventory is a 34-items scale that measures emotional intelligence. This inventory consist of self awareness, self regulation, social skill, empathy and motivation. The alpha coefisien 0.862

The Adversity Intelligence inventory is a 28-items scale that measures adversity intelligence. Adversity intelligence components are Control, Ownership, Reach and Endurance. The alpha coefisien 0.869

The Health Perception Inventory is a 20-items scale that measures perception of health. The alpha coefisien 0.742.

Data Analysis: The Pearson correlation method were used for statistical analysis.

Result

Table 1. Correlation between Spiritual Intelligence with Health Perception

Pearson correlation	Spiritual Intelligence	Health Perception
Spiritual Intelligence	1	0.243*
Health Perception		1

*p<0.05

Table 1 shows a significant correlation between spiritual intelligence and health perception. Although the relationship between the two is weak (0.243). The correlation was positif.

Table 2 Correlation between Emotional Intelligence with Health Perception

Pearson correlation	Emotional Intelligence	Health Perception
Emotional Intelligence	1	0.193
Health Perception		1

p>0.05

Table 2 presents no significant correlation between emotional intelligence and health perception.

Table 3 Correlation between Emotional Intelligence with Health Perception

Pearson correlation	Adversity Intelligence	Health Perception
Adversity Intelligence	1	0.182
Health Perception		1

p>0.05

Table 3 presents no significant correlation between adversity intelligence and health perception

Discussion

Perception is the stimulus that the individual senses, organized and interpreted, so that individuals realize and understand what it senses. Perception as a fundamental person in taking decisions or actions. Similarly in terms of health, perception of health is essential as a basis for taking health-related decisions. Perception is cognitive process[4]. Cognitive embraces intelligence (emotional, spiritual and adversities).

Multiple intelligence needed to solve problems encountered, including to address health problems. Intelligence is composed of spiritual, emotional and adversity Intellegence. Emotional Intelligence (EQ) is defined as the ability to identify, assess and control one's own emotions, the emotions of others and that of groups[9]. Emotional Intelligence is the ability to recognize and understand emotions in yourself and others and your ability to use this awareness to manage your behavior and relationships[10].

There is a relationship between EI and health functioning[11]. Higher emotional intelligence was associated with better health[12]. The findings reflect

that emotional intelligence can play an important role in general health[13]. Emotional intelligence partially mediated the relationship between anxious insecurity and health outcomes[14]. Emotional intelligence is the ability to motivate yourself and survive face a frustrating, control impulses and heart does not surpass – exaggerated pleasure, set the mood and keep the burden of stress does not cripple the ability of thinking and Empath[9].

Spiritual intelligence is the ability to put all the behavior and live in the context of broader meaningfulness[15]. Spirituality is a personal quest to understand the answer as the ultimate goal in life, about the meaning and relationship of the sacred or transcendent that arise from religious rituals and community[16]. The inter connectedness of spirituality with the healing process can be explained by the concept of holistic nursing[17]. Holistic model is a comprehensive model of looking at a variety of healthy pain response. This model explains that all disease psychosomatic component contain, biological, psychological, social, spiritual[18] and cultural[19].

Spiritual intelligence allows us to reconsider our experiences and create meaning; Personal meaning production is an applicable component of spiritual intelligence[20]. Spiritual health is extremely important for many researchers, to the extent that it is seen as one of the key aspects of health [21]. Spiritual intelligence was positively associated with general health. Those who had higher levels of spiritual intelligence tended to have higher levels of health[22]. On the other hand, spiritual intelligence includes neurological processes, particular cognitive capabilities and spiritual personal and interests [23].

Adversity Intelligence is considered to be the determinant of superior performance and success [24]. Adversity intelligence is a concept about personal qualities possessed someone to face many difficulties and in order to achieve success in many areas of his life [8]. Adversity intelligence as human capacity in the form of response patterns that are owned by a person in control and directing, admits, a difficult situation, acknowledge and rectify a difficult situation.

According to Stolz (1997)[8] Adversity intelligence (AI) is the most widely used way of measuring and strengthening human resilience. AI is rooted in three sciences: cognitive psychology (relationship between thoughts and feelings), psychoneuroimmunology (mind-body relationship) and neurophysiology (study of brain)[8]. These three are the building blocks for the adversity quotient. Psychoneuroimmunologydeals with the feelings and emotions. Neurophysiology deals with how the brain learns and functions. Cognitive Psychology deals with the thoughts and feelings[24]. Stolz, further suggested AI is about how one responds to life especially the tough times many people encounter every day. AI is a gauge to measure how you respond and deal with challenges and adversities that many times catch us totally off guard and unprepared[8].

Good AI of a person indicates that the person can fight against all the odds and achieve success. AI helps us to understand many other factors like self-esteem, motivation, fighting spirit, creativity, sincerity, positive attitude, optimism, emotional stability [24]. AI can be improved of the person has empathy, sympathy and if the person is able to understand other's emotions.

Conclusion

Spiritual intelligence relates significantly to health perception, as opposed to emotional intelligence and adversity. So that spiritual approaches can be used as an effort to improve perception of individual health.

Ethical Clearance: The ethical approval for this study was granted by the IRB committee of the Faculty of Medicine at the Universitas Airlangga in 2019.

Source of Funding: This study received funding support from Universitas Nahdlatul Ulama Surabaya, Universitas Airlangga and the Ministry of Research, Technology and Higher Education of Indonesia number 004/ADD/SP2H/LT/DRPM/VIII/2019.

Conflict of Interest: None

Reference

1. King LA. The Science of Psycchology - An Appreciative View Jakarta: Mc Graw Hill Education; 2017.
2. Kammarth L, Scholer A. Cognitive-affective processing system NJ: Wiley; 2013.
3. Marks A, Horrocks K, Schutte N. Emotional intelligence mediates the realtionship between insecure attachment and subjective health outcomes, Personality and Individual Differences. Semantic Scholar. 2016;: p. 188-192.

4. Goleman D. Emotional Intelligence Jakarta: Gramedia; 2017.
5. Hadziq A. Meta Kecerdasan dan Kecerdasan Multikultural: Pemikiran psikologi sufistik Al Ghazali Semarang: RaSAIL Media Grup; 2013.
6. Stolz P. Adversity Quotient Jakarta: Gramedia Widiasarana Indonesia; 2000.
7. King DD. A viable model and self report measure of spiritual intelligence. International Journal Transpersonal Study. 2009;: p. 68-85.
8. Farahi H, Mousa Kafi S, Karimi T, Delazar R. Emotional Intelligence and Its Relationship With General Health Among the Students of University of Guilan, Iran. Iranian Journal of Psychiatry and Behavioral Sciences. 2015; 9(3): p. e1582.
9. Schutte N, Malouff J, Thorsteinsson E, Bhullar N, Rooke S. A meta-analytic investigation of the relationship between emotional intelligence and health. Personal Individual Differences. 2007; 42(6): p. 921-33.
10. Yusuf A, Nihayati H, Iswari M, Okviansanti F. Kebutuhan spiritual: konsep dan aplikasi dalam asuhan keperawatan Jakarta: Mitra Wacana Media; 2017.
11. Tsaousis I, Nikolaou I. Exploring the relationship of emotional intelligence with physical and psychological health function. Stress and Health. 2005; 21(21): p. 77-86.
12. Schutte N, Malouff J, Simunek M, McKenley J, Hollandar S. Characteristic emotional intelligence and emotional well-being. Cognitive Emotion. 2010; 16(6): p. 769-85.
13. Smith NF. Emotional Intelligence San Antonio: API Fund for Payroll Education; 2016.
14. Adib-Hajbaghery M, Faraji M. omparison of happiness and spiritual well-being among the community dwelling elderly and those who lived in sanitariums. International Journal Community Based Nurs Midwifery. 2015; 3(3): p. 216-26.
15. Saad ZM, Hatta ZA, Mohamad N. The Impact of Spiritual Intelligence on the Health of the Elderly in Malaysi. Asian Social Worker and Policy Review. 2010; 4(1): p. 85-97.
16. Ronel N, Gan R. The Experience of Spiritual Intelligence. The Journal of Transpersonal Psychology. 2008; 40(1): p. 100-119.
17. Moallemi S. Spiritual Intelligence and High Risk Behaviors. International Journal of High Risk Behaviors & Addiction. 2015; 3(1): p. e18477.
18. Hosaini, Elias H, Eric S, Aishah S. A review study on spiritual intelligence, adolesence and spiritual intelligence, factors that may contribute to individual differences in spiritual intelligence and the related theories. Journal Social Science. 2010; 6(3): p. 492-438.
19. Verma S, Aggarwal A, Bansal H. The Relationship between Emotional Intelligence (EQ) and Adversity Quotient (AQ). IOSR Journal of Business and Management. 2017; 2(1): p. 49-53.
20. Alligood MR. Nursing Theorists and Their Work. 9th ed. St. Louis, Missouri: Mosby Elsevier; 2018.
21. Dossey B, Barrere C, Keegan L, Helming M. Holistic Nursing: A Handbook for Practice. 6th ed. Burlington, MA: Jones & Bartlett Learning; 2013.
22. King M, Koenig H. Conceptualising spirituality for medical research and health service provision. BMC Health Services Research. 2009; 9: p. 1-7.
23. Piaget J. The Psychology of Intelligence. 1st ed. London: Taylor & Francis Group; 2005.
24. Breznitz S. Perception: The ability responsible for cognition. New York:; 2018.

Maturity Model and Safety Culture in Healthcare: A Systematic Review

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Abstract

Background: Research on safety culture maturity in hospitals is rare and still focuses on patient safety, not yet involved safety and occupational accidents. Previous research uses the *Manchester Patient Safety Framework* (Ma PSaF) instrument to measure 5 levels of patient safety culture maturity: Pathological, Reactive, Bureaucratic, Proactive and Generative. This study aims to investigate the level of patient safety culture maturity in hospitals.

Method: This study used a systematic literature review of 5 databases: PubMed, EBSCO, Proquest, Science Direct and Scopus. Inclusion criteria in this study are articles related to patient safety criteria; research outcome in this study is patient safety maturity level; 3) articles in the form of results obtained from the keywords used;articles have been published since 2009-2019; the article is an academic journal;english articles. 498 articles were obtained and after screening 2 articles selected.

Results: The two articles involved 2 countries: United Kingdom and Indonesia. There are 10 indicators examined in both studies which one developed 10 indicators with 24 dimensions. Study in UK, using univariate quantitative method. Research in Indonesia uses a qualitative method by interviewing experts and literature studies, there is a change in the definition of maturity in 3 dimensions to maintain research reliability, such as safety, communication and teamwork. Maturity of patient safety culture in the UK is proactive level.

Conclusions: There are 10 keys indictors for maturity of a patient safety culture: commitment to overall continuous improvement, priority given to safety, system errors and individual responsibility, recording incidents and best practices, evaluating incidents and practices best, study and make changes, communication about safety issues, personnel management and safety issues, staff education and training, teamwork. At present the safety culture maturity measuring instrument only patient safety. Further research should measure the maturity of safety culture more comprehensive including patient safety, occupational safety and health (OSH).

Keywords: *Maturity of patient safety, patient safety, occupational safety and health, hospital, clinic.*

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Introduction

Maturity of safety culture describes attitudes and behaviors related to incident and accident prevention, reporting, investigation and accident solutions. Maturity of safety culture is used to develop safety culture in organizations [(1)]. According to Westrum,

1988 divides safety culture maturity groups based on how organizations handle safety information, namely pathology, bureaucratic and generative which are then developed by adding reactive and proactive levels[2][3].

Safety culture maturity models help organizations to know the level of safety culture conditions so that efforts can be made to improve culture[4][5]. Safety culture is defined as a set of organizational characteristics and attitudes as well as the behavioral characteristics of its workers related to organizational performance in the aspect of safety[6][7]. The WHO publication in 2004 collected research figures on KTD in hospitals in various countries, namely the United States, United Kingdom, Denmark, Australia, New Zealand, Canada, found to range from 3.2 to 16.6%[8]. It is estimated that almost 50% are preventable events [9].

National Health and Safety states that safety culture organizations influence the behavior of workers in terms of taking risks, following rules and talking about security[10]. Good safety culture practices can have an impact on reducing individual accidents and can stimulate the risk assessment process that causes these accidents [11]. There are 9 instruments that have been formulated to measure safety culture and climate in the health service sector, where 8 instruments use quantitative method with a Likert scale and only 1 instrument measures maturity using qualitative method, namely *Manchester Patient Safety Framework* (Ma PSaF). In Indonesia, patient safety incidents were reported by hospital patient safety committees in 2006 as many as 145 incidents. In 2007 to 2011 457 incidents occurred, 11.23% in the nursing unit, 6.17% in the pharmaceutical unit and 4.12% by doctors. Hospital patient safety committee report for 2008 found the case of near-death 47.6%, side effects (46.2%).[12]

The hospital is one of the organizations providing health services that also should guarantee the safety of human resources, namely hospital workers. Hospital is a place of work that has the risk of workplace accidents and the potential to cause workplace accidents or occupational diseases[13]. *National Safety Council* (NSC) reports that the number of accidents that occur in hospitals is around 41% [14].Data from the Bureau of Labor Statistics in the United States reveals that injuries and illnesses that occur in health workers are 2 times greater than in the private industry as a whole[12][15][13]. So this study aims to determine the maturity model of safety culture in health care.

Method

Eligibility Criteria: This research is a systematic literature review with electronic literature searching of academic journals with a certain criteria. Literature on patient safety maturity is considered relevant if it meets the inclusion criteria, which are 1) articles related to patient safety criteria; 2) research outcome in the form of patient safety maturity level; 3) articles in the form of results obtained from the keywords used; 4) articles have been published since 2009-2019; 5)the article is an academic journal; 6) English language articles. The number of articles found was 533.

Search Strategy: All references that have been found are managed using endnote software. Study selection process includes 4 stages: identification, screening, eligibility and include. Keywords in this study were maturity of safety culture AND healthcare used to search articles on the database. The number of articles obtained as many as 498 articles that was then screened so as to obtain articles eligible to be synthesized as many as 2 articles. The outcome definition is the level of patient safety maturity in health services consisting of Pathological, Reactive, Bureaucratic, Proactive and Generative. The result of articles presented using instruments of Preferred Reporting Items for Systematic Reviews & Meta-analyses (PRISMA) and flowchart arranged according to checklist guidelines from PRISMA 2009.

Quality Assessment: Assessment of research quality used standard criteria that test for misclassification, selection and reporting by evaluating factors of sampling strategy, adequacy of samples, anticipation of bias, focus of intervention and comparison groups, analysis, suitability of statistical tests, description of intervention procedures, determination of inclusion criteria and exclusion, limitations of research and reporting of outcome data. Study quality was classified according: high (score 8 to 12), moderate (score 5 to 7) or low (score 4 to 0). The article used is the value of Quality Assignment≥8.

Results

From the literature search results with systematic literature review techniques obtained 498 articles with the keywords maturity of safety culture and healthcare. Duplicate selection and open access are obtained 480 articles and the we screened (457 articles are not according to population, 18 are not in accordance with

outcome, 1 article is systematic review/literature review and 4 articles are researching not in health services). Two articles are eligible to besynthesized.

The research were obtained from hospitals in United Kingdom and Indonesia. The method of study was pilot study and qualitative research through surveys and interviews with experts about the maturity of patient safety culture. Measuring instruments used in the study are Ma PSCAT (Manchester Patient Safety Culture Assessment Tool) and Ma PSaF (Manchester Patient Safety Framework). Statistical analysis in both journals used univariate analysis and qualitative.

Study by Madelyn P. Law, et al[16] showed that the highest Hamilton Health Science (HHS) teamwork is proactive. Design method in the study was pilot study and employed survey using Ma PSaF. Response rates ranged from 33 to 85%, pathological rates 6.14%, reactive rates 10.53%, bureaucratic rates 12.28%, proactive rates 58.11%, generative rates 12.94%.

The second study was by Arum Astika, et al[17] showed that modifications Ma PSaF from 10 variables to 24 dimensions in research. There were different definition in 3 variables before and after for reliability in the maturity level. Design method in this study was qualitative research that used experts interview and literature study approach. There is a change in the definition of 5 levels of maturity for 3 dimensions to maintain reliability, such as the priority dimensions of safety, communication and teamwork.

Discussions

From the results of this study it appears that research on patient safety maturity is still very rare. Safety maturity research was carried out in hospitals and clinics. In the study of Madelyn P. Law, 2010 in the United Kingdom, 10 variables were measured using The Manchester Patient Safety Culture Assessment Tool (Ma PSCAT)[16]. Ma PSCAT is a collaboration between researchers in Unted Kingdom and Canada based on MapSaF. The study was conducted in the form of a survey of hospital workers using patient safety culture maturity instruments (Ma PSaF). There are 10 variables studied related to patient safety. The results of the highest maturity research at the level of Proactive (58.1%), Bureaucratic (12.28%), Generative (12.94%), Reactive (10.53%), Pathological (6.14%). The results describe the level of proactive or generative maturity there are safety priority variables (73.01%), incident evaluation (68.42%) and collaboration (71.05%). The bureaucratic level includes commitment to continuous development (82.4%), system errors and individual responsibility (96.26%), recording of incidents and best practices (85.84%), learning and effective change (88.29%), safety communication (72.56%) and training and education of workers (82.34%). At the reactive level are management personnel for safety (84.41%).

Arum Astika Research, 2017 in Indonesia, it was conducted qualitatively. Researchers conducted interviews with experts and study literature. The study used a modification of 10 Ma PSaF maturity variables into 24 measured dimensions. And there is a change in definition at 5 levels of maturity for 3 dimensions to maintain reliability, namely the priority dimensions of safety, communication and teamwork. According to NPSA(18), the lowest level of safety culture maturity is Pathological, where patient safety has not been considered. Reative level if the conditions in a patient safety event. Bureaucratic level if there is a patient safety issue system Proactive level if workers in the organization are alert and think about patient issues that might occur. And at the Generative level where the patient safety system is integrated in the organization.

Maturity models describe the development of an entity over time. This entity can be anything that is interesting such as humans, organizational functions, etc. (19)or a collection of structured elements that describe the characteristics of effective processes at various stages of development. It also suggests demarcation points between stages and the method of transition from one stage to another (20).Maturity models can be used as a tool to assess and make improvements to the organization's culture towards a more mature level of safety [5][20][21]. The measurement of cultural maturity is based on a comprehensive set of criteria, measuring an organization's ability to make continuous improvements (23). Measurements can be made using group discussion method, interviews, questionnaires, audits and checklists (21).

In the field of health services, there are 8 instruments measuring patient safety culture using quantitative method with a Likert scale such as HSOPSC, MSI, SCSu, PSCHO, SCORE, SAQ, Victorian SCS. There is only 1 measurement of patient safety culture maturity using a qualitative method, the Manchester Patient Safety Framework (Ma PSaF). The use of qualitative method can provide an in-depth explanation of worker

perceptions so as to combine quantitative and qualitative method to get a complete picture of safety culture(24). According to Weigman, 2002 explains that to assess safety culture it is necessary to use a combination of quantitative method with structured interviews, surveys and questionnaires as well as qualitative method that can be used by means of observation, FGDs, prior information reviews and case studies. This combination of method is usually known as triangulation (25).

Conclusions

This study found evidence that hospital-related research on patient safety culture maturity is still very rarely studied. There are no studies in hospitals that combine patient safety with occupational safety and accidents. In the United Kingdom, the maturity of patient safety in hospitals is at a proactive level. In Indonesia there needs to be improvements in terms of commitment, audits, policies, patient safety priorities, risk management systems, patient safety practices, causes of incidents, patient safety culture, feelings and reporting systems, data analysis, focus and results of investigations, incident learning, people in determining changes, communication about patient safety between staff, patients or both.

Based on the two articles found the similarity of basic instruments used in measuring the maturity of a patient safety culture consisting of 10 indicators namely commitment to overall continuous improvement, priority given to safety, system errors and individual responsibility, recording incidents and best practices, evaluating incidents and practices best, studying and influencing change, communication about safety issues, personnel management and safety issues, staff education and training, teamwork. At present the safety culture maturity measuring instrument only prioritizes patient safety. So that further research is needed that can measure the maturity of safety culture in a more comprehensive hospital including patient safety and occupational safety and health (OSH). In the article, the data analysis is still descriptive so further research needs to use statistical analysis to determine the predictors associated with the maturity of patient safety culture.

Ethical Considerations: Ethical clearance of this study is received from the Ethical Committee of the Faculty of Public Health at Universitas Indonesia,number:17/UN2.F10.D11/PPM.00.02/2020.

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References

1. Guldenmund FW. Understanding and exploring safety culture. Res Agenda Risk Des Anno 2005 20 Years Chair Saf Sci TU Delft 1985-2005. 2010;Dr. (10):1466–80.
2. Westrum R. Cultures with requisite imagination. In: Springer-Verlag, editor. J Wise, D Hopkin and P Stager (eds), Verification and Validation of Complex Systems: Human Factors Issues. Berlin; 1988. p. 401–16.
3. Reason JT. Managing the risks of organizational accidents. 1998.
4. Goncalves Filho AP, Waterson P. Maturity models and safety culture: A critical review. Saf Sci. 2018;105:192–211.
5. Fleming M. Safety Culture Maturity Model. Health and Safety Executive. 2000.
6. INSAG. SAFETY SERIES No . 75-INSAG-4 INTERNATIONAL ATOMIC ENERGY AGENCY, VIENNA, 1991 CATEGORIES IN THE IAEA SAFETY SERIES. Atomic Energy. 1991.
7. Morello RT, Lowthian JA, Barker AL, McGinnes R, Dunt D, Brand C. Strategies for improving patient safety culture in hospitals: A systematic review. BMJ Qual Saf. 2013;22(1):11–8.
8. WHO. The World Alliance for Patient Safety. Geneva: World Health Organization. 2004. 33 p.
9. Smits M, Christiaans-Dingelhoff I, Wagner C, Wal G Van Der, Groenewegen PP. The psychometric properties of the "Hospital Survey on Patient Safety Culture" in Dutch hospitals. BMC Health Serv Res. 2008;8:1–9.
10. WHO. Human Factors in Patient Safety Review of Topics and Tools. 2009.
11. Kasim H, Hassan CRC, Hamid MD, Emami SD, Danaee M. The relationship of safety climate factors, decision making attitude, risk control and risk estimate in Malaysian radiation facilities. Saf Sci. 2019;113:180–91.

12. OSHA. Worker Safety in Your Hospital: Know the Facts. 2013;(800):1–4.
13. Henriqson É, Schuler B, van Winsen R, Dekker SWA. The constitution and effects of safety culture as an object in the discourse of accident prevention: A Foucauldian approach. Saf Sci. 2014;70:465–76.
14. Sarastuti D, K HS, Wijayanti AC. Analisis Kecelakaan Kerja Di Rumah Sakit Universitas Gadjah Mada Yogyakarta. Universitas Muhammadiyah Surakarta; 2016.
15. Hughes P, Ferrett E. Promoting a positive health and safety culture. In: Introduction to Health and Safety in Construction. 2013. p. 51–68.
16. Law MP, Zimmerman R, Baker GR, Smith T. Assessment of safety culture maturity in a hospital setting. Healthc Q. 2010;13 (September 2010): 110-5.
17. Astika Sari A. Assessing Patient Safety Culture in the Hospital: a Pilot Study Using a Modified Manchester Patient Safety Framework (Ma PSaF). J Medicoeticolegal dan Manaj Rumah Sakit. 2017;6(3):187–96.
18. National Patient Safety Agency. Seven steps to patient safety for primary care - The full reference guide. Natl Patient Saf Agency. 2006;(May).
19. G K. Knowledge management and maturity models: building common understanding, in: Proceedings of the 2nd European Conference on Knowledge Management. In: Knowledge Management. 2001. p. 269–78.
20. W P. A Public Sector HPT Maturity Model, Perform. 2007. 9-15 p.
21. Moultrie J, Maier AM, Clarkson PJ. Assessing Organizational Capabilities: Reviewing and Guiding the Development of Maturity Grids. J Clean Prod. 2012;59(1).
22. Bernard B. A Safety Culture Maturity Matrix for Nuclear Regulatory Bodies. Safety. 2018;4(4):44.
23. Binti R, Rosmani C, Che B, Diana M. Journal of Loss Prevention in the Process Industries Developing a risk-based inspection practices maturity model for Malaysian industries. J Loss Prev Process Ind. 2018;56 (August): 217–30.
24. Hogden A, Ellis LA, Churruca K, Bierbaum MM. Safety Culture Assessment in Health Care: A review of the literature on safety culture assessment modes. 2017.
25. Human Engineering. A review of safety culture and safety climate literature for the development of the safety culture inspection toolkit. Heal Saf Exec. 2005;1–42.

Photographic Description of Mother's Dental Anxiety based on Oral Health Literacy Level in Surabaya, Indonesia

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Abstract

Background: Mothers, the main influencers of their children's development, are thought to be one cause of high anxiety in children. Basic Health Research or Riskesdas 2018 stated that 93 percent of early childhood, in the age range of 5-6 years, have cavities. Mother's dental anxiety may effects their childrens oral health and hygiene and worsened by lower oral health literacy.

Aims: To analyze the relationship of dental health literacy level to maternal dental anxiety in the photographic description.

Method and Material: This is a observational analytic research method using a cross-sectional approach, consist by 100 participant mothers of children who visited dental clinic with research criteria, living in the city of Surabaya. Instruments used are MDAS & HELD-IM questionnaire and confirmed by photographic description on mother anxietal face.

Results: There is a significant relationship between the variable level of oral health literacy with the variable maternal dental anxiety with a significance value of 0,000 and a correlation coefficient of 0.704. Mother with lesser oral health literacy, have higher level of dental anxiety and confirmed as that by photographic description.

Conclusions: In this study, it is found that lesser oral health literacy state plays a role as a risk factor in arising dental anxiety in mother perspective. Dental anxiety of mother recorded (photographed) as if emoticon used in MDAS indicators as it is.

Keywords: *Photographic; Dental; Anxiety; Oral; Health; Literacy; Mother.*

Introduction

Dental anxiety is defined as the patient's response to stress that is specific to the dental situation. There are various psychometric self-assessment scales to assess anxiety in general which usually used for research and clinical purposes to assess dental anxiety[1].

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Research in the United States and in other countries has shown that dental anxiety in adults is widespread and likely to result in worse oral health[2]. In addition, A mother's behavior when caring for her children is considered a natural instinct that leads to a strong emotional connection between them[3]. This can produce negative feelings such as anxiety.

The high prevalence of dental caries in children is caused, among others, one of which is the behavior of the people who are not basic information about the importance of maintaining oral health. Oral Health Literacy (OHL) is a degree of capacity a person has

to obtain, process and understand basic oral health information and health services needed to obtain appropriate health decisions[4].

Moreover, Indonesia is the second-least literate nation in the world in a list of 61 measurable countries. It suggested that literate behaviors are critical to the success of individuals and nations in the knowledge-based economics that define the global future. The ability of Indonesians to obtain dental and oral health services can be influenced by the level of oral health literacy.

Oral health literacy can be used to promote oral health so as to prevent oral and dental health problems. In this study, the relationship between maternal dental and oral health literacy levels and dental anxiety experienced by the mother will be analyzed and in this study dental anxiety was confirmed (described) by photographic studies of the mother's face when filling in the Modified Dental Anxiety Scale (MDAS) questionnaire. This validation technique is carried out by reviewing the facial expression of the mother when it comes to dental clinic and asked to fill in the MDAS and Health Literacy in Dentistry (HeLD) questionnaire. The mother's expression can be obtained in the form of factual portraits that can be recorded with human interest photography techniques. Hypothesis of this research is there are correlation between the level of literacy with MDAS.

Material and Method

This is a cross-sectional research, in which a total of 100 mother of children 5-6 years age were randomly selected. An assessment is carried out using the Health Literacy in Dentistry (HeLD) & Modified Dental Anxiety Scale (MDAS) to analyze the relationship of dental health literacy with the level of their dental anxiety. Covered by 6 aspects of MDAS, described by table below[5]:

Table 1. MDAS questionnaire to assess participant's dental anxiety level

No.	Questionnaires	Anxiety Level (give on numbers based on your state)					Resp. Answers (Score)
							
		1	2	3	4	5	
1.	Feeling when going to visit the dentist						
2.	Feeling when waiting in line to go to the dentist						
3.	Feeling when going to receive treatment of tooth been drilled						
4.	Feeling when receiving treatment for dental calculus removal						
5.	Feelings when will receive an injection of local anesthetic						

MDAS is a short five-item questionnaire, which is well validated with a 5-point Likert scale response to each question, from one "no worries" to 5"very anxious". Responses are scored from 1 to 5 have scales range from a minimum of 5 to a maximum of 25. The higher the score, the higher the fear of teeth and the limit point for fear of high teeth has been suggested on a score of 19[1].

Maternal dental anxiety levels in this study will be confirmed using facial expression from the mother by photography description, described by visualization of these faces:

Figure 1. Facial expression visualization sequences according to dental anxiety situation based on MDAS

questionnaire

These 5 faces visualization are photographed when they are being asked about their dental anxiety according to the MDAS scale.. Photograph were taken under subject's consent, using Canon L Series 70-300mm F4 IS USM tele-lens, mounted on Sony A7 mark III Full Frame Mirrorless Digital Camera by Sony E-Mount to Canon EF mount adaptor.

HeLD questionnaire is a development of the Health Literacy Management Scale (HeLMS) which has 29 items to be scaled are designed to assess components of oral health literacy. It can measure the ability of individuals to search for, understand and use health information to determine care. Since the instrument was originally written in English, it was back-translated into Indonesian version and ran by validation and reliability trial in Surabayan Population Characteristics and resulting in having 26 items of HeLD-IndonesiaN MODIFIED (HELD-IM) which is focused on the 'Difficulty experienced'.

Results

The research was carried out from June to September 2019 at the Mulyorejo Public Health Center in Surabaya. The sample of this study amounted to 100, data collected randomly. The study population was a group of mothers of children aged 5-6 years, who visited with criteria: 1. Living in the city of Surabaya while the research was ongoing; 2. Being in a healthy condition; and 3. Willing to be a research sample participant. The distribution & correlation of the participant's risk factors according to Oral Health Literacy level & Dental Anxiety Level are given in Table 2.

Table 2. Percentage distribution & correlation of the participant's dental anxiety level according to risk factors, towards oral health literacy level

Risk Factor Variables	Sample Size	Percentage Distribution of HeLD		Percentage Distribution of MDAS		P value HeLD	P value MDAS
		High (Mean 67.6)	Low (Mean 32.2)	High (Mean 54.8)	Low (Mean 46.7)		
Academic Level							
Primary Ed.	79	42.7	48.3	46.8	53.2	0.078	0.098
Higher Ed.	21	47.1	52.9	51.1	48.9		
Job Status							
Unemployed	62	45.6	54.6	73.7	26.3	0.091	0.086
Employee	38	49.3	50.7	68.9	32.1		
Oral Health Condition Self-assessment							
Good	34	66.7	33.3	87.4	12.6	-0.007*	0.032*
Poor	66	24.4	75.6	13.4	86.4		
Historical Dental Visit							
Scheduled/Routine	71	58.3	41.7	17.9	82.1	-0.003*	0.043*
Rarely/Never	39	31.2	68.8	76.3	23.7		
Latest Dental Visit							
6-12 months	60	54.9	45.1	57.4	43.6	-0.005*	0.025*
>1 year	40	23.6	76.4	66.8	33.2		
Experience on Latest Dental Visit							
More Pleasent	44	78.3	21.7	11.2	88.8	-0.012*	0.007*
Less Pleasent	56	34.7	65.3	74.3	26.7		
Delayed visit behavior to the dentist							
Yes	26	56.5	43.5	65.4	34.6	-0.032*	0.021*
No	74	83.2	16.8	80.2	19.8		

These scientific findings of distribution and correlation of oral health literacy variable based primarily on a couple group of risk factors mentioned in table 2. Although the higher the level of one's education, the higher the level of one's knowledge would get, the results of this study remarks that the relationship between HELD-IM level and education level is not significant.

Based on table 2 above also, there is a significant relationship between risk factor variables that are inversely proportional between: Oral Health Condition Self-assessment, Historical Dental Visit, Latest Dental

Visit, Experience on Latest Dental Visit and Delayed visit behavior to the dentist, with score levels in dental anxiety and OHL levels in subjects. However, in this study, it was found that there was no significant relationship between economic conditions in this study represented by employment status figures, literacy levels and subjects' dental anxiety levels.

Based on table 2 it is found that there is a inverse relationship between the self-assessment of oral health with the subject's level of dental anxiety and the level of literacy on the subject, this is in line with the theory of Bandura (1977) which states that a person is able to regulate the activities required for a particular performance and did it[6]. In addition, the experience of visiting a dentist or being exposed to information from dental medical personnel also contributes to the fluctuation in the value of dental anxiety and oral health literacy as in the table found that subjects who have a routine history of visiting a dentist have a higher level of dental anxiety lower (P = -0.043) compared to those who rarely visited the dentist. Likewise, with the oral health literacy results that those who regularly visit the dentist also have a high level of literacy (P = 0.003). This was also evidenced by the subject's most recent visit to the dentist if they visited more than 1 year ago, subjects had lower dental and oral health compared with those who had the experience of the last visit in the last 6-12 months.

Table 3. Percentage distribution & correlation of the participant's photographic description towards dental anxiety level & oral health literacy level

Confirmatory Variable	Sample Size	Percentage Distribution of HeLD		Percentage Distribution of MDAS		P value HeLD	P value MDAS
		High (Mean 67.6)	Low (Mean 32.2)	High (Mean 54.8)	Low (Mean 46.7)		
Photographic Description							
Less anxious	12	27.8	72.2	23.5	76.5	-0.244	0.036
More anxious	19	23.2	76.8	79.7	20.3		

Based on the experience of the subject visit to the dentist is illustrated in table 2, that 56% of the subjects had a less pleasant experience during the visit. This risk factor, has the impact of an inverse relationship (P = 0.012) with the level of dental health literacy held by the subjects. This finding is in line with Corah's (1988) study which states that anxiety related to dental care is a well-known phenomenon that has been reported to cause 6% of the general population to avoid dental care[7]. On the other hand, the experience was linearly proportional to the level of dental anxiety experienced by the subjects (P = 0.007).

It was further translated by table 3 which illustrates that a photographic percentage of people who were slightly anxious had a low level of dental anxiety (P = 0.036). Based on table 4 also, in people who have a high level of dental anxiety visiting a dentist in this study revealed a visualization of a face that did look more anxious, accompanied by a decrease in the level of dental health literacy (p = -0,244). Added in table 3, for those who also had the behaviour to postpone a visit to the dentist further decreased (p = -0.032) the level of dental and mouth literacy that he had while having a linear relationship to the increase in dental anxiety (p = 0.021).

Discussion

Dental anxiety is a phenomenon that often arises in children which is influenced by their mother and it also associated with fewer dental visits, poor oral hygiene

habits and poorer oral health status[8]. The current high rate of dental and mouth disease can be influenced by a number of factors, especially behaviour for understanding basic information about the importance of maintaining oral health.

Oral Health Literacy (OHL) is a degree of capacity a person has to obtain, process and understand basic oral health information and health services needed to obtain appropriate health decisions[4]. It is believed that an increase in OHL is associated with better patient-dentist communication, which can contribute to reducing dental anxiety and thereby increasing the likelihood of seeking dental care[9].

In this study it was found that psychometric assessments using HELD-IM questionnaires were able to show their specificity. This is evidenced by the discovery of the relationship between risk factor variables in the form of self-assessment of oral health, dental history of visits to the dentist, recent experiences when visiting the dentist and delaying visits to the dentist with fluctuations in oral and dental health literacy values and dental anxiety owned.

Based on the results of the validity test of the HeLD questionnaire modified into Indonesian (HELD-IM), there were 26 items that were tested as valid ($p > 0.3$). Based on the results of reliability testing, it is known that the Cronbach alpha number of 26 questionnaire items is 0.817. So this number (0.817) is greater than the minimum value of Cronbach Alpha 0.6. Therefore, it can be concluded that the research instrument used to measure service variables can be said to be reliable.

The educational level variables examined in this study found no significant relationship between differences in education levels and the level of dental health literacy. This is consistent with Sabbahi's (2009) findings that the relationship between OHLI and education level is not significant[10]. OHLI scores were significantly correlated with scores on the TOFHLA ($q = 0.613$) and oral health knowledge tests ($q = 0.573$).

In the study results of the relationship between the level of literacy and dental anxiety possessed by the subjects in this study found a significant relationship between the two ($p = 0{,}000$). Not only that, this relationship pattern was also reinforced by the visualization of some subjects who did look more photographically anxious and had a significant relationship with their dental anxiety (MDAS) ($p = 0.036$). Dental anxiety is identical to facial changes. So in this study, maternal dental anxiety levels are confirmed using facial expressions. Likewise in many other researchs[11].

This study uses human interest photography to present activities that can affect emotions and feelings of sadness or joy to see them[12]. Thus, in this study the photographic visualization of the subjects when filling out a questionnaire about dental anxiety experienced was tested in relation to the MDAS number and yielded a significant number linearly related.

Conclusion

This research, produces a conclusion that dental anxiety possessed by someone in this case the mother has many literative factors that underlie it. If, a mother is more often visit frequency and is exposed to routine and valid dental and oral health information, then it is possible to have lower dental anxiety. The photographic description of the visualization of anxiety faces using photography techniques *human interest* in this study shows that there is a significant correlation between the MDAS questionnaire scores and the linear proportions. However, these two questionnaires (HELD-IM and MDAS), may not be a representation of all regions in Indonesia (because they only involve the people of Surabaya). The limitations of this study, will be even more reduced if other studies are conducted to explore the reliability of the instrument namely HELD-IM, MDAS and confirmed by a sustainable photographic picture in other location settings in Indonesia.

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References:

1. Bahammam M, Hassan M. Validity and reliability of an Arabic version of the modified dental anxiety scale in Saudi adults. Saudi Med J 2014; Vol. 35 (11).
2. Oosterink FM, deJongh A, Hoogstraten J. Prevalence of dental fear and phobia relative to other fear and phobia subtypes. Eur J Oral Sci. 2009;117:135-43.
3. Gunarsa SD. Psikologi Praktis: Anak, Remaja, dan Keluarga. Jakarta: PT BPK Gunung Mulia; 2004.

4. Ueno M, Takeuchi S, Oshiro A, Kawaguchi Y. Relationship between oral health literacy and oral health behaviors and clinical status in Japanese adults. J Dent Sci. 2013;8 (2): 170-176.
5. Zafar MS, Gazal G, Tola AW, Fareed WM, Alnazzawi AA. A randomized control trial comparing the visual and verbal communication method for reducing fear and anxiety during tooth extraction. The Saudi Dental Journal. 2015; 28(2): 80-85.
6. Bandura A. Health promotion by social cognitive means. Health Educ Behav 2014; 31: 143–164.
7. Corah NL. Dental anxiety. Assessment, reduction and increasing patient satisfaction. Dent Clin North Am 1988; 32: 779-790.
8. Sovaria M, et al. Correlation Between Anxiety In Mothers and Children with Sensory Impairments Before Dental Treatment. 2017.
9. Guo Y, Logan HL, Dodd VJ, Muller KE, Marks JG, Riley JL 3rd. Health literacy: pathway to better oral health. Am J Public Health. 2014 Jul;104(7):e85-91.
10. Sabbahi, D., Lawrence, H., Limeback, H and Rootman, I. (2009). Development and evaluation of an oral health literacy instrument for adults. Community Dentistry and Oral Epidemiology, 37(5), pp.451-462.
11. Guo Y, Logan HL, Dodd VJ, Muller KE, Marks JG, Riley JL 3rd. Health literacy: pathway to better oral health. Am J Public Health. 2014 Jul;104(7):e85-91.
12. Paulus, Edison dan Laely Indah Lestari. 2011. Buku Saku Fotografi. Jakarta: PT. Elex Media Komputindo.

Vertical Dimension of Rest (VDR) Analysis Using Photography Application

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Abstract

Vertical dimension is a vertical height of the face that can be determined by muscle relation andphysiologic rest position. Vertical dimension of rest position is usually used as a reference point in vertical dimension of occlusion measurement. The aim of the study was to compare the vertical dimension of rest measurement by phonetic, photograph measurement and photo analysis method. 30 subjects within age 19-25 years, Angle class I malocclusion, has complete teeth, not wear dentures and orthodontics appliances, normal overjet and overbite and no face deformities or asymmetry were measured. Phonetic method was done by measured the distance between tip of nose and chin with digital vernier caliper while subject pronounce the letter m. Subjects were photographed with distance 56 cm from the tip of the nose to the lens while the subjects pronounce letter m. Photograph measurement method, photo was print and the vertical dimension of rest was measured. Photo analysis method, vertical dimension of rest was measured using Corel Draw X5 application. The results of one way ANOVA showed no significant differences between vertical dimension of rest measurement from phonetic, photograph measurement and photo analysis method. In conclusion,there is no vertical dimension of rest measurement differences between phonetic, photograph measurement and photo analysis method.

Keywords: *Restvertical dimension, photograph measurement, photo analysis method, phonetic.*

Introduction

World Health Organization in 2000 reported that tooth loss is found in 5-15% of most population.[1]Tooth loss could be caused by trauma, caries and periodontal disease.[2] Full denture is used to restore the function of mastication, phonetic and esthetic.[3] According to Geerts et. al.,[19] the most important procedure in the full denture treatment, is vertical dimension measurement.

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Vertical dimension is a vertical height of the face that can be determined by muscle relation andphysiologic rest position use of the lower jaw as an indicator.[4] Based on *The Academic of Prosthodontic*[6], vertical dimension is a distance between two selected anatomic or marked points, one on a fixed and one on a movable member. Vertical jaw relation can be measured in two positions, vertical dimension of rest position (VDR) and vertical dimension of occlusion (VDO).[3] Vertical dimension of occlusion is the height of lower part of the face between two reference points when the tooth in maximal intercuspal position, while vertical dimension of rest is measured when the postural position of the mandible of an individual is resting comfortably in an upright position and the associated muscles are in a state of minimal contractual activity.[6] VDO is constant and can be maintained in an unlimited time.[3]

In long timecomplete edentulous patients, mandibular will be changed into habitual rest position.

Physiologic rest position is a jaw position when elevator and depressormuscle in a rest or physiologic condition, balanced tonus and the condyle on relax position in the mandibular fossa.[7] Vertical dimension of rest position is usually used as a reference point in vertical dimension of occlusion measurement.[8] The difference between VDR and VDO is named as freeway space or interocclusal space, which the normal range is 2-4 mm.[3]

Over high of vertical dimension may cause cheek biting, trauma, the increase of facial height, swallowing and speaking problems and clicking of temporomandibular joint. Over low of vertical dimension can cause angular cheilitis, swallowing problem, the decrease of facial height, pain and TMJ clicking accompanied by headache and neuralgia.[3] Support of lip and cheek will be decreased, so that the efficiency of mastication and esthetic will be decreased too.[9] Measurement of vertical dimension can be done directly or indirectly. Direct measurement consists of facial measurement, swallowing method[10], fonetic method[11], tactile and bitting forces. Indirect measurement of vertical dimension can be conducted by cephalography, digital photo and pre-extraction record.[19] Determine the height of a third lower part of face is an important step in the making of removable denture. There are several method to evaluate and measure the vertical dimension, but none of the methodhas high accuracy, thus the vertical dimension measurement should be combined with other method to reduce the error that can be happened.[19]

In the digital era, photograph has been used in many dentistry sectors, as in orthodontics, reconstructive surgery and prosthetics.[12] Gomes reported that digital photo is a good representative and significantly more accurate than cephalometric analysis when the measurement in soft tissue is needed.[8] Vertical dimension of rest position measurement by digital photo was done by Gomeswith the measurement of distance between outher canthus eye to rima oris and subnationto menton using *HL image ++97* software.[8] The result of this study showed that the range of the two points was equal. It is known that vertical dimension can be measured with digital camera at the range of shoot is 56 cm from the lens to the tip of the nose. The use of tripod is to stabilize the camera so that there is not a distortion when taking the photo. Vertical dimension can also be obtained from digital photo with the equation: N-Sn (subject) x Sn-Gn (photo)/N-Sn (photo).[12] (N= nasion; Sn=Subnasal; Gn=Gnation)

Conventional measurement tool, as a sliding caliper, can injury the patient if it contact with the patient's skin. They are simple and easy to handle. However its is difficult to reset them accurately on the previously marked two reference points and to hold them in place by hand during measurement. Vertical dimension measurement by digital photo can solve the problem, but the accuracy is still questionable.[7]

Although it is accurate, a very difficult procedure will reduce the frequency of usage, whereas an easy procedure will be used more often in vertical dimension measurement. Digital photo is an easy method to measure the vertical dimension, but it is used infrequently.[15] Digital photo can make up the direct vertical dimension measurement, so that the inaccuracy of measurement can be avoided.[16]

Materials and Method

This research was done on 30 dentistry students of Universitas Gadjah Mada Yogyakarta who meet the following inclusion criteria: 19-25 years, not in orthodontic treatment, Angle class I malocclusion, has complete teeth and does not have face abnormality (birth defects of the face) and asymmetry.

The research was started by preparing the tools and materials which are needed. Those following tools and materials were: digital vernier caliper, diagnostic set, DSLR Nikon 50mm 1.8D camera (Nikon, Japan), tripod, black marker, research form, cotton, alcohol 70%, Dettol antiseptic and informed consent. After that, the researcher gave verbal and written instructions to the subject and did the selection of subject based on inclusion criteria. The subjects that had fulfill the criteria and were willing to be as a subject, were requested to fill and sign the informed consent.

VDR measurement by phonetic method was done by measuringthe length between the tip of the nose (pronasal) and the chin (gnathion) of the subject with digital vernier caliper while instructing the subject to pronounce the letter of "m". After that, VDR measurement with photograph measurement was done by taking a photo of the face of subject with range 56 cm from the lens of camera to the tip of the nose while instructing the subject to pronounce the letter of 'm'.The camera was putted on the tripod and subjects were instructed to relax, the head upright, the face perpendicular to Frankfurt Horizontal Plane. Photo was printed by using printer in 5R size (127

x 178 mm) and the photo was calculated to predict the vertical dimension by the formula:

$$\frac{N - Sn(subject) \times tipofnose - Gn(photo)}{N - Sn(photo)} = tipofnose - Gn(subject)$$

Photo analysis method measure the distance between tip of nose and chin with Corel Draw X5 application. The photo was changed to life-size first, then by Horizontal or vertical dimension tool the VDR was measured. All of the measurement was done three times then averaged for all the subjects. The result of the measurement was analyzed by software SPSS 16.0.

Results

The result from DVR measurement of phonetic method, photographic measurement and photo analysis method was tested by normality test (Shapiro-Wilk) and homogenity test (Levene's test) as a requirement to do the one way ANOVA.

Table 1. Descriptive statistics of DVR by phonetic method. photograph measurement and digital photo analysis in millimeter.

Group	N	*x*	Sb
Phonetic method	30	69,0423	4,54707
Photograph Measurement	30	67,1017	4,38271
Digital photo analysis	30	68,2647	4,66987

The average of DVR from phonetic method was 68.0423 mm,photograph mesurement was 67.01017 mm and photo analysis method was 68.2647mm. The average difference from phonethic method and photograph method was 1.03213mm. The average of phonetic method and photo analysis method was 0.22mm. The average of photograph measurement and photo analysis method was 1.03213mm. The average difference was still in the range of 2 – 4 mm. Thus the value was considered to be neglected.[18]

Table 2. The comparison between the distance tip of nose-Gn (photo) and tip of nose-Gn (subject).

N-Sn (subject)	Tip of nose -Gn (photo)	N-Sn (photo)	Tip of nose -Gn (subject)
56,1829	50,36133	42,109	67,10
$\frac{Tipofnose - Gn(subject)}{Tipofnose - Gn(photo)} = \frac{67,10}{50,36133} = 1,33$			

Based on the table 2, the rate of magnification between the distance tip of nose-Gn (photo) and tip of nose-Gn (subject) was 1,33.

Discussion

This research was conducted on 30 Dentistry students of Universitas Gadjah Madawith inclusion criteria that had been set before. The election of the subjects' age was between 19 – 25 years old, assuming that the growth of the jaw would stop at the age of 12 on the men while the women would stop at the age of 18.[17] Based on Basic Health Research in 2007, loosing entire tooth started at the age of above 25. Thus it is expected that in the range of age 19 – 25 years old, the subjects' teeth will be complete with the maximum growth. Another inclusion criteria were the subject does not use dentures, not

currently using orthodontics device, malocclusion Angle I and symmetrical face. These criteria put in a place to avoid the difficulty of measuring the vertical dimension which can cause inaccuracies. The use of orthodontia and dentures could transform jaw relation.

The average of DVR from phonetic method was 68.0423 mm,photograph mesurement was 67.01017 mm and photo analysis method was 68.2647mm. The average difference from phonethic method and photograph method was 1.03213mm. The average of phonetic method and photo analysis method was 0.22mm. The average of photograph measurement and photo analysis method was 1.03213mm. The average difference was still in the range of 2 – 4 mm. Thus the value was considered to be neglected.[18]

The results of this study indicate no significant differences between the tip of nose-gnathion distances measured on respondents, calculate them on photos and measure them using Corel Draw X5 application. Therefore, the measurement results of the three method were statistically the same. In stages of Maxillo Mandibular Relation on the making of the dentures, the determination and measurement of the vertical dimension of occlusion or rest position can be predicted using the photograph measurement and digital photo analysis. This result was in accordance with Gomes's statement[8] that the picture is a good representation and significantly more accurate than the analysis of the cephalometric when the measurements on soft tissues required.[7]This resultalso indicated that the distance of the tip of the nose to the chin of the patient can be calculated by using the predictions of the photo.Therefore vertical dimension of rest predicted by the use of photograph application can be used as alternative method of measurement.

The vertical dimension as the distance between the two selected anatomic or marked points, one on a fixed and one on a movable member.[6]Vertical dimension at rest was is an important factor in this research, because it is a major guideline in determining vertical dimension in the process of making a complete denture.[3] Phonetic and photo analysis method were chosen as method in this research. Phonetic method is simple, fast and does not require many tools and commonly used.[19,20] Whereas, the photo analysis method is a modification of conventional measurement which able to complete the direct measurement of vertical dimension. Thus, inaccuracy in the results could be avoided.[15]

VDR measurement can be done in various ways. An accurate result needs a difficult measurement. Unfortunately, the difficult measurement will reduce the frequency of use. Otherwise, a simple way will be frequently used in determining the vertical dimension. One convenient way of measuring the vertical dimensions at rest is the phonetic method which is a direct measurement. An easy but rarely used measurement method is digital photo analysis.[16] Digital photo can complement direct vertical dimensional measurement. Thus, the inaccuracy in measurements can be avoided.[15]

The face measurement and the photo taking were performed on subjects with upright head and rest jaw position. The slightly bent head position reduced the vertical dimension at rest while the backward head position rose up the vertical dimension at rest.[10]Meanwhile, another research used Corel Draw to measure the vertical dimension of occlusion from the digital photo. This software is commonly used to edit pictures, but this software is also able to measure certain points on the face.[18]

This research used anone way ANOVA to determine whether there was a difference in the average value of the vertical dimension at rest between the phonetic method, photograph measurement and digital photo analysis. The results showed there was no significant difference between them ($P>0.05$). Through this test, it was concluded that the measurement of vertical dimensions using photograph measurement and digital photo analysis can be used as an alternative method. This result was suitable with Tjahjanti's report. The research said that photo profiles could be used as one method to get the vertical dimension.[16] Moreover, the correlation is not tested in this research. Thus, this research does not provide the information on how good the method is. Phonetic method was done by measuring the distance between the tip of the nose and the chin. The measurement can be done by using digital Vernier caliper. The lack of this method is the large of the results range and varied. This method depends on the operator capability. Moreover, there is a difficulty on applying the same measurement point at the same time and the unstable of supporting tools (the tools need to be held by the hand). Different emphasis on soft tissue also caused variations in measurement results.The measurement of vertical dimension by using digital photo analysis will give the result within a range which are closer to each other in repeated measurements. Ruler in Adobe

Photoshop will eliminate the emphasis on soft tissue,[7] nevertheless this method requires more sophisticated tools.

The use of Corel Draw is commonly used, cheap and easy to apply. Identify the tip of the nose and chin is done by looking at the marks that have been given using black markers before the photo taking is done. Measurement through phonetics and photo analysis method was done with three times. The means of each subject measurement were analysed by SPSS. This was done to minimize errors.[18] Measurement of vertical dimensions with a combination of several method is recommended to minimize errors.[5]

Conclusion

The conclusion suggests no significant differences among VDR measurement and phonetic method, photograph measurement and digital photo analysis. The vertical dimension of rest can be predicted from photograph measurement and digital photo analysis using the formula N-Sn (subject) x tip of the nose-Gn (photo)/N-Sn (photo).

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Conflict of Interest: The authors declare no conflict of interest.

Ethical Clearance: This study has received ethical clearance from Faculty of Dentistry, Universitas Gadjah Mada, Yogyakarta, Indonesia, by number: 001358/ KKEP/FKG-UGM/EC/2018.

References

1. World Health Organization 2000, WHO Global Oral Health Data Bank and WHO Oral Health Country, https://www.who.int/oral_health/media/en/orh_table1.pdf?ua=1, accesed on Juli 2019.
2. Sopianah Y, Sabilillah MF, Fadilah A. Correlation of Cost, Time, Need, Access and Competence with the Public Interest in Installing Dentures at Non-professional Dentist, MKGI 2007; 50(1):49-53.
3. Nallaswamy D, Ramalingam K, Bhat V. Textbook of Prosthodontics, Jaypee Brothers, New Delhi 2003; 130-139..
4. Miralles, R., Dodds., C., Palazzi, C., Jaeamillo, C., Quezada, V., Ormeno, G., dan Villegas, R. Vertical Dimension, Part 1: Comparison of Clinical Freeway Space. J Craniomandibular pract. 2001; 19(4): 230-236
5. Toolson, L.B. and Smith, D.E. Clinical Measurement and Evaluation of Vertical Dimension. J Prost Dent2006;95(5): 335-339.
6. The Academy of Prosthodontics. The Glossary of Prosthodontics terms, J. Prosth Dent 2017; 117 (5S):50-90.
7. Wirahadikusumah A, Koesmaningati H, Fardaniah S. Digital Photo Analysis as a Predictor of Physiological Vertical Dimension.J Dent Indon,2011; 18 (2): 38-44.
8. Gomes VL, Goncalves LC, Correia CLM, Lucas BL, Carvalho PM. Vertical dimension of the face analyzed by digital photographs.Eur J Esthetic Dent 2008; 3(4):15-24.
9. McCordJF, Grant AA. Registration : Stage II-Intermaxillary Relations. BDJ 2000; 188(11):601-606.
10. Niswonger ME. The Rest Position of the Mandible and the Centric Relation, JADA 2004; 21(9):1572-1582.
11. Silverman MM. Determination of Vertical Dimension by Phonetics, J Prost Dent 2006; 6(4): 465-471.
12. Petricevic N, Celebic A, Antonic R, Borcic J, Lajnert V. Use of digital photographs in prosthodontic reconstruction of vertical dimension. Medicina 2008;44(1): 67-71
13. Rassol MA. Facial Measurement Method for Determining Occlusal Vertical Dimension, Research report, Faculty of Technology Medica, Bagdad, 2006:.2-6.
14. Geerts GAVM, Stuhlinger ME, Nel DG. A Comparison of the Accuracy of Two Method used by Pre-doctoral Students Measure Vertical Dimension. J Prost Dent 2004; 91(1):59-66.
15. Fayz F, Eslami A. Determination of occlusal vertical dimension: A literature review. J Prost Dent,2008; 59(3): 321-323.
16. Tjahjanti M.E, Dipoyono HM, Septodika PW. Pengukuran Jarak Hidung-Dagu dari Foto untuk Aplikasi Pengukuran Dimensi Vertikal, Laporan Penelitian, Fakultas Kedokteran Gigi Universitas Gadjah Mada, Yogyakarta, 2011: 2-4.

17. Premkumar S. Textbook of Orthodontics, Elsevier, New Delhi,2015; 85-86.
18. Ladda R, Kasat VO, Bhandari AJ. A New Technique to Determined Vertical Dimension of Occlusion from Anthropometric Measurement of Interpupillary Distance, J Clin Exp Dent, 2015; 6(4):395-399.
19. Geerts GAVM, Stuhlinger ME, NelDG. A Comparison of the Accuracy of Two Method used by Pre-doctoral Students Measure Vertical Dimension, J Prost Dent 2004; 91(1):59-66
20. Basker RM, Daveport JC, Tomlin HR. Prosthetic Treatment of the Edentulous Patient, ed.5, John Wiley & Sons, New Delhi, 2011; 152-153.

The Correlation between Joint Sound Versus Temporomandibular Opening Index (TOI) on Cases of Maxillary and Mandibular Teeth Loss

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Abstract

Temporomandibular disorder (TMD) is a condition that affects adjacent masticatory or temporomandibular joints (TMJ) including the entire tissue. Evaluation for TMD includes lateral jaw movement, protrusion and maximum mouth opening. Dysharmony in one or more of that evaluation can be a TMD indicator. The aim of study was to understand the correlation between joint sound against Temporomandibular Opening Index (TOI) on cases of maxillary and mandibular teeth loss.Subjects were taken from Yogyakarta province. There were 40 subjects was divided to be four groups include 10 lost two quadrants of posterior teeth for 18 months, 10 lost one quadrant of posterior teeth for 18 months, 10 lost two quadrants of posterior teeth for 12 months and 10 lost one quadrant of posterior teeth for 12 months. Mouth opening were measured by active and passive means followed by inserting into a formula to acquire TOI. The temporomandibular joint sound wasobserved by special prototype of electrosonography and processed withMatlab software to acquire the data. The joint sound was carried out on both sides. The data were analysedby SPSS 16.0 program using regression testto obtain the correlation between TOI and joint sound. The level of significant was set at α=0.05.Results revealedmeans of TOI on all groups showed significant differences of positive correlation between frequency and amplitude of joint sound ($p<0.05$). In conclusion, joint sound has a positive correlation with TOI in cases of maxillary and mandibular tooth loss.

Keywords: *Temporomandibular joint, TOI, TMD, joint sound.*

Introduction

The joint of the human body that is having the most complicated work mechanism is the temporomandibular joint. There are two actions that can be performed by this joint, rotation and translation movement (sliding). This joint can provide a very large chewing force causing rotation at the bottom of the joint cavity. Some of the components of the temporomandibular joints including skeletal components (temporal and mandibular muscles), articular discs, various ligaments and muscles.[1] TMD could be caused by several factors. Occlusal factors are one of them. The occlusal factor may affect the incidence of TMD[2], the number and quadrant of loss of two teeth associated with decreasing vertical height, number of teeth contacted and malocclusion disorder.[3] When molars are missing, they will move to the correct position when touching the teeth and change the movement and position of condyles.[4]

The imbalance of vertical dimension reduction and occlusion causes tooth movement which may be resulted by the loss of molars of the second molar and third molar. According to Effat[5], movement occurs due to changes in the, frequency, direction, andsurface of the

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pressure absorbed by the teeth. The pressure absorbed by the tooth can resulted into a biomechanical change of the mandible.[3] Assessments that could be performed to confirm the condition of TMJ are the lateral movement of the jaws, the formation of protrusions and opening the mouth to the maximum. The presence of disharmony in one or all of these movements indicates TMD.[6,7]

There are various ways that temporomandibular joint mobility could be analyzed. Dijkstra[7] compared four measurement method include the measurement of mouth opening angle, linear opening width measurement, condylar mobility measurement and radiographic examinations of the temporomandibular joint mobility. In addition to these four measurement method, other measurement method such as measuring the mandibular deviation or calculating the submandibular jaw opening index (TOI), by measuring the widths of the active and passive openings.[9]Many advantages of TOI assessment is found. This method can be used to evaluate the success of treatment of TMD patients and is independent of the length factor of the mandibular anterior teeth or gonial angle where these factors account to the extent of the effect of the linear opening. In addition, special instrument such as cephalogram, mandibular bone goniometer, mandible excursiometer is not necessary, resulted in measurement that is easier and less expensive.[9,10]

Atrophy of the condylar intervertebral disc complex arises from the collapse of the normal rotational movement of the intervertebral disc on the condyles. Thinning of the posterior boundary of the intervertebral disc can cause the disc to displace to a more posterior position. If the condyle rests on the posterior side of the intervertebral disc or posterior disc tissue, abnormal translational movement of the condyle to the trailing edge of the intervertebral disc can occur during the opening. Clicks are associated with abnormal condylar movements, which may felt a single click while opening for the first time, but later felt during opening and closing of the mouth.[7,11] TMJ sound is very common among patients with TMD, but it is also common in non-patient populations. Various causes of TMJ sound are suggested. TMJ's joint deformation, anatomical changes, muscle discordance and intervertebral disc replacement.[12] Clicks and creping are regarded as signs of morphological changes and displacement of the anterior disc with arthropathy.[13]

The purpose of study was to examine the relationship between TOI and joint sound that can lead to a reliable evaluation method to assess TMD patients in the future.

Materials and Method

A cross-sectional study was confirmed in this study. Subjects were obtained from the population of Yogyakarta city. All subjects received sufficient information on the research procedure and signed an informed consent. The Ethical clearance was delivered from Prof.Soedomo Dental Hospital Ethics Committee. Forty subjects were divided to be 4 group include 10 were losing the two quadrants of posterior teeth in 18 months. Ten people had lost one quadrant of posterior teeth for 18 months. Ten people had lost the two quadrants of posterior teeth for 12 months. Ten people had lost one quadrant of posterior teeth for 12 months. The inclusion criteria was the minimum age is 18 years old, patients who have undergone loss of the maxillary and mandible (bicuspid and molar) unilateral free end or bilateral free end,she/he has one or more TMD signs and symptoms as joint pain, joint sound and opening restriction, subjects lost posterior teeth for 12 months or 18 months and the upper and lower jaw still have complete teeth. However, the exclusion criteria included the patients are wearing a denture andthey had previous orthodontic treatment and patients have a habit of bruxism.

Passive and active openings were measured by a digital caliper (electronic Digital Caliper, Hong Kong). After repeating the measurement three times, the average value was calculated with formula: TOI = (passive mouth opening) × 100%/(passive entrance + active mouth).

Opening width measurement: Measurement of oral opening width was carried out with method like patients were asked to sit upright with a comfortable posture. To obtain the active mouth opening width, the patient was instructed to maximally open the mouth without operator assistance. Using the digital caliper, the active mouth opening width (mm) was measured from the mesioincisaledge of the mandibular central incision in the margin of the cusp center. Measurement was performed three times and an average value was taken. Active mouth opening width (mm) was measured from mesioincisal edge of maxillar central incisive to mesioincisal edge of mandibular central incisive using digital caliper. To get the passive opening width, the patient was instructed to open the mouth to its maximum. Thereafter, the thumb of the operator was placed in the upper incisive, the index finger was placed

in the lower incisive and the operator applied pressure to the jaw so that the lower jaw moved further to the upper jaw. Passive mouth opening widthwas measured from mesioincisal edge of maxillar central incisive to mesioincisal edge of mandibular central incisive using digital caliper.

Recording of temporomandibular joint sound: Joint sound was measured when opening and closing the mouth from the right left Temporomandibular joint, the sound will be recorded in frequency and amplitude. Joint sounds can be obtained with a special instrument ordered in electronic instrumentation study program in mathematics and science faculty at Universitas Gadjah Mada.

a. Objective examination

1. Re-examination to ensure loss of posterior teeth using a diagnostic set.
2. Re-examination of the sound of the temporomandibular joint. Examination was done in two stages. First, a stethoscope was used to determine the presence or absence of joint sounds and then an electrosonographic prototype was delivered to listen and ensure the presence of joint sounds. Examination of joint sounds was performed on both sides of the temporomandibular joint.

b. Sound recording

1. Subjects were asked to attach an electrosonographic prototype earpiece to the external acoustic meatus to feel like using an ear plug.
2. Subjects were instructed to open and close the mouth following the movement of the metronome of 5 times. The maximum mouth opening was as wide as possible that the subject can do.
3. Recording the sound of the temporomandibular joint as well as examining the sound produced by the hands free on both sides of the temporomandibular joint.

The recorded temporomandibular joint sound was analyzed by the Matlab program (The Math Works Inc, Masachussets, USA). The analysis datawere done by comparing the TOI of the 4 groups. Firstly, the data were tested for normality and homogenity using Levene's test and Kolmogorov-Smirnov test. Regression and corellation test were done to understand the correlation between TOI and joint sound test with $\alpha = 5\%$. The software used for data analysis is SPSS 17.0 (IBM, New York, USA).

Result

Measurement of joint sound, quadrant number and time length of teeth loss was explained in Figure 1.

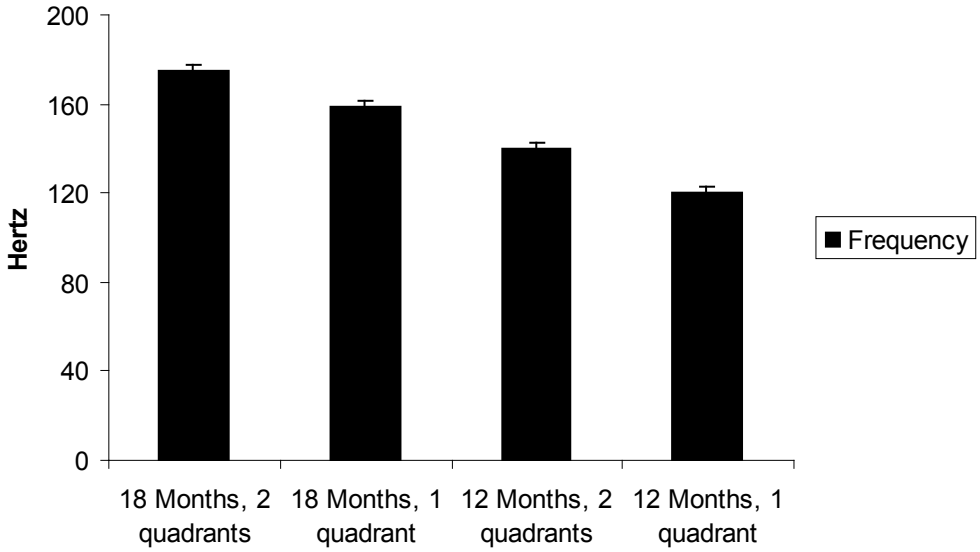

Figure 1. Mean and standard deviation (X ± SD) of requency of joint sound, quadrant number and time length of teeth loss.

Based on Figure 1,the frequency of patient losing teeth for 18 months on two quadrants was 174.81 ± 0.77. The frequency of patient losing teeth for 18 months on one quadrant at 158.89 ± 0.41. The frequency of patient losing teeth for 12 months on two quadrants was 140.26 ± 0.40, The frequency of patient losing teeth for 12 months on one quadrant was 120.16 ± 0.37. These values shown a specific pattern, that was the joint sound (frequency and amplitude) of patient losing teeth for 18 month on two quadrants was more than patients losing teeth for 18 months on one quadrant, 12 months on two quadrants and 12 months on one quadrant. The joint sound of patients losing teeth for 18 months on one quadrant was more than patients losing teeth for 12 month on two quadrants and 12 months on one quadrant. The joint sound of patients losing teeth for 12 months on two quadrants was more than patients losing teeth for 12 month on one quadrant.

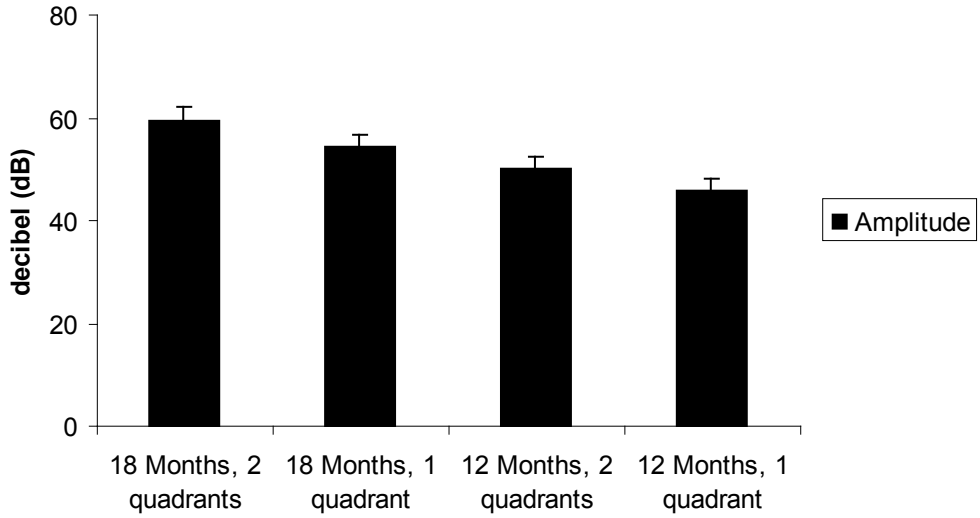

Figure 2. Mean and standard deviation (X ± SD) of amplitude of joint sound, quadrant number and time length of teeth loss.

As seen in Figure 2, the amplitude of patient losing teeth for 18 months on two quadrants was 59.26 ± 0.86, for 18 months on one quadrant at 54.38 ± 0.29 and for 12 months one two quadrants at 50.08 ± 0.46 and for 12 months on one quadrant was detected at 45.70 ± 0.44.

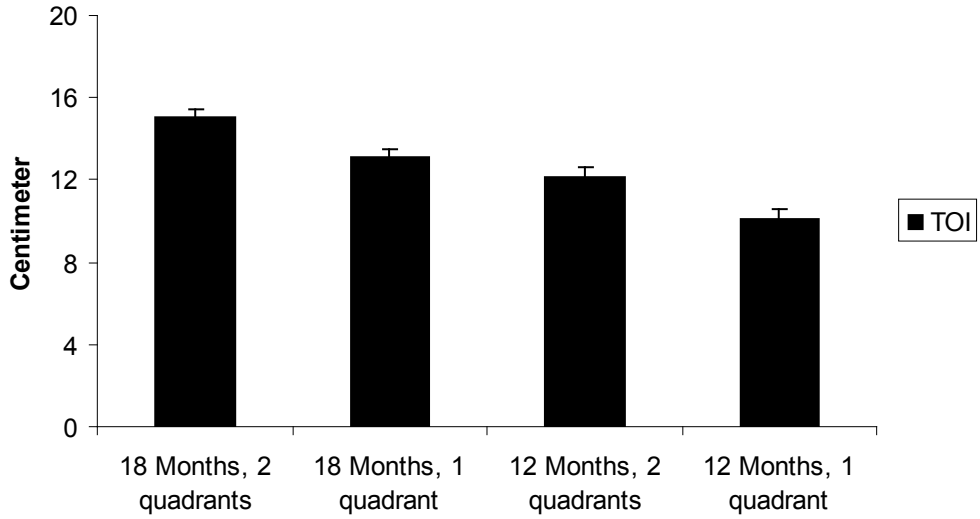

Figure 3. Mean and standard deviation (X ± SD) of Temporomandibular Opening Index (TOI), quadrant number and time length of teeth loss.

As shown in Figure 3, TOI value for patient that losing posterior teeth for 18 months on two quadrants was 15.06 ± 0.34. TOI value for patient with losing the posterior teeth for 18 months on one quadrant was 13.07 ± 0.44. TOI value for patient with losing posterior teeth for 12 months on two quadrants was 12.14 ± 0.50. TOI value for patient with losing posterior teeth for 12 months on one quadrant was 10.08 ± 0.52. Moreover, TOI value for patient with losing posterior teeth for 18 months on two quadrant was more than patient that losing posterior teeth for 18 months on one quadrant, 12 months on two quadrants and 12 months on one quadrant.

Regression and correlation value of patients with losing posterior teeth on various time length and quadrant. The regression value that states significance ($p<0.05$) between TOI and joint sound (frequency and amplitude) was shown on patients that losing posterior teeth for 18 months on two quadrants, 18 months on one quadrant and 12 months for two quadrants. The negative sign of correlation shown negative relationship between TOI of various time length and quadrant with joint sound (frequency and amplitude). Correlation value of TOI with frequency on patients losing posterior teeth for 12 months on one quadrant was -0,23 (-23%), it means there were 23% contributing factor of smaller TOI on higher frequency. Correlation value of TOI with amplitude on patients losing posterior teeth for 12 months on one quadrant was -0,27 (-27%), it means there were 27% contributing factor of smaller TOI on higher amplitude. Correlation value of TOI with frequency on patients losing posterior teeth for 12 months on two quadrants was -0,33 (-33%), it means there were 33% contributing factor of smaller TOI on higher frequency. Correlation value of TOI with amplitude on patients losing posterior teeth for 12 months on one quadrant was -0,34 (-34%), it means there were 34% contributing factor of smaller TOI on higher amplitude. Correlation value of TOI with frequency on patients losing posterior teeth for 12 months on one quadrant was -0,58 (-58%), it means there were 58% contributing factor of smaller TOI on higher frequency. Correlation value of TOI with amplitude on patients losing posterior teeth for 12 months on one quadrant was -0,55 (-55%), it means there were 55% contributing factor of smaller TOI on higher amplitude. Correlation value of TOI with frequency on patients losing posterior teeth for 12 months on one quadrant was -0,78 (-78%), it means there were 78% contributing factor of smaller TOI on higher frequency. Correlation value of TOI with amplitude on patients losing posterior teeth for 12 months on one quadrant was -0,66 (-66%), it means there were 66% contributing factor of smaller TOI on higher amplitude.

Discussion

The results of the study showed that there was an influence between the number of quadrants and the length of posterior on patient's Temporomandibular Opening Index (TOI) with joint sound (frequency and amplitude). The lower of TOI value showed the lower mouth opening resulted in higher frequency and amplitude. The regression test showed a higher negative correlation between a longer period of losing teeth on more quadrant.

Temporomandibular joint disorders are classified into 2 include intrinsic disorders (originating from intra-articular) and extrinsic disorders (extra-articular origin). Intrinsic factors are related to conditions that occur in the joint capsule, while extrinsic factors are not directly related to the temporomandibular joint. The existence of these extrinsic factors can cause disruption in the temporomandibular joint.[8,9,10]

Assessment of mouth opening limitations plays an important role in the clinical examination of the masticatory system. This is based on the width of the maximum mouth opening describing the capacity of the condyle to translate in the joint. Muscle contractions withmyospasm or fatigue can induce pain, so that the movement of mandibular patient will be limited for reducing the pain. Clinically, inability to open the mouth in the normal range will be assessed. Hyperactivity of the masticatory muscles can induce the spasm, pain and fatigue, so that the width of the active mouth opening will decrease[9,10]

The low score of TOI in TMD occurs as a protective mechanism of pain. Antagonistic muscle contraction and changes in muscle structure will cause decreased of the active opening width. The difference in the width of the passive and active mouth openings in the TOI calculation was a reference to assess the tissue elasticity. Increased of mouth opening differentiation showed the difference of muscle activities in each patients. The mechanism of protective contraction caused an increase in the activity of the antagonistic jaw muscles. The TMD structural changed such as shortening of the jaw muscle was correlated with contributing to jaw excursion srinked.[9]

TOI has simple method, fast, inexpensive and it is a

reliable indicator to determine the range of mandibular condyle movement and limited mandibular motion in patients with temporomandibular joint disorders.[8] The method has many advantages because it does not depend on the anatomy and morphology of facial bones. This method can help classify of the patients into the difference of temporomandibular joint disorders diagnosis suggesting it can provide the clinical benefits.[10]

Conclusion

Negative correlation was detected between TOI and joint sound caused by TMD followed by the reduction of active mouth opening. Interestingly,the lower of TOI showed the higher of the frequency and amplitude of patient joint sound.

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Conflict of Interest: The authors declare no conflict of interest.

References

1. Fehrenbach MJ, Herring SW. Illustrated Anatomy of the Headand Neck, 3rdedition, Saunders Elsevier, St. Louis,2007, p. 131-6.
2. Celic R, Jerolimov V, Filipovic-Zore I, Knezovic-Zlataric D. The Prevalence of Temporomandibular Disorders in a Non-Patient Population. Acta Stomatol Croat. 2001; 35(3): 327-330.
3. Wang MQ, Xue F, He JJ, Chen JH, Raustia A. Missing Posterior Teeth and Risk of Temporomandibular Disordes.J Dent Res. 2009;88 (10): 945-950.
4. Jubhari EH. Proses Menua Sendi Temporomandibula pada Pemakai Gigi Tiruan Lengkap.Cermin Dunia Kedokteran 2002;137: 41-44.
5. Effat KG. Otological Symptoms and Audiometric Findings in Patients with Temporomandibular Disorders: Consten's Syndrome Revisited. J Laryngol otol. 2016;130 (12): 1137-1141
6. Wright EF, North SL. Management and Treatment of Temporomandibular Disorders: a Clinical Perspective. J Man ManipTher. 2009; 17(4):247-254.
7. List T, Jensen RH. Temporomandibular Disorders: Old Ideas and New Concepts. Cephalgia. 2017;37 (7): 692-704.
8. Dijkstra PU, de Bont LGM, Stegenga B, Boering G. Angle of Mouth Opening Measurement: Reliability of a Technique for Temporomandibular Joint Mobility Assessment. J Oral Rehabil. 1995; 22(4): 263-268.
9. Danis CG, Mielenz TJ. Reliability of Measuring Active Mandibular Excursion Using a New Tool: The Mandibular Excursiometer. JOSPT. 1997; 25(3): 213-219.
10. Azak AN, Evlıoğlu, Erdem GT, Ordulu L. The Temporomandibular Opening Index in Patients with Temporomandibular Disorders Undergoing Surgical Extraction of Mandibular Third Molars: A Pilot Study, İstTıp. 2006; 69(2):29-31.

Correlation between Duration of Work and Hand Position Using Computer with Carpal Tunnel Syndrome (CTS) at the Registration Administration Officer in Dr. Soetomo General Hospital Surabaya

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Abstract

Background: Carpal tunnel syndrome (CTS) is commonly reported among professional computer users. Repetitive work is a widely known risk factor for occupational CTS. Administrative staff for patient registration is one of the jobs in Dr. Soetomo General Hospital that deals with repetitive data entry work in terms of long-term use of computers.

Objective: This study aims to determine the relationship between length of work and hand position of computer use with the incidence of carpal tunnel syndrome in administrative registration staff at Dr. Soetomo Hospital Surabaya.

Method: Clinical examination and nerve conduction study (NCS) observes 60 hands of 30 registration officers with computer users at Dr. RSUD Dr. Soetomo Surabaya that fulfills the inclusion and exclusion criteria from period of the October-December 2012.

Results: The average age of the study subjects was 37.80 + 10.841. The subjects of the study consisted of 54 women and 6 men. The average length of work in the year is 9.75 + 8.36. The average working hour / day is 6.02 + 1.367. The frequency of the most extension hand position with 68.3%, the incidence of 92.9% for the occurrence of CTS work duration> 3 years was significant with P = 0.005, RO 8,273 (95% CI 1,829-37,410). The incident rate is 89.6%, for the occurrence of CTS at staff with working years> 4000 hours, gets result of P = 0.021, RO 6.143 (95% CI 1.406-26,842). The incident of 87.8% for the occurrence of CTS with extended hand position, gets insignificant result with P = 0.263, RO 2.571 (95% CI 0.644-10.270).

Conclusion: There was a significant relationship between length of work and the incidence of CTS and there was no relationship between extension hand position and incidence of CTS.

Keywords: *Duration of Work, Hand Position, CTS Occurrence.*

Introduction

Computers are used in offices around the world, for the last few decades there has been a rapid increase in computer-related work demands. Several studies have reported a positive relationship between computer use and musculoskeletal symptoms(1). CTS is commonly reported among professional computer users among musculoskeletal disorders. Repetitive work on the hands causes a variety of changes to the carpal tunnel that could

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cause the CTS. Repetitive was a widely recognized risk factor for occupational CTS due to the increased pressure on the carpal tunnel The cause of trauma was a hand movement that has been identified as a disturbing factor for CTS occurrence especially in people who work repetitively requiring strength of the fingers and flexion-extension of the wrist.

The compression of the median nerve in the wrist was the most common compression neuropathy and, consequently, was one of the most common reasons for electro diagnostic examination. Almost all patients have compression sites that usually occur in the carpal tunnel resulting in a set of symptoms and signs called carpal tunnel syndrome

Soetomo General Hospital Surabaya is a type A referral hospital for Eastern Indonesia that uses computerization in its service administration. The patient registration administration officer is one of the jobs in Soetomo General Hospital which is related to repetitive data entry job in long term computer usage[2].

Therefore, the researcher wanted to know the correlation between the duration of work and hand position of computer usage with the incident carpal tunnel syndrome (CTS) which evaluated by electro diagnostic nerve conduction study (NCS) on median wrist nerve in the form of distal latency and Δ SNAP at the registration administration officer in Soetomo General Hospital who uses the computer in its activity.

Method

This study was an observational analytic study that aims to find the correlation between the duration of work and the hand position using a computer with the incidence of carpal tunnel syndrome (CTS) at the registration administration officers in Soetomo General Hospital Surabaya. The cross sectional study was used in this study because it was considered in accordance with the purpose of research which was to know the correlation between two variables at one time. In addition, this design was relatively easy, fast, and rarely threatened to drop out. Consecutive sampling was used as a method of selecting samples because this method was the best of non-probability sampling and easy to do[3].

This study used cross sectional study because it was considered in accordance with the problems studied and the objectives to be achieved. The sampling of the research was conducted in the Section of Registration of Patients and Neurology Policlinic at Soetomo General Hospital, while the NCS recording was done in EMG Room of Soetomo General Hospital Surabaya[4].

Population and Sample: Population in this research was administration officer of patient registration using computer in Soetomo General Hospital. While the samples were the administrative officers of patient registration using both mouse and keyboard computers that fulfilled inclusion-exclusion criteria. The inclusion criteria were the registration administration officers in Soetomo General Hospital using computer in their duties, aged 18 - 56 years, has worked for a minimum of 6 months, and was willing to follow the research. While the exclusion criteria as follows officers who have experienced trauma (carpal or radius fracture), neoplasms, and arthritis; and officers with CTS but did not want to do the NCV screening.

Moreover, the sampling from consecutive admissions was used until the number of samples has been determined. Preliminary research was conducted to determine the sample size. Based on the calculation obtained the required sample size was 12 of each proportion. Then, the total samples obtained were 60 officers in this study.Later on, the results of the preliminary research obtained the required sample size of each proportion was 12 along with the total sample that obtained during this study was 60 consisting of 6 men (10%) and 54 women (90%). That happened because this research was a cross sectional studies which recording and measuring variables at one time simultaneously[5].

The sampling of the research was conducted in the Section of Registration of Patients and Neurology Policlinic at Soetomo General Hospital, while the NCS recording was done in EMG Room of Soetomo General Hospital Surabaya from October to December 2012.

Research Variables: The independent variables in this research were the duration of work and hand position of computer usage at the administrative officers of patient registration in Dr. Soetomo General Surabaya. While the dependent variables was the incidence of CTS based on the NCS value of the median nerve wrist by the antidromic examination of the IV finge[6].

The operational definition for the variable of the patient registration administration officer was the officer whose daily activities related to the administration of the

patient using computer in both the mouse and keyboard at least in the last 6 months. The duration of work was a routine activity related to the use of computers. The position of the hand was a habit of hand position when the working using a computer[7]. Flexions and neutrals were the position between the forearm and hand in straight position with no flexion/extension on the wrist. CTS was an entrapment neuropathy by the median nerve compression that were diagnosed with anamnesis (pain or thickness on the anterior surface of the thumb, index finger, middle finger and half radial of ring finger a few weeks earlier), physical examination (positive sign of Tinel or Phalen) and was proved by using nerve conduction study[8].

Table 1. The Nerve Conduction Study (NCS) assessment of the median wrist nerves

	Normal (msec)	Mild (msec)	Moderate (msec)	Severe (msec)
DL CMAP	< 4	4	4-6	>6
Δ SNAP the median-ulnar nerves	< 0,4	0,4	0,4-2	>2

Table 1 shows that the Nerve Conduction Study (NCS) assessment of the median wrist nerves using IV finger antidromic examination and normal assessment of CTS (mild, moderate, severe)

Data Collection: Prior to the data collection, all subjects which included in the inclusion criteria were briefed on the purpose, usefulness, and risk of the research, then asked to follow the study without coercion. At the end of the explanation, the subjects were asked to read the research descriptions. If the subjects have been understood, they were asked to sign the statement of consent to participate in research. However, if there were things that have not been understood or less clear then it could be asked back to the doctor who gave an explanation[2].

The subjects who have signed a letter of approval will be recorded in the form of identity and characteristics. The data were collected by the author and other resident doctors with the following steps; conducting anamnesis, physical and neurology examination, selecting the samples for the experimental group according to the inclusion and the exclusion criteria, data collection, nerve conduction study (NCS) examination, and lastly, all results were collected for the data tabulation and the statistical analysis. The correlation between working duration and hand position with CTS incidents assessed with NCS median nerve wrist was analyzed by fisher test because it did not meet the requirements of chi square test[9].

Result

Table 2. Fisher Test Analysis between the Work Duration with the Incidence of CTS

		CTS Incident				P
		Normal		CTS		
		N	%	N	%	
Work Duration	< 3 years	7	38,9	11	61,1	0,005
	>3 years	3	7,1	39	92,9	

Additionally, 11 subjects with a working duration <3 years experienced CTS (61.1%) whereas CTS incidence in long-term officers >3 years was found in 39 subjects (92.9%). The correlation between the working duration and the CTS incidence was analyzed by Fisher test that resulted in a significant difference with P = 0,005 (significance Fisher) and odd ratio of 8,273 (95% CI 1,829-37,410).The duration of work was calculated based on the working duration in year multiplied by the mean of working duration each subject in hours for each day was (276 effective working days in a year).

Table 3. Fisher Test Analysis between the Work Duration in the Year/Hours with the Incidence of CTS

		CTS Incidents				P
		Normal		CTS		
		N	%	n	%	
Work Duration	< 3000 hours	4	40,0	6	60,0	0,052
	>3000 hours	6	12,0	44	88,0	
Work Duration	< 4000 hours	5	41,7	7	58,3	0,021
	>4000 hours	5	10,4	43	89,6	

Tabel 4 shows that CTS incidence was experienced by 6 subjects with duration of <3000 hours (60%) and 44 subjects with duration >3000 hours (88%). The correlation between the working duration in year/hours and the CTS incidence was analyzed by Fisher test that resulted in no significant difference with P=0,052 (significance valueFisher) and odd ratio of 4,889 (CI 95% 1,063-22,484). CTS incidence was experienced by 7 subjects with duration of <4000 hours (60%) and 43 subjects with duration >4000 hours (88%). The data analysis of the correlation between the working duration in year/hours and the CTS incidence was a significant difference with P=0,021 (significance valueFisher) and odd ratio 6,143 (CI 95% 1,406-26,842).

Table 4. Fisher Test Analysis between Hand Position with CTS Incidents

		CTS Incidents				P
		Normal		CTS		
		N	%	N	%	
Hand Position	Normal	5	26,3	14	73,7	0,263
	Extension	5	12,2	36	87,8	
Total		**10**	**16,7**	**50**	**83,3**	

Table 5 shows that 14 subjects experienced CTS incidence in normal hand position (73.7%) and 36 subjects with extension hand position experienced CTS incidence (87.8%). Fisher test was performed to see the correlation between the hand position and the CTS incidence which resulted in no significant difference with P = 0,263 (Fisher significance value) and odds ratio 2,571 (95% CI 0,644-10,270).

Discussion

The data above shows that women have higher risk to get the symptom because it was likely due to the use of intensive and repetitive hand in doing housework, typing and other work traditionally that done mostly by women[10]. This might be part of the explanation of why the prevalence of CTS in women was way greater than in men[11].Moreover in this study, both working duration in years and in year/hours associated with the computers usage have the risk factors for CTS events after examination with a nerve conduction study (NCS). This was consistent with a study by Ali KM who found that working with computers was 2.4 times more likely to have CTS (95% CI 1.4-3.8). The administrative activity was a repetitive activity with stress and mechanical stress, constantly typing and using the mouse, compared to other computer users[12].

The extension hand position risk for CTS incidence in this study was not statistically significant, but the proportion in this group (87.8%) was higher than the normal position (73.7%). These results were consistent with the results of Ali KM's study which have a higher risk for CTS but did not statistically significant. The position of the extension hands while working using the computer causes the carpal tunnel to narrow compared to the neutral position (13)This requires ergonomic attention. Keeping hands neutral while working with a

computer could be facilitated by using adjustable seats and the proper positioning of the keyboard and mouse. Creating awareness among computer professionals to kept the hands in a neutral position was also important[11].

The results of this study implied that CTS was an important musculoskeletal problem in administration officers who use computers. CTS have been reported to be a painful condition with numbness and tingling in the hands and an important cause of an occupational disability[14]. Therefore, it was important to make an early diagnosis of CTS in administration officers who use the computers based on clinical symptoms and examinations to prevented the development of working disability. It was also important to study the relationship of further risk factors, as well as the implement ergonomic rules to relieve suffering and pain[15].

However, this study still has limitations, firstly, the predominant population was female. Based on a comparison study of CTS between men and women, it was not clear whether the results of this study could be generalized to the male population. Secondly, electro diagnostic standard was used in this study to diagnose CTS. Then, Thirdly, the positioning of the hands did not use a detailed angle.

Conclusion

There was a correlation between the working duration both in years and in year/hours with CTS incidences based on NCS median nerve results. Also, therewasno correlation between extension hand position when using computer with CTS occurrences based on NCS median nerve wrist results at registration administration officers in Soetomo General Hospital Surabaya.

Ethical Clearance: The research process involves participants in the survey using a questionnaire that was accordant with the ethical research principle based on the regulation of research ethic committee. The present study was carried out in accordance with the research principles. This study implemented the basic principle ethics of respect, beneficence, non-maleficence, and justice.

Conflict of Interest: There is no report of conflict of interest so far and this paper is 100% original and never been published before elsewhere.

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References

1. Hasanah RA, Suwandi T, Wibowo A. Prevelance on the Occurance of Computer Vision Syndrome to VDT Operator in Bank Surabaya, Indonesia. Indian J Public Heal Res Dev. 2017;8(4).
2. Sari YK, Martiana T, Dewanti L. Factors related to personal absorbed dose in health workers at hospital's radiology unit. Indian J Public Heal Res Dev. 2018;9(12):606–11.
3. Miftahussurur M, Yamaoka Y. Diagnostic method of Helicobacter pylori infection for epidemiological studies: critical importance of indirect test validation. Biomed Res Int. 2016;2016.
4. Kusumo AD, Bramantoro T, Berniyanti T, Wening GRS, Sosiawan A, Palupi R. Actuating food residual detection habit using self-made disclosing agent solution to improve the dental hygiene for fertile age mothers. J Int Oral Heal. 2019;11(1):33.
5. Kurniasari SF, Ulfiana E, Efendi F. The effect of sleep hygiene and brain gym on increasing elderly comfort and sleep quality. Indian J Public Heal Res Dev. 2018;9(12):589–94.
6. Nakagawa S, Maeda□Iino A, Miyawaki S. Relationships of maxillofacial morphology and malocclusion with handgrip strength in adult women. Orthod Craniofac Res. 2019;
7. Sutrisno I, Firmansyah M, Widodo RB, Ardiansyah A, Rahmat MB, Syahid A, et al. Implementation of Backpropagation Neural Network and Extreme Learning Machine of pH Neutralization Prototype. In: Journal of Physics: Conference Series. IOP Publishing; 2019. p. 12048.
8. Szabo RM, Slater Jr RR, Farver TB, Stanton DB, Sharman WK. The value of diagnostic testing in carpal tunnel syndrome. J Hand Surg Am. 1999;24(4):704–14.
9. Machin A, Hamdan M. Factors Associated with Onset to Hospital Delay among Stroke Patients in the Emergency Department. Indian J Public Heal Res Dev. 2018;9(11).
10. Garfinkel MS, Singhal A, Katz WA, Allan DA, Reshetar R, Schumacher Jr HR. Yoga-based intervention for carpal tunnel syndrome: a randomized trial. Jama. 1998;280(18):1601–3.
11. Warren DJ, Otieno LS. Carpal tunnel syndrome in patients on intermittent haemodialysis. Postgrad Med J. 1975;51(597):450–2.

12. Phalen GS. The Carpal-tunnel Syndrome: Clinical Evaluation of 598 Hands. Clin Orthop Relat Res. 1972;83:29–40.
13. Katz JN, Larson MG, Sabra A, Krarup C, Stirrat CR, Sethi R, et al. The carpal tunnel syndrome: diagnostic utility of the history and physical examination findings. Ann Intern Med. 1990;112(5):321–7.
14. Katz JN, Simmons BP. Carpal tunnel syndrome. N Engl J Med. 2002;346(23):1807–12.
15. Katz JN, Stirrat CR. A self-administered hand diagram for the diagnosis of carpal tunnel syndrome. J Hand Surg Am. 1990;15(2):360–3.

A Preliminary Study: Troponin T and Reg3β in Children with Left-to-Right Shunt Congenital Heart Disease with Heart Failure

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Abstract

Background: Congenital heart disease (CHD) cause heart failure and myocardial injury. Troponin in the heart is a biomarker of myocardial injury in adults and children. Studies that examine troponin T and Reg3β in children with left-to-right shunt CHD with heart failure are still limited.

Objective: This study aims to analyse the troponin T and Reg3β in children with left-to-right shunt CHD with heart failure compared to children without heart failure.

Method: This study was a case control study of children with left-to-right shunt CHD with heart failure and children with left-to-right shunt CHD without heart failure performed with non-random sampling consecutive techniques at the Dr. Soetomo General Hospital, Surabaya in April–June 2019. The diagnosis of left-to-right shunt CHD was determined based on echocardiographic examination. All subjects with left-to-right shunt CHD were evaluated using the Paediatric Heart Failure Score. Troponin T examination was carried out using a one-dimensional electrophoresis technique, which is 12% sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE). Reg3β examination was carried out by the ELISA method. Data analysis was performed with an independent sample t test using the SPSS.

Results: This study involved 11 children, consisting of 7 children with left-to-right shunt CHD with heart failure and 4 children with left-to-right shunt CHD without heart failure. Most children (72.7%) were female, 3 children (27.3%) were ≤ 5 years old, 5 children (45.4%) were 5–10 years old and 3 children (27.3%) were > 10 years old. There was a significant increase in the Troponin T and Reg3β in children with left-to-right shunt CHD with heart failure as compared to children without heart failure.

Conclusion: Troponin T and Reg3β can be used as biomarkers in children with left-to-right shunt CHD with heart failure.

Keywords: *Congenital Heart Disease, Troponin T, Reg3β, Heart Failure.*

Introduction

Congenital heart disease (CHD) is a congenital disorder that often occurs in children[1]. Excessive pressure and volume in children with CHD creates the risk of injury to the myocardium[2]. Troponin in the heart is a biomarker of myocardial injury in adults[3]. Injury to the myocardium is the cause of elevated troponin levels in 60% of cases[4]. Studies in children mention the role of troponin as a diagnostic marker of myocarditis in children[5].

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Injury to the myocardium raises the body's response by triggering proliferation, phagocytosis and M2 macrophage polarization[6]. This role is mediated by Reg3β, which is increased due to cardiac inflammation[7] and provides a protective mechanism when cardiac injury and stress occur[6]. Previous studies have mentioned an increase in the level of injured Reg3β[8].

Several studies of biomarkers of myocardial injury have been carried out to predict the prognosis and improve outcomes in patients. Troponin T is associated with the degree of myocardial damage and can predict morbidity and mortality due to heart disease [9]. Troponin T is associated with prognosis and mortality in heart failure [10]. Another study stated that Reg3β can be used as a prognostic factor in mortality in patients with acute coronary syndrome [7]. Studies that examine troponin T and Reg3β in children with left-to-right shunt CHD with heart failure are still limited.

Material and Method

This research was a case control study conducted at the Paediatric Cardiology Outpatient Clinic, Emergency Room and Paediatric Ward, Dr. Soetomo General Hospital, Surabaya in April–June 2019. Subjects were children with left-to-right shunt CHD with heart failure with a comparison group, children without heart failure. The diagnosis of left-to-right shunt CHD was determined by echocardiographic examination. The types of cardiac abnormalities categorized as left-to-right shunt CHD included ventricular septal defect (VSD), atrial septal defect (ASD) and patent ductus arteriosus (PDA). Inclusion criteria in this study were age between 5 and 10 years and meeting the clinical criteria for heart failure according to the Paediatric Heart Failure Score. Exclusion criteria in this study were children who scheduled for surgery within the next month, impaired renal function, hyperkalaemia with serum potassium levels > 5.5 mEq/L and unstable clinical conditions, such as receiving intravenous inotropes, ventilator pneumonia and sepsis. Sampling was done by consecutive non-random sampling techniques. All subjects with left-to-right shunt CHD were evaluated using the Paediatric Heart Failure Score.

Troponin T measurement was carried out using a one-dimensional electrophoresis technique, which is 12% SDS-PAGE. Reg3β measurement was performed using the ELISA method.

The mean difference between the two groups was evaluated by the independent sample t test if the data were normally distributed and the Mann-Whitney U test if the data were not normally distributed. The normality of data distribution was tested with the Shapiro-Wilk test. Differences in troponin T and Reg3β in children with left-to-right shunt CHD with heart failure and children without heart failure were analysed using an independent sample t test. Data were analysed using the Statistical Package for Social Sciences (SPSS).

Findings: A total of 11 children were involved in this study, consisting of 8 (72.7 %) females, 3 children (27.3 %) ≤ 5 years old, 5 children (45.4 %) 5–10 years old and 3 children (27.3 %) > 10 years old (Table 1).

Table 1. Subject Characteristics

Variable	Case n (%)	Control n (%)
Sex		
Female	5 (71.4 %)	3 (75 %)
Male	2 (28.6 %)	1 (25 %)
Age		
≤ 5 years old	2 (28.6 %)	1 (25 %)
5–10 years old	3 (42.8 %)	2 (50 %)
> 10 years old	2 (28.6 %)	1 (25 %)

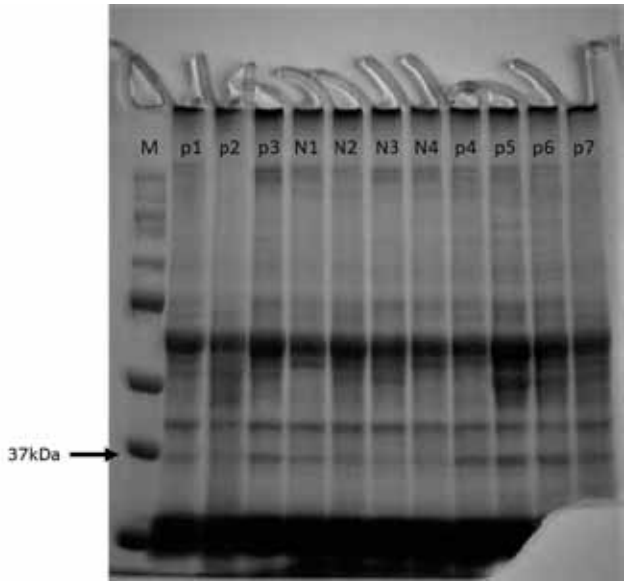

Figure 1. Troponin T

Figure 1 showed the measurement of Troponin T using 12% SDS-PAGE. This study showed that there was a significant increase in 37 kDa protein distribution (Troponin T). The protein band profile obtained from the SDS-PAGE electrophoresis showed differences in

the synthesized protein bands. The group with left-to-right shunt CHD with heart failure had higher Troponin T levels as compared to the group without heart failure (Table 2).

Table 2. Level of Reg3β and Troponin T

	Case (Mean ± Standard Deviation)	Control (Mean ± Standard Deviation)
Reg3β (ng/mL)	19.063 ± 0.619	9.978 ± 0.678
Troponin T	42.600 ± 15.545	6.831 ± 5.61

Reg3β ELISA results showed that there was a significant increase in Reg3β levels in the left-to-right shunt CHD group with heart failure as compared to controls (Table 2).

Discussion

CHD is a congenital disorder that often occurs in children and accounts for up to 1/3 of cases of congenital abnormalities in children [1]. CHD occurs in 6 to 10 per 1000 live births, with an average of 8 out of 1000 live births [11]. The highest prevalence of CHD occurs in Asian countries, which is 9.3 out of 1000 live births [1]. CHD is divided into several types, including right-to-left shunt CHD, obstructive heart disease, cyanotic heart disease and miscellaneous heart disease. The pathogenesis of CHD is multifactorial, including genetic factors or chromosomal abnormalities, environmental factors, maternal infections, smoking and alcohol during pregnancy, pregnancy with diabetes mellitus and obesity during pregnancy or interactions of all these factors [12].

Heart failure can be a complication of CHD. Left-to-right shunts of CHD that can generally cause heart failure include VSD, ASD, atrioventricular septal defect (AVSD) and patent ductus arteriosus (PDA) with moderate to large diameter defects. Children with CHD have a risk of myocardial injury due to excess pressure and volume [2].

Troponin is a single homogeneous protein consisting of four main protein fractions using SDS-PAGE, namely fraction 2, fraction 3 and fraction 4 [13]. There are three forms of troponin, namely troponin T (TnT), troponin I (TnI) and troponin C (TnC) [14]. Troponins in the heart are distinguished by regions with different amino acid sequences. Fraction 2 (~24 kDa) is called TnI ('I' for inhibitory), which inhibits the activity of Mg^{2+}-dependent actomyosin ATPase in the absence of Ca^{2+}. Fraction 3 (~37 kDa) is bound to tropomyosin, so it is called TnT ('T' for tropomyosin), which connects tropomyosin and troponin complexes. Fraction 4 (~20 kDa) is bound to Ca^{2+} and is referred to as TnC ('C' for calcium), which regulates the activity of thin-filaments [13].

Troponin and tropomyosin work to regulate muscle contraction [14]. Troponin levels increase significantly in children with VSD and ASD as compared to healthy children. This condition indicates a significant increase in volume and pressure because left-to-right shunts in CHD can cause damage to the myocardium [15]. Troponin correlates with oxygen saturation and ejection fraction in children with CHD [2].

This study found that children with left-to-right shunt CHD with heart failure had higher levels of troponin T as compared to children without heart failure. Troponin T is associated with myocardial injury in children. However, studies in new-borns have shown that troponin T levels were neither related to the type of heart failure nor the type of heart abnormality [16].

Reg (Regenerating gene) is a protein that was first isolated from rat cDNA and consists of three subtypes, namely types I, II and III. Reg3 consists of Reg3α, Reg3β and Reg3γ [17]. Reg3β was first found in mice models with pancreatitis [18]. Previous studies have suggested that Reg3β was associated with the intensity of inflammation in the heart and increased in cases of acute coronary syndrome [7].

In this study, there was an increase in Reg3β levels in children with left-to-right shunt CHD with heart failure. Previous studies have suggested that Reg3β was involved in the mechanism of protection against cardiac injury and stress [6]. Reg3β levels increase in cardiac ischemia. Healing myocardium after injury requires macrophages [8]. Reg3β plays a role in the repair of myocardial injury by triggering proliferation, phagocytosis and polarization of M2 macrophages [6].

Conclusion

Troponin T and Reg3β can be used as biomarkers in children with left-to-right shunt CHD with heart failure.

Conflict of Interest: The authors declare that there is no conflict of interest regarding this research.

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Ethical Clearance: This study was approved by the Ethical Committee of Dr. Soetomo General Hospital, Surabaya No. 1198/KEPK/V/2019.

Reference

1. van der Linde D, Konings EEM, Slager MA, Witsenburg M, Helbing WA, Takkenberg JJM, et al. Birth Prevalence of Congenital Heart Disease Worldwide. Journal of the American College of Cardiology. 2011 Nov;58(21):2241–7.
2. Hafez MO, Morsy SM, Mahfoz RA, Ali AR. Myocardial Injury in Children with Unoperated Congenital Heart Diseases. Cardiology Research and Practice. 2015;2015:1–5.
3. Myhre PL, O'Meara E, Claggett BL, de Denus S, Jarolim P, Anand IS, et al. Cardiac Troponin I and Risk of Cardiac Events in Patients With Heart Failure and Preserved Ejection Fraction. Circulation: Heart Failure [Internet]. 2018 Nov [cited 2019 Dec 15];11(11). Available from: https://www.ahajournals.org/doi/10.1161/CIRCHEARTFAILURE.118.005312
4. McCarthy CP, Raber I, Chapman AR, Sandoval Y, Apple FS, Mills NL, et al. Myocardial Injury in the Era of High-Sensitivity Cardiac Troponin Assays: A Practical Approach for Clinicians. JAMA Cardiology. 2019 Oct 1;4(10):1034.
5. Eisenberg MA, Green-Hopkins I, Alexander ME, Chiang VW. Cardiac Troponin T as a Screening Test for Myocarditis in Children: Pediatric Emergency Care. 2012 Nov;28(11):1173–8.
6. Zhou S, Jiang H, Wang H, Lu H, Chen R, Xu H, et al. Reg3β from cardiomyocytes regulated macrophage migration, proliferation and functional skewing in experimental autoimmune myocarditis. Am J Clin Exp Immunol. 2018;7(2):8–15.
7. Lörchner H, Widera C, Hou Y, Elsässer A, Warnecke H, Giannitsis E, et al. Reg3β is associated with cardiac inflammation and provides prognostic information in patients with acute coronary syndrome. International Journal of Cardiology. 2018 May;258:7–13.
8. Lörchner H, Pöling J, Gajawada P, Hou Y, Polyakova V, Kostin S, et al. Myocardial healing requires Reg3β-dependent accumulation of macrophages in the ischemic heart. Nature Medicine. 2015 Apr;21(4):353–62.
9. Lipshultz SE, Rifai N, Sallan SE, Lipsitz SR, Dalton V, Sacks DB, et al. Predictive Value of Cardiac Troponin T in Pediatric Patients at Risk for Myocardial Injury. Circulation. 1997 Oct 21;96(8):2641–8.
10. Kociol RD, Pang PS, Gheorghiade M, Fonarow GC, O'Connor CM, Felker GM. Troponin Elevation in Heart Failure. Journal of the American College of Cardiology. 2010 Sep;56(14):1071–8.
11. Wren C. The Epidemiology of Cardiovascular Malformations. In: Moller JH, Hoffman JIE, editors. Pediatric Cardiovascular Medicine [Internet]. Oxford, UK: Wiley-Blackwell; 2012 [cited 2019 Dec 21]. p. 268–75. Available from: http://doi.wiley.com/10.1002/9781444398786.ch19
12. Nakanishi T, Markwald RR, Baldwin HS, Keller BB, Srivastava D, Yamagishi H, editors. Etiology and Morphogenesis of Congenital Heart Disease: From Gene Function and Cellular Interaction to Morphology [Internet]. Tokyo: Springer; 2016 [cited 2019 Dec 21]. Available from: http://www.ncbi.nlm.nih.gov/books/NBK500252/
13. Park KC, Gaze DC, Collinson PO, Marber MS. Cardiac troponins: from myocardial infarction to chronic disease. Cardiovascular Research. 2017 Dec 1;113(14):1708–18.
14. Lippi G, Targher G, Franchini M, Plebani M. Genetic and biochemical heterogeneity of cardiac troponins: clinical and laboratory implications. Clinical Chemistry and Laboratory Medicine [Internet]. 2009 Jan 1 [cited 2019 Dec 10];47(10). Available from: https://www.degruyter.com/view/j/cclm.2009.47.issue-10/cclm.2009.322/cclm.2009.322.xml
15. Sugimoto M, Ota K, Kajihama A, Nakau K, Manabe H, Kajino H. Volume Overload and Pressure Overload due to Left-to-Right Shunt-Induced Myocardial Injury. Circulation Journal. 2011;75(9):2213–9.
16. Tarkowska A, Furmaga-Jabłońska W. The Evaluation of Diagnostic Role of Cardiac Troponin T (cTnT) in Newborns with Heart Defects. The Scientific World Journal. 2012;2012:1–6.

17. Narushima Y, Unno M, Nakagawara K, Mori M, Miyashita H, Suzuki Y, et al. Structure, chromosomal localization and expression of mouse genes encoding type III Reg, RegIIIα, RegIIIβ, RegIIIγ. Gene. 1997 Feb;185(2):159–68.
18. Iovanna J, Orelle B, Keim V, Dagorn JC. Messenger RNA sequence and expression of rat pancreatitis-associated protein, a lectin-related protein overexpressed during acute experimental pancreatitis. J Biol Chem. 1991 Dec 25;266(36):24664–9.

The Combination of SLC2A9 Gene (rs2280205 and rs6820230) and Major Metabolic Factors with Association to Gout in Thai Men; A Matched Case-Control Study

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Abstract

A combination of non-synonymous variants, rs2280205 and rs6820230 of the SLC2A9 gene and major metabolic parameters contribute to developing gout remains not well studied or assessed in Thai men. This study was conducted to assess the association between combined of two non-synonymous variants and gout. Using data from male subjects of age ≥ 20 years in the Genetic variation of Urate transporter genes in Hyperuricemia and Gout among Thai population Study (GUHGTHS). We randomly performed a 1:1 age-matched case-control study that included 48 gout patients and 48 non-gout subjects. Using multivariate logistic regression analysis was used to analyze data. The single and joint locus effect of rs2280205 and rs6820230 variants were independently associated with gout. However, the combination of rs2280205 and high fasting glucose, including rs6820230 variant and high fasting glucose were associated with gout, the adjusted odds ratio was 13.70-fold and 5.81-fold, respectively. Meanwhile, we did not observe an association between these variants and high blood pressure, including general obesity with gout.

In conclusion, rs2280205 and rs6820230 variants did independently associated with increased risk of gout, but predominantly occurred in high fasting glucose subjects. However, further studies with larger sample sizes and homogeneous populations should be confirmed these results.

Keywords: *rs2280205 variant, rs6820230 variant, gout, metabolic parameters.*

Introduction

Gout has an increasing prevalence and incidence in the Asia-Pacific region.[1-2] Genetic factors play an essential role in the risk of gout. The genome-wide association studies (GWAS) have identified that more than 20 multiple loci associated with gout in American-European populations.[3-6] A subsequent functional study revealed that glucose transporter 9 encoded by SLC2A9 gene possibly interfered with excretion of urate.[7-10] However, several studies have reported the association of some non-synonymous variants of SLC2A9 gene to gout.[11-13] The two common rs2280205 and rs6820230 variants have been described as possible sites of interaction with urate and glucose, thereby interfering with their excretion.[14] Previous studies in 2014 showed that rs2280205 variant was reduced associated with the risk of gout (32%), while rs6820230 variant was increased with susceptibility to gout in Caucasian.[15] A frequent rs2280205 variant was associated with

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slightly lower serum uric acid reduction of 5 to 10%.[3,16] However, studies on theses variants did not show an association with gout[(3,16)]. Moreover, previous studies revealed that the risk factors of gout are complicated due to environmental factors, particularly in men, postmenopausal,[17-19] diuretics,[17,19] seafood,[19] and sugar-sweetened soft drinks.[20] Previously, several studies also revealed that the major associated factors of metabolic syndrome including obesity,[21-23] hypertension,[23,24] and high fasting glucose[25,26] are independently associated with gout. The previous studies also provided successful findings which indicated the associations of genetic variants and major metabolic factors that play a part in determining the risk of developing gout. However, the association between rs2280205 and rs6820230 variants and gout risk in Thai men has never been examined. Thus, the aim of this study was to investigate the effects of these variants, SNP-SNP interaction and a combination of genetic and major metabolic factors contributing to the development of gout.

Materials and Method

Study Population: This matched case-control study was performed using the GUHGTHS data. The target population was men with age ≥ 20 years and had participated in health examinations and blood sampling. of the 145 subjects (77 gout patients and 68 non-gout subjects) whose data were used in 2018, subjects over 65 years of age and those with incomplete data were excluded from this study. Furthermore, subjects showing evidence of diseases related to gout such as acute heart disease, kidney disease, cancer, induce and/or reduce serum uric acid medication/substances were also excluded from the study. Gout cases and non-gout subjects were randomly selected and matched (1:1) based on age (5±10 years). As a result, a total of 96 subjects (48 gout patients and 48 non-gout subjects) were enrolled for this present study. Forty-nine subjects were excluded from the study because we could not match between cases and non-gout subjects.

Definitions: All gout patients were clinically diagnosed based on the Rome criteria[27] and confirmed by the rheumatologist. The inclusion criteria of non-gout subjects were normal level of serum uric acid and no evidence and no symptoms of gout. General obesity was classified based on body mass index (BMI) ≥ 25 kg/m^2. High fasting plasma glucose (FPG) was defined by FPG ≥ 100 mg/dl or diabetic treatment. High blood pressure (BP) was defined by systolic BP ≥ 130 mmHg or diastolic BP ≥ 85 mmHg and antihypertensive medication. Hypertriglyceridemia was defined by elevated triglyceride ≥ 150 mg/dl or medication. Finally, Low high-density lipoprotein cholesterol (HDL-C) was defined by HDL-C < 40 mg/dl or reduced HDL-C medication.

Data Collection: We recorded the results of genotype and allele distribution from the GUHGTHS. Moreover, we collected the original values of clinical and biochemical data via standardized data extraction form.

Statistical Method: All statistical analyses were performed using STATA version 14 (Stata, College Station, TX). The Hardy-Weinberg equilibrium was used to describe genotype and allele distribution.[28] Multivariate conditional logistic regression analysis was used to analyze the data. A p-value less than 5% was considered statistically significant.

Results

In Thai men, the gout patients were found to be older than the non-gout subjects (Table 1). The mean BMI and uric acid level of gout patients were higher than non-gout subjects. The percentage of gout patients with general obesity, high BP, high FPG and hypertriglyceridemia was higher than non-gout subjects, but the percentage of low HDL-C with non-gout subjects was higher than gout patients.

Our representative results of the genotype and allele distribution for rs2280205 and rs6820230 variants are shown in Table 2. A single locus effect of rs2280205 and rs6820230 variants were not associated with gout (Table 3). In addition, we found that there were no interactions between two variants with the development of gout risk. However, the interactions between rs2280205 variant with high FPG significantly increased the risk of gout. The interactions of rs6820230 variant with high FPG also increased the risk of gout. In contrast, the rs2280205 and rs6820230 variants combined with high BP and general obesity were not significantly associated with gout risk (Table 3).

Discussion and Conclusion

The present study indicated that two non-synonymous rs2280205 and rs6820230 variants were not associated with gout in Thai men. The previous studies also demonstrated that these variants did not

show an association with gout in Czech population[3] and Cameroonians.[12] However, Chisnall (2014)indicated that rs6820230 variant was associated with susceptibility to gout, whereas the rs2280205 variant could reduce (32%) the risk of gout in Caucasian.[15] Moreover, several recent studies by GWAS have identified that the SLC2A9 gene may be associated with gout.[29-31]The product of SLC2A9 gene encodes for the molecule to reabsorb uric acid in the kidney and loss of function from a mutation in this gene causes renal hypouricemia and prevents reabsorption of filtered urate proximal tubules.[7-10] When we examined the SNP-SNP interaction that could be involved in a wide range of gout-related processes. We found that the combination of rs2280205 and rs6820230 variants has no association with gout. In general, several genes can contribute to gout without their gene products ever directly interacting. We assumed that the expression of the rs2280205 and rs6820230 variants may also oppose each other, with one variant modifying the expression of another variant.

There is some evidence suggesting that major metabolic factors such as general obesity,[21-23] hypertension,[23] and high FPG[32] are associated with gout. Therefore, we hypothesized that gene-environmental interaction might also play a significant role in gout risk; our study indicated that the combination of rs2280205 and rs6820230 variants with high FPG, but not general obesity and high BP, is significantly increased the risk of gout. We agreed with the remarks of a previous study that high FPG might influence the function of glucose transporter 9 (GLUT-9)[33] and may contribute to the reabsorption of uric acid through elevated expression of the urate transporter-1.[34] we assumed that an increase of glucose in tubular fluid with an associated elevation of reabsorptive transport on GLUT-9 may inhibit uric acid reabsorption. However, the mechanisms of association between gene-environment need to be explored in near future.

The current study had few limitations. First, this study involved the use of a small number of gout patients from a single hospital-based population: Large independent studies are required to further validate our results. Secondary, we only studied two variants of SLC2A9, therefore gene-gene interactions with some other gene should be investigated in the future studies. Finally, we were not able to collect other details of major environmental factors such as alcohol, smoking, dietary consumption, waist circumference, waist to hip ratio, that could affect gout.

In conclusion, the combination of rs2280205 and rs6820230 variants and high FPG contributed to the development of gout. Our study revealed that these genetic data and an interaction analysis have provided considerably to our understanding of the pathogenesis of gout. Further studies with larger sample sizes and homogeneous populations should be confirmed.

Table 1. Baseline characteristics

Variables	Gout, n (%)	Non-gout, n (%)
Number	48	48
Age (years)	57.94±12.23	54.58±14.64
Body mass index (kg/m^2)	26.20±5.00	24.95±3.58
Body mass index ≥ 25	30(62.50)	22(45.83)
High blood pressure	41(85.42)	29(60.42)
High fasting glucose	33(68.75)	17(35.42)
Hypertriglyceridemia	33(68.75)	25(52.08)
Low HDL-C	40(83.33)	43(89.58)
Serum uric acid (mg/dL)	6.28±2.27	6.47±1.19

HDL-C: high density lipoprotein cholesterol

Table 2. Genotypes and alleles distribution

SNPs	Genotypes or Alleles	Frequencies, n (%)		p-value*
		Gout	Non-gout	
Number		48	48	
rs2280205				
	G/G	29 (60.00)	32 (67.00)	0.140
	G/A	16 (33.00)	12 (25.00)	
	A/A	3 (6.00)	4 (8.00)	
	G/A-A/A	19 (40.00)	16 (33.00)	
	Allele, G	74 (77.00)	76 (79.00)	
	Allele, A	22 (23.00)	20 (21.00)	

SNPs	Genotypes or Alleles	Frequencies, n (%)		p-value*
		Gout	Non-gout	
rs6820230				
	C/C	39 (81.00)	42 (88.00)	1.000
	C/T	9 (19.00)	6 (12.00)	
	T/T	0	0	
	C/T-T/T	9 (19.00)	6 (12.00)	
	Allele, C	87 (91.00)	90 (94.00)	
	Allele, T	9 (9.00)	6 (6.00)	

* Hardy-Weinberg equilibrium test; SNPs: single nucleotide polymorphisms

Table 3. The major risk factor associated with gout

Factors		OR (95% CI)	aOR (95% CI)
rs2280205[1]			
G/G		1.00	
G/A-A/A		1.33 (0.57-3.02)	2.70 (0.45-16.04)
rs6820230[1]			
C/C		1.00	
C/T-T/T		1.60 (0.53-4.96)	2.80 (0.51-15.47)
Best combination			
rs2280205	rs6820230		
G/G	C/C	1.00	
G/G	C/C-T/T	2.20 (0.58-8.26)	2.47 (0.39-5.57)
G/A-A/A	C/C	1.63 (0.63-4.22)	3.51 (0.90-3.64)
G/A-A/A	C/T-T/T	1.28 (0.75-2.73)	1.57 (0.70-5.40)
rs2280205	Obesity[2]		
G/G	Normal	1.00	
G/G	Obesity	1.81 (0.68-4.80)	1.48 (0.31-6.87)
G/A-A/A	Normal	1.39 (0.40-4.80)	2.09 (0.28-5.42)
G/A-A/A	Obesity	3.31 (0.81-13.52)	3.93 (0.44-5.09)
rs2280205	Fasting plasma glucose (FPG)[3]		
G/G	Normal	1.00	
G/G	High FPG	3.65 (1.06-12.68)	4.45 (0.93-11.19)
G/A-A/A	Normal	0.96(0.24-3.82)	1.25 (0.15-14.28)
G/A-A/A	High FPG	12.05(1.99-17.95)	13.70(1.59-15.25)
rs2280205	Blood pressure (BP) [4]		
G/G	Normal	1.00	
G/G	High BP	7.31 (0.48-8.24)	7.38 (0.85-9.42)
G/A-A/A	Normal	2.20 (0.26-6.77)	3.68 (0.46-8.73)
G/A-A/A	High BP	7.31 (0.46-8.64)	7.84 (0.18-9.87)
rs6820230	Obesity[2]		
C/C	Normal	1.00	
C/C	Obesity	1.15 (0.46-2.86)	0.89 (0.24-3.21)
C/T-T/T	Normal	0.52 (0.88-3.05)	0.56 (0.46-6.87)
C/T-T/T	Obesity	6.68 (0.81-9.16)	3.14 (0.24-4.65)

Factors		OR (95% CI)	aOR (95% CI)
rs6820230	Fasting plasma glucose (FPG) [3]		
C/C	Normal	1.00	
C/C	High FPG	4.88 (1.47-6.16)	7.47 (0.53-6.47)
C/T-T/T	Normal	1.40 (0.20-9.81)	3.98 (0.22-7.04)
C/T-T/T	High FPG	7.12 (1.18-13.04)	5.81(1.88-8.21)
rs6820230	Blood pressure (BP) [4]		
C/C	Normal	1.00	
C/C	High BP	3.43 (0.15-7.78)	5.06 (0.78-9.58)
C/T-T/T	Normal	1.54 (0.26-8.66)	4.27 (0.28-8.29)
C/T-T/T	High BP	1.03 (0.11-6.58)	1.53 (0.19-4.68)

OR: crude odds ratio; Adjusted odds ratio (aOR) 1) obesity, high BP, hypertriglyceridemia and high FPG, 2) high FPG and hypertriglyceridemia; 3) obesity, high BP and hypertriglyceridemia; 4) obesity, high FPG and hypertriglyceridemia

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Ethical Clearance: This study was approved by Khon Kaen University Ethics Committee for Human Research (No.HE612369).

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References

1. Kuo C-F, Grainge MJ, Zhang W, Doherty M. Global epidemiology of gout: prevalence, incidence and risk factors. Nat Rev Rheumatol. 2015; 11:649.
2. Liu R, Han C, Wu D, Xia X, Gu J, Guan H, et al. Prevalence of Hyperuricemia and Gout in Mainland China from 2000 to 2014: A Systematic Review and Meta-Analysis. Biomed Res Int. 2015;762820(10):10.
3. Hurba O, Mancikova A, Krylov V, Pavlikova M, Pavelka K, Stiburkova B. Complex analysis of urate transporters SLC2A9, SLC22A12 and functional characterization of non-synonymous allelic variants of GLUT9 in the Czech population: no evidence of effect on hyperuricemia and gout. PLoS One. 2014;9(9).
4. Kottgen A, Albrecht E, Teumer A, Vitart V, Krumsiek J, Hundertmark C, et al. Genome-wide association analyses identify 18 new loci associated with serum urate concentrations. Nat Genet. 2013;45(2):145-54.
5. Phipps-Green AJ, Merriman ME, Topless R, Altaf S, Montgomery GW, Franklin C, et al. Twenty-eight loci that influence serum urate levels: analysis of association with gout. Ann Rheum Dis. 2016;75(1):124-30.
6. Reginato AM, Mount DB, Yang I, Choi HK. The genetics of hyperuricaemia and gout. Nat Rev Rheumatol. 2012;8(10):610-21.
7. Roddy E, Choi H. Epidemiology of Gout. Rheum Dis Clin North Am. 2014;40(2):155-75.
8. Reginato AM, Mount DB, Yang I, Choi HK. The genetics of hyperuricaemia and gout. Nat Rev Rheumatol. 2012;8(10):610-21.
9. Matsuo H, Chiba T, Nagamori S, Nakayama A, Domoto H, Phetdee K, et al. Mutations in glucose transporter 9 gene SLC2A9 cause renal hypouricemia. Am J Hum Genet. 2008;83(6):744-51.
10. Anzai N, Ichida K, Jutabha P, Kimura T, Babu E, Jin CJ, et al. Plasma urate level is directly regulated by a voltage-driven urate efflux transporter URATv1 (SLC2A9) in humans. J Biol Chem. 2008;283(40):26834-8.
11. Hollis-Moffatt JE, Gow PJ, Harrison AA, Highton J, Jones PB, Stamp LK, et al. The SLC2A9 nonsynonymous Arg265His variant and gout: evidence for a population-specific effect on severity. Arthritis Res Ther. 2011;13(3).

12. Nkeck JR, SingwéNgandeu M, Ama Moor V, Nkeck JP, Chedjou J-P, Ndoadoumgue AL, et al. Genetic analysis for rs2280205 (A>G) and rs2276961 (T>C) in SLC2A9 polymorphism for the susceptibility of gout in Cameroonians: a pilot study. BMC Res Notes. 2018;11(1):230-.
13. Roman YM, Culhane-Pera KA, Menk J, Straka RJ. Assessment of genetic polymorphisms associated with hyperuricemia or gout in the Hmong. Per Med. 2016;13(5):429-40.
14. Sun L, Zeng X, Yan C, Sun X, Gong X, Rao Y, et al. Crystal structure of a bacterial homologue of glucose transporters GLUT1-4. Nature. 2012;490(7420):361-6.
15. Chisnall AJ. The role of SLC2A9 Variants in Hyperuricemia and Gout. University of Otago2014; Available from: http://hdl.handle.net/10523/5046.
16. McArdle PF, Parsa A, Chang YP, Weir MR, O'Connell JR, Mitchell BD, et al. Association of a common nonsynonymous variant in GLUT9 with serum uric acid levels in old order amish. Arthritis Rheum. 2008;58(9):2874-81.
17. Ragab G, Elshahaly M, Bardin T. Gout: An old disease in new perspective – A review. Int J Adv Res. 2017;8(5):495-511.
18. Kumar S, Gupta R, Suppiah R. Gout in women: differences in risk factors in young and older women. N Z Med J. 2012;125(1363):39-45.
19. Choi HK, Atkinson K, Karlson EW, Willett W, Curhan G. Purine-rich foods, dairy and protein intake and the risk of gout in men. N Engl J Med. 2004;350(11):1093-103.
20. Choi HK, Curhan G. Soft drinks, fructose consumption and the risk of gout in men: prospective cohort study. BMJ. 2008;336(7639):309-12.
21. Cea Soriano L, Rothenbacher D, Choi HK, Garcia Rodriguez LA. Contemporary epidemiology of gout in the UK general population. Arthritis Res Ther. 2011;13(2).
22. Maynard JW, McAdams De Marco MA, Baer AN, Kottgen A, Folsom AR, Coresh J, et al. Incident gout in women and association with obesity in the Atherosclerosis Risk in Communities (ARIC) Study. Am J Med. 2012;125(7):8.
23. Bhole V, de Vera M, Rahman MM, Krishnan E, Choi H. Epidemiology of gout in women: Fifty-two-year followup of a prospective cohort. Arthritis Rheum. 2010;62(4):1069-76.
24. Rothenbacher D, Primatesta P, Ferreira A, Cea-Soriano L, Rodriguez LA. Frequency and risk factors of gout flares in a large population-based cohort of incident gout. J Rheumatol. 2011;50(5):973-81.
25. Facchini F, Chen YD, Hollenbeck CB, Reaven GM. Relationship between resistance to insulin-mediated glucose uptake, urinary uric acid clearance and plasma uric acid concentration. Jama. 1991;266(21):3008-11.
26. Muscelli E, Natali A, Bianchi S, Bigazzi R, Galvan AQ, Sironi AM, et al. Effect of insulin on renal sodium and uric acid handling in essential hypertension. Am J Hypertens. 1996;9(8):746-52.
27. Bardin T, Richette P. Definition of hyperuricemia and gouty conditions. CurrOpinRheumatol. 2014;26(2):186-91.
28. Shan G. A note on exact conditional and unconditional tests for Hardy-Weinberg equilibrium. Hum Hered. 2013;76(1):10-7.
29. Kim YS, Kim Y, Park G, Kim SK, Choe JY, Park BL, et al. Genetic analysis of ABCG2 and SLC2A9 gene polymorphisms in gouty arthritis in a Korean population. Korean J Intern Med. 2015;30(6):913-20.
30. Matsuo H, Yamamoto K, Nakaoka H, Nakayama A, Sakiyama M, Chiba T, et al. Genome-wide association study of clinically defined gout identifies multiple risk loci and its association with clinical subtypes. Ann Rheum Dis. 2016;75(4):652-9.
31. Merriman TR, Dalbeth N. The genetic basis of hyperuricaemia and gout. Joint Bone Spine. 2011;78(1):35-40.
32. Pan A, Teng GG, Yuan J-M, Koh W-P. Bidirectional Association between Diabetes and Gout: the Singapore Chinese Health Study. Sci Rep. 2016; 6:25766.
33. Ruiz A, Gautschi I, Schild L, Bonny O. Human Mutations in SLC2A9 (Glut9) Affect Transport Capacity for Urate. Front Physiol. 2018; 9:476.
34. Enomoto A, Kimura H, Chairoungdua A, Shigeta Y, Jutabha P, Cha SH, et al. Molecular identification of a renal urate anion exchanger that regulates blood urate levels. Nature. 2002;417(6887):447-52.

Acute Infection Following Flood Disaster: An Example from Bojonegoro District, East Java, Indonesia

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Abstract

On December 27, 2007, huge flood inundated Bojonegoro district, Indonesia. Our study aims were to investigate occurrence and risk factors of acute infections following the Bojonegoro flood. This survey with multistage-cluster sampling studied 1016 flooded-household members, 1021 non-flooded members. Chi-square test and Cox multiple-regression model were used in the analysis. Half of flooded-household members experienced acute infections within 1 month after flood, predominantly dermatitis (prevalence rate: 20.4%), acute respiratory tract infection (19.1%), gastroenteritis (10.7%) and dengue hemorrhagic fever (0.7%). The prevalence rates of these infections were higher than official rates before flood. Age, household status, contact duration with flood water were significant risk factors of gastro-enteritis, while for acute respiratory infection, number of household member, age, contact duration with floodwater, socio-economic status, displacement duration were the significant predictors. Environmental disruption, poor hygiene and sanitation, displacement and evacuation may increase the likelihood of spreading acute infections following the flood.

Keywords: *Flood, dermatitis, respiratory infection, gastroenteritis, Bojonegoro.*

Introduction

Since 2006, Indonesia was in 4th rank of countries in the world most frequently hit by natural disasters. Most of the events were hydrological, predominantly flood.[1].

On December 27, 2007, one of the most disastrous floods in Indonesia attacked Bojonegorodistrict in East Java province, after days of heavy rain and overflowing of the great river Bengawan Solo,inundating 60% of its sub-districts and displacing 229,000 people.[2]

Since 1966 until now, Bojonegoro, located in the downstream of Bengawan Soloriver, was frequently hit by floods due to ecologic and infrastructure factors such as overflowing of the river, poor drainage system, ecological destruction, lack of river capacity, etc.[3,4] Yet, there was little information about health impact, including occurrences of infections following flood. Our study was then aimed to investigate occurrence and risk factors of acute infections following the Bojonegoro flood.

Method

This cross-sectional study, done in 2008 in Bojonegoro district through multistage-cluster sampling,had selected randomly 25 villages from 167 flooded villages and also 25 villages from 268 non-flooded villages.

Among 25 flooded villages, we collected data from 245 randomly selected flooded households, with 1,016 household members. Simultaneously, among 25 non-flooded villages, we also collected data from 244 randomly selected non-flooded households, with 1,021 members.

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Respondents were heads of the households (or spouses) aged 18+ years old and/or had ever got married and signed informed consent. Standard pre-tested questionnaire was used in guided interview to elaborate socio-demographic profile, evacuation, displacement, environmental disruption, hygiene and sanitation, and acute infection (based on history, symptoms and signs, as diagnosed by physician).The prevalence rates after flood was compared with officially reported prevalence rates before flood in 2007 (from National Basic Health Survey) in Bojonegoro population.[5] Prevalence Ratio (PR) with its 95%confidence interval (CI) were used to measure associations. Chi-square test and Cox regression model were applied.

Ethical clearance (letter No.62/KE/12/08) was obtained from Health Research Ethical Committee, Faculty of Public, Universitas Indonesia.

Results

Majority of respondents were males, adults aged 20+, married, low educated and displaced. Flooded household members were commonly exposed with flood water for 90 minutes/day (table not shown).

Most flooded household members were displaced for 8 days and majority moved to relatives/friends/ neighbors' houses and many moved to other villages. The flood,generally, reached 1-meter height inside house and lasted for 10 days. (Table 1).

Table 1. Flooding, Evacuation and Displacement

Variables	Flooded households (N=245)	
	n	%
Displacement		
No	59	24.1
Yes, displaced	186	75.9
Place of evacuation/displacement		
Relative's house	76	40.9
Friend's/neighbor's house	23	12.4
Public building (school, offices, mosque/church)	53	28.5
Tent/barrack	11	5.9
Other	23	12.4
Area of evacuation/displacement		
Same village	110	59.1
Different village, same sub-district	37	19.9
Different sub-district, same district	28	15.1
Different district	11	5.9
Separation with household member during displacement (N = 186)		
No	124	66.7
Yes	62	33.3
	Flooded Household	
	Mean (SD)	**Range**
Water level inside house (meter) (N=245)	1.0 (0.5)	0.10 – 2.5
Duration of flooding in house/yard(day) (N=245)	10.2 (6.6)	1 - 60
Duration of displacement (days) (N=186)	7.7 (3.6)	2 - 30

Comparison between proportions of flooded households having certain hygiene and sanitation conditions at moments before and after flood showed very significant differences (p-value<<0,05), such as decrease of using bored/spring water, increase of using bottled water/water supply (from government/agencies), increase of poor drinking water quality, increase of drinking raw (not-boiled) water, increase of defecating

in open places (e.g. garden, field, bushes, river and flood water), increase of throwing garbage to river/drain/ditch (table not shown).

About half of flooded-household members reported experiencing acute infectionsone month after flood occurrence. The predominant acute infections were skin infection/dermatitis (prevalence rate: 20.4%), acute respiratory-tract infection (ARI) (19.1%) and gastro-enteritis (GE) (10.7%) (table not shown). The past prevalence rates of dermatitis, ARI, GE and Dengue hemorrhagic fever (DHF)within 1 month after flood were substantially higher (p-value<<0,05) than corresponding officially reported prevalence rates before flood (i.e. dermatitis: 0.7%; ARI: 16.2%; GE: 6.5%; DHF: 0.2%).[5] (Figure 1).

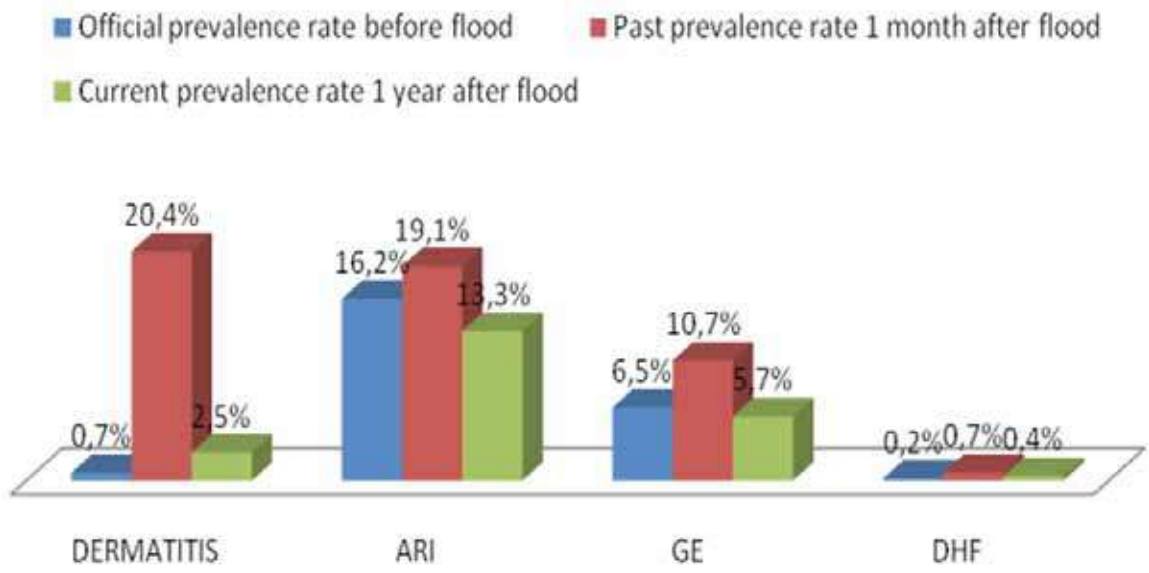

Figure 1. Prevalence Rates of Acute Infections among Bojonegoro Population

We found that age, household status and contact duration with flood water were significant predictors of GE. (Table 2)

Table 2. Important Predictors of Gastroenteritis, 1 Month after Flood,Using Cox Regression Model

Predictors	β	SE	p-value	PR (95% CI)
Age Group (Years)			**.000**	
0-5	1.733	.399	.000	5.7 (2.6 -- 12.4)
6-14	.887	.382	.020	2.4 (1.2 -- 5.1)
50+	.499	.235	.034	1.7 (1.1 -- 2.6)
15-49				1.0
Household status			**.002**	
Child	1.126	.322	.000	3.1 (1.6 -- 5.8)
Spouse	.965	.334	.004	2.6 (1.4 -- 5.1)
Head				1.0
Contact duration with floodwater (minutes/day)			**.000**	
> 120	3.236	.495	.000	25.4 (9.6 -- 67.1)
31-120	3.247	.474	.000	25.7 (10.2 -- 65.1)
≤30	2.903	.480	.000	18.2 (7.1 -- 46.6)
0				1.0

β is regression model coefficient and SE is standard error.

Concerning ARI, we found that the number of household members, age, contact duration with floodwater, social-economic status, duration of displacement were significant predictors (Table 3).

Table 3. Important Predictors of Acute Respiratory Infection, 1 Month After Flood,Using Cox Regression Model

Predictors	β	SE	p-value	PR (95% CI)
Number of HH members	-.173	.051	.001	0.84 (0.76 -- 0.93)
Age Group (Years)			.000	
0-5	1.093	.242	.000	3.0 (1.9 -- 4.8)
6-14	.487	.205	.017	1.6 (1.1 -- 2.4)
50+	.368	.183	.045	1.4 (1.0 -- 2.1)
15-49				1.0
Contact duration with floodwater (minutes/day)			.008	
> 120	1.314	.478	.006	3.7 (1.5 -- 9.5)
31-120	1.052	.471	.026	2.9 (1.1 -- 7.2)
≤30	.783	.466	.093	2.2 (0.9 -- 5.5)
0				1.0
Social-economic status			.001	
Low	-.538	.184	.004	0.6 (0.4 -- 0.8)
Medium	-.553	.174	.002	0.6 (0.4 -- 0.8)
High				1.0
Duration of displacement (days)			.118	
10-30	.415	.222	.062	1.5 (0.9 -- 2.3)
1-9	.371	.195	.057	1.5 (1.0 -- 2.1)
0				1.0

β is regression model coefficient and SE is standard error.

Discussion

Official reported that Bojonegoro flood submerged and damaged 16 sub-districts, 131 villages, 2.544 hectares of rice fields, 15 health centers and displaced 2,715 families/229.00 people and caused 8 deaths.[2]

Overflow of Bengawan Solo, the longest great river in Java Island, due to torrential rains and damage of dams,were essential factors resulting in huge flood. We found large proportion of house damages and disturbances of water and sanitation (especially concerning drinking water) and sewage system. Environmental disruption, poor hygiene and sanitation, displacement and evacuation may increase likelihood of spreading common acute infectious diseases leading to outbreak after flood.[6–8]

Official report (within 3 weeks of flooding period) of main infections was consistent with our finding, i.e. skin problems (12,089 cases), acute respiratory infection/ influenza (9,341 cases), myalgia (3,844), and diarrhea (2,492).[2]

The significant increase of prevalence rates of dermatitis, acute respiratory-tract infection (ARI), gastro-enteritis (GE) and Dengue hemorrhagic fever (DHF) occurred within 1 month after flood, as compared to official rates before flood suggests high likelihood of transmission/spreading of the four acute infections in Bojonegoro population, especially among displaced and evacuated.

Our finding demonstrated that children, especially the under-five, had the largest risk to experience GE and ARI after flood. Similarly, in Aceh province, after tsunami, children had higher odds to get acute diseases.[9]

Dermatitis/eczema and skin infections after flood were also reported by Vietnam and Taiwan studies.[10,11] Studies from Taiwan and Pakistan[11,12] showed that skin infection, eye and GE, frequently occured during/

after flood, because of exposure to contaminated water. During flood, pathogenic organism might be carried away by flood waters and introduced to the surface waters.[11]. Failure to wash and treat wounds (even minor wounds) with clean water may cause infection. Skin problems founded after 2004 tsunami were infections, infestations, fungal infections, including *tinea corporis*, eczemas and lacerations.[13]

The increased prevalence of ARI could be attributed to housing/shelter and environmental factors, e.g. displacement, overcrowding, and poor ventilation, poor sanitation, cold temperatures, and individual susceptibility.[14–17]. These factors existed during the Bojonegoro flood, especially during displacement in shelter. Our finding showed;experiencing some days of displacement gave 50% increasing risk to get ARI.

Pathogens, such as, virus (e.g. *Rotavirus),* bacteria(e.g. *Vibrio Cholera*, *Salmonella enterica, Enterotoxigenic Escherichia Coli*), and protozoa (e.g. *Entamoeba Histolytica*) may cause GE/diarrhea transmitting through drinking water contamination. Nevertheless, we did not examine the etiologic pathogens causing GE. When water purification and sewage disposal systems are disturbed or underground pipelines and storage tanks were damaged, sources of clean water might be contaminated by wastes leading to water-borne transmission of diarrhea/GE. The fecal-oral transmission, especially in crowded shelter, may further boost the spread of diarrhea/GE.[12,18]. Humid and hot environment may be in favor of the growth and reproduction of pathogenic bacteria of gastrointestis.[19] This may explain the possible increase of GE prevalence during/after the Bojonegoro flood. Our finding underlined; the longer being exposed with flood water, the stronger the risk to experience GE. Flood study in 2007 in Anhui Province, China, demonstrated that longer duration of moderate flooding may cause greater risk and burdens of diarrhea than shorter duration of severe flooding.[20] In Netherland exposed to floodwater was significantly associated GE and ARI.[21] Many studies from many countries showing consistent associations between flood and diarrhea/ GEstrongly supported our finding.[6,11,23–26,12,14–18,20,22,27] Significant increase of proportion of not boiling water for drinking after flood, indicating poor access to clean drinking water, might have also contributed to this contamination. Host immunity, overcrowding and poor hygiene and sanitation might have played important role in this transmission dynamics.[12,14,18]

Increase of incidence or prevalence of mosquito-borne diseases after rainfall or floods, were due to increasing breeding sites created by the puddle or filled container, especially when the drain is blocked or the water flow is stagnant.[18,28,29] Positive effect of flood on the increase of DHF incidence, might particularly occurred in endemic areas of dengue fever.[15]

Our study limitation were difficulties to recall subject memories and having missing values in several variables.

We conclude that; 1) prevalence rates of dermatitis, ARI,GE and DHF increased substantially after flood;2) age, household status and duration of contact with flood water were the most important predictors for GE;3) number of household members, age, contact duration with flood water, social-economic status, duration of displacement were the most important determinants of ARI; 4) Environmental disruption, poor hygiene and sanitation, displacement and evacuation might increase the likelihood of spreading the infections after flood.

We recommend to, firstly, implement high standard management of displaced population, including quick restoration of environmental disruption, hygiene and water sanitation and sewage system, in order to prevent/minimize occurrence of predominant acute infections, after flood, like dermatitis, GE and ARI and DHF. Secondly,is to monitor and control effectively the spread of predominant acute infections in flood-prone areas through strong routine and emergency surveillance system, including EWARS (early warning and alert response system). Specific intervention might be strengthened to prevent the spread of acute infections among under-five children in flood-prone areas, including achieving and maintaining very high immunization coverage (in accordance to national guideline) and improving their nutritional status.

Conflict of Interest: None declared

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References

1. Guha-sapir D, Hoyois P, Wallemacq P, Below R. Annual Disaster Statistical Review 2016 The numbers and trends Annual Disaster Statistical

Review 2016 The numbers and trends. Belgium: Centre for Research on the Epidemiology of Disasters (CRED); 2016.

2. Dinas Kesehatan Bojonegoro. Rapid Health Assessment Bencana Banjir di Daerah Aliran Bengawan Solo, Kabupaten Bojonegoro (Rapid Health Assessment Flood Disaster in Flowing Area of Bengawan Solo River, Disrict of Bojonegoro). Bojonegoro; 2008. (Unpublished Report).
3. Rini I, Ari D, Anggraeni M, Santosa EB. Climate change, flood and homes : Understanding location preferences in Indonesia. 2015. (17).
4. Prastica RMS, Maitri C, Hermawan A, Nugroho PC, Sutjiningsih D, Anggraheni E. Estimating design flood and HEC-RAS modelling approach for flood analysis in Bojonegoro city Estimating design flood and HEC-RAS modelling approach for flood analysis in Bojonegoro city. In: IOP Conference Series: Materials Science and Engineering. 2018.
5. Balitbangkes DepKes RI. Laporan Riset Kesehatan Dasar Tahun 2007 Propinsi Jawa Timur. Jakarta; 2008.
6. Kouadio IK, Aljunid S, Kamigaki T, Hammad K. Infectious diseases following natural disasters : prevention and control measures. Expert Rev Anti-infective Ther ISSN. 2014;10(1):95–104.
7. Gautam OP, Velleman Y, Paudel KP, Dhimal M, Curtis V. Water, sanitation, and hygiene interventions: an urgent requirement in post-flood Nepal. Lancet Infect Dis [Internet]. 2017;17(11):1118–9. Available from: http://dx.doi.org/10.1016/S1473-3099(17)30569-8
8. Amitabha D, Samuel P, Achhelal P, Mahesh W. Post Flood Health Hazards in Ernakulam District of Kerala: A Focus on Safe Water Supply and Control of Acute Diarrheal Disease. Int J Heal Sci Res. 2019;9(6):260–4.
9. Guha-Sapir D, Panhuis W van, Lagoutte J. Short communication: Patterns of chronic and acute diseases after natural disasters – a study from the International Committee of the Red Cross field hospital in Banda Aceh after the 2004 Indian Ocean tsunami. Trop Med Int Heal. 2007;12(11):1338–41.
10. Bich TH, Quang LN, Thi L, Ha T, Thi T, Hanh D, et al. Impacts of flood on health: epidemiologic evidence from Hanoi, Vietnam. Glob Health Action. 2011;1–8.
11. Huang L, Wang Y, Wu C, Chen Y, Huang Y. Risk of Flood-Related Diseases of Eyes, Skin and Gastrointestinal Tract in Taiwan : A Retrospective Cohort Study. PLosONE. 2016;11(5):1–11.
12. Baqir M, Sobani Z, Bhamani A, Bham N, Abid S, Farook J, et al. Infectious diseases in the aftermath of monsoon flooding in Pakistan. Asian Pacific J Trop Biomed. 2012;2(1):76–9.
13. Lee, S.H. et al. Skin problems after a tsunami. J Eur Acad Dermatol Venereol. 2006;20(7):860–3.
14. Saulnier DD, Hanson C, Ir P, Alvesson HM, Schreeb J Von. The Effect of Seasonal Floods on Health : Analysis of Six Years of National Health Data and Flood Maps. Int J Environ Res Public Heal. 2018;15.
15. Paterson DL, Wright H, Harris PNA. Health Risks of Flood Disasters. Clin Infect Dis. 2018;67(1):1450-4.
16. Yavarian J, Shafiei-Jandaghi NZ, Mokhtari-Azad T. Possible viral infections in flood disasters: A review considering 2019 spring floods in Iran. Iran J Microbiol. 2019;11(2):85–9.
17. Pascapurnama DN, Murakami A, Chagan-Yasutan H, Hattori T, Sasaki H, Egawa S. Integrated health education in disaster risk reduction: Lesson learned from disease outbreak following natural disasters in Indonesia. Int J Disaster Risk Reduct [Internet]. 2018;29(July 2017):94–102. Available from: https://doi.org/10.1016/j.ijdrr.2017.07.013
18. Torti J. Floods in Southeast Asia : A health priority. J Glob Health. 2012;2(2).
19. Ma S, Tang Q, Liu H, He J, Gao S. Correlation Analysis for the Attack of Bacillary Dysentery and Meteorological Factors Based on the Chinese Medicine Theory of Yunqi and the Medical-Meteorological Forecast Model. Chin J Integr Med. 2013;19(3):182–6.
20. Ding G, Zhang Y, Gao L, Ma W, Li X, Liu J, et al. Quantitative Analysis of Burden of Infectious Diarrhea Associated with Floods in Northwest of Anhui Province, China : A Mixed Method Evaluation. PLoS One. 2013;8(6):1–9.
21. Mulder AC, Pijnacker R, De Man H, Van De Kassteele J, Van Pelt W, Mughini-Gras L, et al. "sickenin'' in the rain" - Increased risk of gastrointestinal and respiratory infections after urban pluvial flooding in a population-based cross-sectional study in the Netherlands." BMC Infect Dis. 2019;19(1):1–12.

22. Gao L, Zhang Y, Ding G, Liu Q, Jiang B. Identifying Flood-Related Infectious Diseases in Anhui Province, China : A Spatial and Temporal Analysis. Am J Trop Med Hyg. 2016;94(4):741–9.
23. Wu X, Lu Y, Zhou S, Chen L, Xu B. Impact of climate change on human infectious diseases : Empirical evidence and human adaptation. Environ Int [Internet]. 2016;86:14–23. Available from: http://dx.doi.org/10.1016/j.envint.2015.09.007
24. Davies GI, Mciver L, Kim Y, Hashizume M, Iddings S. Water-Borne Diseases and Extreme Weather Events in Cambodia : Review of Impacts and Implications of Climate Change. Int J Enviromental Res Public Heal. 2015;12:191–213.
25. Sari PN, Nofriya. Flood Disaster, Diarrhea and Community Resilience in Water Provision: A Case Study in The City of Bukittinggi. J Kesehat Masy Andalas. 2018;12(2):77–83.
26. Okaka FO, Odhiambo BDO. Relationship between flooding and out break of infectious diseasesin Kenya: A review of the literature. J Environ Public Health. 2018;2018.
27. Ishak, Sakung J, Budiman. Behavior Relationship with The Event of Diarrhea Post Flood in Kelurahan Tuweley District Tolitoli. J Kolaboratif Sains. 2018;1(1).
28. Acuin J, Firestone R, Htay TT, Khor GL, Thabrany H, Saphonn V, et al. Southeast Asia : an emerging focus for global health. Lancet [Internet]. 2011;377(9765):534–5. Available from: http://dx.doi.org/10.1016/S0140-6736(10)61426-2
29. Tomia A, Hadi U, Soviani S, Retnani E. Dengue Hemorrhagic Fever (DHF) Cases in Ternate City Based on Climate Factor. Media Kesehat Masy Indones Univ Hasanuddin. 2016;12(4):241–9.

Family Income and Prepregnancy Weight Associated Inversely with Gestational Age and Birth Weight

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Abstract

Background: Preterm birth and low birth weight (LBW) are major determinants of child mortality. Like other developing countries, Bangladesh has been suffering for significant burden of preterm birth and LBW. Conclusive data on risk factors of these consequences should analyze to take preventive measures.

Aim: This study was to observe the effects of maternal socio-demographic and nutritional parameters on gestational age and birth weight. Materials and Method: A cross sectional data collected from 348 mothers seek antenatal care in a low-cost hospital from September 2017 to February 2018.A pre structured questionnaire used to gather maternal information. Correlation analysis, analysis of variance (ANOVA) and logistic regression used to find potential determinants.

Results: The prevalence of the preterm birth and LBW was 8.1% and 25.2% respectively. Chances of LBW found higher in lower income mothers (OR=1.62; 95% CI: 1.004 to 2.62) and the probability of preterm birth was higher in lower preconception weighted women (OR = 2.08; 95% CI: 1.07 to 2.81).

Conclusion: Pregnancy nutrition and economic solvency can reduce the bad outcomes of mothers.

Keywords: *Birth outcome, income, nutrition, gestational age, factor, Bangladesh.*

Introduction

Preterm birth (before 37 weeks of gestation)remains a public health issue that causes high perinatal mortality and adult morbidity.[1] Globally,early birth affects 10% of all pregnancies and costs yearly 1 million neonatal deaths.[2] In addition, future cardiovascular diseases and stroke are thought to be associated with preterm birth.[3,4] Identification of its causes should be in priority to frame preventive strategies. Unfortunately,risk factors of preterm birthis not still identified in this setting, although thought to be multifactorial and diverge with settings in general.[5,6] Reports showed 45–50% of causes of premature birth were unexplained.[6,7,8]

Like preterm birth, LBW (<2500 gm birth weight) is another indicator of child's susceptibility to diseases and survivalability.[9,10,11] In 2015, 20.5 million global newborns, approximately 14.6 % of total births, were LBW.[10] About half of world under weighted kids have born in South Asia .[9,10] National survey 2015 showed 22.5% LBW in Bangladesh.[12] Maternal demographic factors and nutrition are well reported risk factors of LBW including young maternal age [13,14]. The predictors of LBW is still too well-studied in this study area.

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National study 2011 expressed most noteworthy recurrence (23%) of low birth weight found at Chattogram division.[15] Many people from rural surroundings move to the city and lead lower class life in slums. They usually took antenatal care from low-cost maternity clinics. According to existing literature, only one hospital-based study conducted in this setting which used only MUAC as hypothesized predictors of birth size.[16] In Bangladesh, LBW prevalence was about 27% of which about 84% were small for gestational age and the rests of 16% were preterm.[17] The other possible determinants could be contributed to the detrimental outcome. Understanding on the prevalence of preterm birth and LBW and its potential risk factors would be the key for developing and designing interventions to reduce the events of LBW and premature birth.

Materials and Method

Study setting and design: Three antenatal care (ANC) centers providing low cost services were selected to collect information from Chattogram city, the southeastern part of Bangladesh,beside the Karnaphuli River, and 265 km away from the capital Dhaka, Bangladesh by car. A total of 400 women, 29 to 40 weeks of pregnancy, selected randomly from ANC registrar book and invited to participate the study after informing the purpose of the study, confidentiality maintain and no harmful of them. After willingness 384 participants enrolled in this study.

Sample size determination: Single population proportion test of significance used to calculate sample size. A previous study of LBW prevalence used as a prior information.[18] Taking probability of LBW (p) 20%, margin of error (m) 4%, Zvalue 1.96 at 5% level of significance, we calculated 384 sample size to achieve 80% power of the test from the following formula.

$$n = (z_{0.05}/m)^2 p(1-p)$$

Ethical Consideration: The study follows the Helsinki declaration ethical rules of 1964 and permission was taken from respective authority before commencing the study with approval no. 01/09/2015_01. Written inform consent was taken from every participant before providing necessary information with assuring the concealment of their personal materials.

Study Variables: We collected data on socio-demographic of pregnant women, gestational age, mother's age, mother's age at married, mother's education, maternal height, pre-pregnancy weight, family income, maternal parity, and nutritional parameters including mid-upper arm circumference (MUAC), body mass index (BMI), and hemoglobin (Hb).

Maternal anthropometric measures: Maternal height and preconception weight were recorded. Height was categorized as ≤ 150 cm and >150 cm and weight as ≤ 40 kg and > 40 kg.[10] Body mass index (BMI) was calculated by $weight\ (kg)/(height\ (m))^2$ and categorized as according to WHO classification: under normal (<18.5 kg/m^2), normal weight (18.5–24.9 kg/m^2) and overweight (≥ 25 kg/m^2).[19] Mid upper arm circumference measured by scale and categorized as <24 cm and ≥ 24 cm.[20]

Maternal and newborn factors: Maternal birth order or parity was collected, the mother who has no live birth named as first birth, who has one live birth before titled as second birth and two live birth before categorized as third or higher birth and perinatal factors such as birth weight and gestational age were collected from clinic antenatal care registrar book. A child with birth weight < 2500 g as low birth weight (LBW) and ≥ 2500 g considered as normal birth weight (NBW).[9] If the gestation was < 37 weeks at birth categorized as preterm birth and ≥ 37 weeks as term birth.[21]

Statistical Analysis: Descriptive measures and statistical tests were performed formaternal anthropometric and maternal factors. Pearson correlation analysis and multiple logistic regression analysis was performed to identify the degree of intensity and observed the strength of association between LBW and preterm birth and each of variables and it was expressed as odds ratio (OR) with 95% confidence interval. Data were analyzed using SAS version 9.3 and 0.05% level of significance was considered.

Results

Maternal and newborn characteristics outcome are shown in table 1. The mean age of respondents was 23.77 years and nearly half of them 185 (48.1%)had 8 years of education. Over half of mothers' 197 (51.2%) family monthly earned ten thousand taka or less. The first-born babies were 212 (60.92%) and multiparous women were 173 (49.71%) ranged from 1 to 3. The average gestational age was 38.71 weeks with range between 26 and 44 weeks. The birth weight ranged between 900 to 4000 gm with average was 2728.28 gm. The prevalence of LBW was 25.2% and preterm birth was 8.1%.

Table 1: Descriptive statistics of mothers and newborns in an ANC hospital,Bangladesh

Parameters	Mean (SD) or N (%)	Range
Mothers		
Age (years)	23.77 (3.65)	17 to 36
Height (cm)	1152.45 (5.11)	138 to 165
Weight (kg)	49.85 (9.27)	31 to 90
BMI (kg/m^2)	21.41 (3.62)	13.01 to 35.16
MUAC (cm)	25.86 (2.68)	18.5 to 35
Family income (Tk)	15277.71 (12605.89)	4000 to 80000
Newborns		
Gestational age (weeks)	38.71 (2.32)	26 to 44
Birth weight (gm)	2728.28 (547.65)	900 to 4000
LBW (<2500 gm)	97 (25.2%)	-
Preterm birth (<37 weeks)	31 (8.1%)	-

The Pearson correlation coefficients between maternal characteristics, gestational age and birth weight are given in table 2. All maternal characteristics were not correlated with gestational age. On the contrary, all maternal characteristics were significantly positively correlated with birth weight except age of the participant.

Table 2: Correlation coefficients of maternal characteristics with GA and BW

Maternal Characteristics	Gestational Age	Birth Weight
Age	-0.027 (P = 0.595)	0.085 (P=0.097)
Height	0.033 (P = 0.515)	0.146 (P=0.004)
Preconception weight	0.019 (P = 0.714)	0.188 (P < 0.001)
MUAC	0.015 (P = 0.775)	0.199 (P< 0.001)
BMI	0.012 (P = 0.822)	0.151 (P = 0.003)

The effect of birth order, education and family income on gestational age and birth weight are given in table 3. Increasing birth order with increased birth weight significantly (p=0.031) as shown in table 3. Gestational age was not significantly associated with birth order. The low birth weight rate was decreasing as with increasing birth order but not significant. The number of years of education had no statistically significant effect on gestational age but had significant effect on birth weight. Family income had no statistically significant effect on gestational age but had significant effect on birth weight (P=0.037).

Table 3: Effect of education, family income and birth order on GA and BW

Parameters	Gestational age	P-value	Birth weight	P--value
Level of education				
0 to 8 years	38.88 (2.36)	0.130	2654.43 (519.16)	0.026
9 to 12 years	38.68 (2.35)		2753.43 (559.33)	
>12 Years	38.03 (1.95)		2897.94 (512.61)	
Family Income				
≤ 10000 tk	38.59 (2.44)	0.296	2675(547.05)	0.037
10001 to 20000 tk	38.98 (2.13)		2648.80 (496.77)	
>20000 tk Years	38.55 (2.31)		2850.8 (532.47)	

Parameters	Gestational age	P-value	Birth weight	P--value
Birth Order				
First birth	38.67 (2.46)	0.933	2634.14 (549.81)	0.031
Second birth	38.77 (2.27)		2789.12 (500.84)	
Third birth	38.77 (2.27)		2704.34 (501.23)	

Parameter estimates of logistic regression analysis of preterm birth was given in table 4. A multiple logistic regression conducted with saturated model. The likelihood ratio test suggest that the model contains the parameter age, BMI and preconception weight (Chi-square=10.85 and p value=0.03). And the model correctly fits which confirmed by Hosmer and Leme show goodness of fit test (Chi-square= 1.73 and p value=0.94). Only preconception weight was the statistically significant. The probability of preterm birth was 2.08 times higher for the preconception weight less than or equal to 40 kg as compared to greater than 40 kg.

Table 4: Multiple logistic regression analysis of risk factors for preterm birth

Parameter	Odds Ratio (OR)	95% CI	P value
Age (Years)			
≤ 24	2.113	0.884 to 5.051	0.0924
> 24	-	-	-
Body mass index (kg/m^2)			
Underweight	3.413	0.924 to 12.601	0.0964
Overweight	1.112	0.392 to 3.157	0.4093
Normal	-	-	-
Preconception Weight			
≤ 40 kg	2.08	1.067 to 2.805	0.0214
> 40 kg	-	-	-

Parameter estimates of logistic regression analysis of LBW given in table 5. A multiple logistic regression was conducted with saturated model. The likelihood ratio test suggest that the model contains the parameter family income and body mass index (BMI) (Chi-square=8.54 and p value=0.03). And the model correctly fits which confirmed by Hosmer and Leme show goodness of fit test (Chi-square=0.89 and p value=0.93). Family income had the significant effect on LBW. The participant whose family income less than or equal to ten thousand taka the probability of having LBW was 1.622 times higher compared to family income greater than ten thousand taka.

Table 5: Multiple logistic regression analysis of risk factors for LBW

Parameter	Odds Ratio (OR)	95% CI	P value
Family income (BDT)			
≤ 10000	1.622	1.004 to 2.619	0.048
> 10000	-	-	-
Body mass index (kg/m^2)			
Underweight	1.077	0.642 to 1.940	0.1696
Overweight	0.541	0.245 to 1.150	0.0789
Normal	-	-	-

Discussion

This study investigates the prevalence and risk factors of gestational age and birth weight. We found 8.1% preterm birth and 25.2% LBW in the study population. And, the prepregnancy weight associated with preterm birth and family economy was significant for LBW.

The rate of premature birth in our research was in lines of Kader and Tripathi who found 10.79% babies were premature in Matlab, Bangladesh.[22] In the cultural context of Bangladesh, premature birth is difficult to identify, as women do not identify themselves as pregnant unless they are certain that they will be maintain their pregnancy.[12]

The prevalence of LBW varies widely across region and found 26.4 % during 2015 in Southern Asia.[10] We found over quarter of total women deliver LBW babies which was similar to NLBWS in 2015 which found 22.6%.[14] Another study found LBW rate was 29% in urban area.[23] But this rate is fluctuating due to study area and sample size. Overall, this rate is ranging from 20% to 36% as ever seen in Bangladesh.[18,22]

The etiology of preterm birth has been a major concern. Preconception weight was the determinant of preterm birth in this study. The possibility of preterm birth was increased if pre-pregnancy weight was ≤ 40 kg. Kosa *et al*. also showed that premature birth was generally associated with low maternal pre-pregnancy weight.[24]

Handsome family income is a sound strength to manage every corner of the expenses of family. In this study family income had a significant effect on birth weight. The probability of having LBW was 1.62 times higher for the family income less than or equal to ten thousand taka. Britto *et al*. reported that mother of lower family income almost twice times higher to give LBW babies.[25] This research is not free from limitations. Only three clinic considered for data collection, so this result was not generalizable. To generalize the result, need to include more clinic and government hospital.

Conclusion

Preterm birth (PB) and LBW are the multifactorial issue in obstetrics. Even with technological improvements in the health care system, PB and LBW still remains a major concern for health officials. Child morbidity and mortality are associated with preterm birth and LBW. Also, some adulthood diseases are consequences of preterm birth and child malnutrition. Authorities have tried to reduce the burden this morbidity. This investigation found significant rates of preterm birth and LBW in study population. Pre-pregnancy weight and family income was two respective determinants. Proper pre pregnancy diets and economic security may reduce the vulnerable situations in the study area.

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References

1. Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE, Cousens S, Mathers C, Black RE. Global, regional, and national causes of child mortality in 2000- 13, with projections to inform post-2015 priorities: an updated systematicanalysis. Lancet 2015; 385(9966): 430–40.
2. Rubens CE, Sadovsky Y, Muglia L, Gravett MG, Lackritz E, Gravett C. Prevention of preterm birth: harnessing science to address the global epidemic. Sci Transl Med 2014; 6(262): 262sr5
3. Abu Hamad K, Abed Y, Abu Hamad B. Risk factors associated with pretermbirth in the Gaza strip: hospital-based case-control study. East MediterrHealth J 2007; 13(5):1132–41.
4. Jiang F, Gao JS, Zhong YF, Hu J, Yang JQ, Ma LK, Liu JT. Preterm births in Peking union medical College Hospital in the Past 25 years. Zhongguo Yi XueKeXue Yuan Xue Bao 2016; 38(5): 528–33.
5. Romero R, Espinoza J, Kusanovic JP, Gotsch F, Hassan S, Erez O, Chaiworapongsa T, Mazor M. The preterm parturition syndrome. BJOG 2006; 113(Suppl 3): 17–42.
6. Beck S, Wojdyla D, Say L, Betran AP, Merialdi M, Requejo JH, Rubens C, Menon R, Van Look PF. The worldwide incidence of preterm birth: a systematic review of maternal mortality and morbidity. Bull World Health Organ 2010; 88(1): 31–8.
7. Villar J, Papageorghiou AT, Knight HE, Gravett MG, Iams J, Waller SA, Kramer M, Culhane JF, Barros FC, Conde-Agudelo A, Bhutta ZA, Goldenberg RL.The preterm birth syndrome: a prototype phenotypic classification. Am J Obstet Gynecol 2012; 206(2):119–23.
8. Hedderson MM, Ferrara A, Sacks DA. Gestational

diabetes mellitus and lesserdegrees of pregnancy hyperglycemia: association with increased risk ofspontaneous preterm birth. Obstet Gynecol 2003; 102(4): 850–6.

9. UNICEF-WHO. United Nations Children's Fund and World Health Organization. Low birth weight: Country, Regional and Global estimates. New York: UNICEF, 2004.
10. UNICEF-WHO. National, regional, and worldwide estimates of low birth weight in 2015, with trends from 2000: a systematic analysis". The Lancet Global Health. 2015. Available online at <http://dx.doi.org/10.1016/S2214-109X (18)30565-5>.
11. Dey AC, Ahmed FU, Mannan A, Saha LC, Barua C, Mahmood CB. Small for Gestational Age Babies: Morbidity and Immediate Outcome in a Tertiary Care Hospital - A Prospective Study. Bangladish Journal of Child Health 2007; 31: 1–3.
12. IPHN, Institute of Public Health Nutrition, National Low Birth Weight Survey 2015, Directorate General of Health Services, Ministry of Health & Family Welfare, Government of Bangladesh, 2017.
13. Lee KS, Ferguson RM, Corpuz M, Gartner LM. Maternal ageand incidence of low birth weight at term: a population study.Am J Obstet Gynecol 1988; 158: 84-9.
14. Osrin D, de L Costello AM. Maternal nutrition and fetal growth: practical issues in international health. SeminNeonatol 2000; 5: 209-19.
15. Haque SMR, Tisha S and Huq N. Low Birth Weight Accompanying Less Antenatal Care in Bangladesh with Substantial Divisional Variation: Evidence from BDHS – 2011. Public Health Research 2015; 5(6): 184-191 DOI: 10.5923/j.phr.20150506.03
16. Ahmed FU, Karim E and Bhuiyan SN. Mid-arm circumference at birth as predictor of low birth weight and neonatal mortality. Journal of Biological Science 2000; 32(4): 487-493.
17. Ahmed FU, Rahman ME, Perveen R. Utilization of trained traditional birth attendants (TBA) in rural Bangladesh. JCMCTA1996; 6: 23-26.
18. Khan JR, Islam MM, Awan N and Muurlink O. Analysis of low birth weight and its co-variants in Bangladesh based on a sub-sample from nationally representative survey. BMC Pediatrics 2018; 18:100.
19. WHO. Physical status: the use and interpretation of anthropometry. Report of a WHO Expert Committee. World Health Organ Tech Rep Ser 1995; 854:1-452.
20. Sultana T, Karim MN, Ahmed T, Hossain MI. Assessment of Under Nutrition of Bangladeshi Adults Using Anthropometry: Can Body Mass Index Be Replaced by Mid-Upper-Arm-Circumference? PLoS ONE 2015; 10(4): e0121456. doi:10.1371/journal. pone.0121456
21. WHO, World Health Organization. International statistical classification of diseases and related health problems. Rev. 10, vol 1 and 2, ICD-10. Geneva: WHO; 1992.
22. Kader M, Tripathi N. Determinants of low birth weight in rural Bangladesh. Int J Reprod Contracept Obstet Gynecol 2013; 2(2): 130-134
23. BBS, Bangladesh Bureau of Statistics. National Low Birth Weight Survey of Bangladesh 2003–2004. Planning division, Ministry of Planning, Government of the People's Republic of Bangladesh; 2005.
24. Kosa JL, Guendelman S, Pearl M, Graham S, Abrams B, Kharrazi M. The association between pre-pregnancy BMI and preterm delivery in a diverse southern California population of working women. Matern Child Health J 2011; 15(6):772-81. doi: 10.1007/s10995-010-0633-4
25. Britto RPdA, Florêncio TMT, Benedito Silva AA, Sesso R, Cavalcante JC and Sawaya AL. Influence of Maternal Height and Weight on Low Birth Weight: A Cross-Sectional Study in Poor Communities of Northeastern Brazil. PLoS ONE 2013; 8(11): e80159. doi:10.1371/journal.pone.0080159.

Effectiveness of the Participatory Health Promotion Program for Improving Health Outcomes of Elderly with Non-Communicable Diseases in Municipalities, Thailand: An Experimental Study

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Abstract

Objective: The objectives of this study were to evaluate the effectiveness of a participatory health promotion program for elderly with non-communicable diseases (NCDs) in municipalities, Thailand.

Methodology: This experimental study was conducted among elderly who suffering from diabetes and/or hypertension. The total samples of 84 of elderly with NCDs, of which 40 patients from 2 health centers were randomly allocated to the experimental group, whereas 44 from other 2 health centers were randomly allocated to a control group. Data were collected at baseline and 3 months after the implementation of a participatory health promotion program. The analysis of co-variance (ANCOVA) were used to determine effectiveness of the health promotion program.

Results: The results indicated an effectiveness of the participatory health promotion program. After adjusting the baseline and controlling other covariates, the experimental group demonstrated improving of outcomes including reduced triglyceride(adjusted mean different = -32.15, 95% CI: -57.28 to -7.02)and increased HDL (adjusted mean different = 4.01, 95%CI: 1.11 to 6.89).

Keywords: *Elderly health care, Municipality, Non-communicable disease, Participatory health promotion program, Self-management.*

Introduction

The most common diseases among elderly in Thailand were hypertension, diabetes, arthritis/degeneration, emphysema, cardiovascular diseases, myocardial infarction, and paralysis[1]. More than 60% and 10% of the elderly aged 80 years old and over suffering with high blood pressure and diabetes, respectively. About 56% of the elderly reported that they had chronic diseases such as diabetes, high blood pressure. 37% of males and 42% of females elderly reported of having 2 or more chronic diseases[1-3]. Regarding social problems, it was found that the rate of dependency of the elderly population towards 100 working people was 25.4 people in 2016 and expected that in 2027 and 2137 the rates will increase to 40.4 people and 54.95 people respectively. While 10% of the elderly living alone in the municipality[1, 4]. The policy recommendations were to increase the effectiveness of health promotion and disease prevention in the elderly, especially the on diabetes, hypertension, falls and mental health. We should enhance the role of local administrative organizations in developing a seamless health service system in the context of the area[1, 5].

Thailand has been in the process of rapid urbanization. A municipality is a local administrative

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organization which responsible for managing development in its area. One of its authority and duties is to promote the development of women, children, youth, the elderly and the disabled. Nonthaburi Municipality locates in the vicinity of Bangkok. The total population is 255,315 people, with 149,383 households[6], of which 21.8 % were the elderly population[7]. NCDs especially hypertension and diabetes, were found among more than 80% of these elderlies. Both ddiseases common risk factor: overweight, hypelipidemic, inappropriate health behaviors especially dietary, exercise, stress management, and taking medications as prescribed by the doctor. It was recommended that self-care for the elderly with chronic health problems should focus on maximizing independence, vigor, and life satisfaction. Health promotion in this population is vital to prevent complications and decrease risks that reduce life quality[8, 9]. In addition, an effective health promotion model should be relevant with the environmental and economic context with create a balance between the need to use resources for health development and other developments[8]. The NCDs policy in 2017 of the Ministry of Public Health states thatthose with hypertension and diabetes must be able to control the diseases.One important measure to achieve that goal is community participation[10].

Nonthaburi Municipality has 6 public health centers providing health promotion services, disease prevention, medical treatment, and rehabilitation.There are unclear system and network between the community and public health centers for promoting self-care of these patients[7]. There were limited roles of patients to plan and set goals for their self-care with medical personnel. The health personnel team need to develop skills in health behavior modification. There were recommended thatincreasing supports for patients to take care of themselves together with the participation of the community would result in the reduction and prevention of risks thatlead to better health outcomes of the patients. Therefore, this study aimed to evaluate the effectiveness of the developed health promotion program for elderly with NCDs.

Objective: To evaluate the effectiveness of the participatory health promotion program in improving health outcome of elderly with NCDs in municipalities, Thailand.

Method

This experimental study was conducted among elderly who suffering from diabetes and/or hypertension. The sample size was calculated with the G* Power program[11]. When assigned effect size at 0.55[12] alpha at 0.05 and power of test at 0.80 with on tail test, a sample size of the experimental and control group were 42 people in each group. In order to prevent the loss of samples, therefore, it was added to each group of 45 people, including a sample group of 90 people. Inclusion criteria were people aged 60-80 years old who were diagnosed with hypertension and/or diabetes by physician, able to communicate with researcher, voluntarily participate in the study and could be followed for 12 weeks. The study samples were45 elderly with HT and/or DM who were randomly selected from 2 health center to an experimental group and another 45 patients who were randomly selected from other 2 health centers to acontrol group. After baseline data collection the experimental group received an intervention which was a health promotion program developed from the contribution of stakeholders and the suggestion of experts as an empowerment learning process, focused on how to help patients become more knowledgeable and take control over their bodies, disease, and treatment. The program initiated with building relationships with the elderly, learning about diabetes and hypertension, risk level, sharing self-care experience and determining alternatives for behaviour modification, dietary for diabetes and hypertension patients, forming a team for peer-assisted, setting self-care goals, making the next appointment. It aimed to inspire, inform, support and facilitate their efforts to identify and attain their own goals. The health record book was used for an individual to record their health data, learning, goals setting and planning for self-care, appointment, and having essential health knowledge. Instruments were a structured questionnaire, physical checkup and laboratory tests. The total samples who were completed data at the 12 weeks were 84 participants, 40 in the experimental group and 44 in the control group.

Both descriptive and inferential statistic were used for data analysis. Categorical data were analyzed presenting frequency distribution and percentage. Means, standard deviations, medians were analyzed for continuous data.An intention-to-treat protocol was used to determine the effectiveness of the participatory health promotion program. Mean different with adjusted based line between the experimental and control groups were analyzed by the analysis of covariance (ANCOVA) presenting adjusted mean difference and 95% CI of the outcome variables.

Results

Demographic and Socioeconomic Characteristics of Elderly with NCD: There was a total of 84 participants that completed the study protocol,of which 40 participants were in the experimental group whereas there were 44 in the control group. Majority of the elderly in control group were female (51.5%), married (68.1%) with the average age of 68.2 ± 5.44 years old. In the experimental group 72.5% were females, married (45.0%) with the average age of 68.9 ± 5.39 years old. More than half of both groups finished primary education (61.4% in control) and (52.5% in experiment). Most of them were unemployed/housewife (control =62.8%) and (experiment = 60.0%). The median monthly income of the control group was 12,000 Baht (min: 600, max: 40,000), which not much different with that of the experimentalgroup of 11,000 Baht (min: 600, max: 100,000).

Effectiveness of the participatory health promotion program for elderly with NCDs: After 3 months, the ANCOVA showed that the mean difference after adjusting the baseline data between control group and experimental groups of Triglyceride was reduced. In addition, HDL was increased when controlling age, gender, occupation, income, and economic status (Table 1).

Table 1: Effectiveness of the Participatory Health Promotion Program for Elderly with NCDs

Variables	Control (n=44)		Experimental (n=40)		Experimental comparison	
	Mean (S.D)	Mean Change from Baseline	Mean (S.D)	Mean Change from Baseline	Adjusted mean difference (95%CI)	P-value
Triglyceride						
Baseline	119.32(52.08)	-	153.30(76.63)	-	-	-
3 months	144.84(49.17)	20.94	121.30(66.20)	-39.33	-32.15(-57.28 to -7.02)	0.013
HDL						
Baseline	53.93(14.34)	-	52.02(15.42)	-	-	-
3 months	51.00(11.37)	-2.82	53.50(12.00)	1.36	4.01(1.11 to 6.89)	0.007
Cholesterol						
Baseline	202.50(36.09)	-	208.87(46.32)	-	-	-
3 months	196.43(58.39)	-1.80	196.15(40.58)	-13.72	-10.77(-31.40 to 9.85)	0.301
LDL						
Baseline	124.60(29.40)	-	133.04(58.35)	-	-	-
3 months	126.90(47.06)	4.08	118.44(36.40)	-15.47	-14.00(-32.88 to 4.87)	0.143
HbA1c						
Baseline	6.40(0.98)	-	6.34(0.79)	-	-	-
3 months	6.15(0.81)	-0.25	6.21(0.81)	-0.11	0.01(-0.11 to 0.32)	0.349
Fasting plasma glucose						
Baseline	118.36(19.59)	-	119.52(32.09)	-	-	-
3 months	104.88(30.60)	-13.46	107.50(29.31)	-10.84	2.45(-8.96 to13.86)	0.669
BMI						
Baseline	25.29(2.97)	-	25.02(2.99)	-	-	-
3 months	25.26(2.88)	0.06	24.94(2.97)	-0.12	- 0.26(-0.82 to 0.29)	0.345
Waist Circumference						
Baseline	90.23(13.52)	-	87.23(9.16)	-	-	-
3 months	90.01(7.16)	0.52	87.01(8.66)	0.10	-1.92(-5.26 to1.42)	0.256
Systolic Blood Pressure						
Baseline	132.79(17.52)	-	137.17(16.15)	-	-	-
3 months	139.18(20.26)	7.78	135.07(16.39)	-4.03	-6.15(-15.50 to 3.19)	0.193
Diastolic blood pressure						
Baseline	72.86 (8.21)	-	73.45 (9.22)	-	-	-
3 months	78.70 (12.79)	6.43	77.77 (9.67)	4.15	-0.37(-6.21 to 5.46)	0.898

Discussion

The result indicated that the participatory health promotion program for elderly with NCD could help reduced Triglyceride and increased HDL after 3 months implementation. This result was similar to the finding from a study on the effects of a self-management support program for Thai people diagnosed with metabolic syndrome which found that swing arm exercise reduce of triglyceride and HDL. This could be due to the effectiveness of this health promotion program which included activities focused on how to help patients become more knowledgeable and take control over their bodies, disease, and treatment. This participatory health promotion program was in line with the suggested guideline from Foundation for Gerontology Research and Development Institute which stated that patients should be considered as patience center care by increasing the support them to be able to perform self-care management in the community as well as focusing on skill care development practices, sharing experience and lifelong learning[1,13]. Moreover, the support from local administration organization for budget on laboratory test and engaging in mobilization processes also influence the success of the program[14, 15]. This health promotion program was designed to improve participating and context of the areas[16-18].

This study found no significant difference between the experimental and control groups in BMI, systolic blood pressure, diastolic blood pressure, waist circumference, HbA1C, cholesterol LDL. It was contrast with the results of the holistic health promotion program of the elderly [19] reported that the experimental group had significantly improvement on physical activity and exercise, BP, flexibility of shoulder, VO2max and QOL and BMI as well. This reason could due to difference of self-care behaviors as well as the different in evaluation criteria. The dietary habits also vary therefore it affected on BMI change as well as sugar level and HBA1C.

Conclusion

The participatory health promotion program could help improve some help outcomes of elderly with NCD in the municipality areas. The participatory health promotion program for elderly with NCD focusing on the empowerment learning process and promoting self-management are effective to improve self-efficacy, self-care behavior, physical fitness, physical and mental health of the elderly. The municipality should continue with this program for the elderly as well as let them reflect and set their own gals and strategies to improve their health behavior to achieve the preferable health outcomes.

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References

1. Pramote Prasartku. Situation of The Thai Elderly 2016. Nakhon Pathom: Foundation for Gerontology Research and Development Institute; 2017.
2. Porapakkham Y, Pattaraarchachai J, Aekplakorn W. Prevalence, awareness, treatment and control of hypertension and diabetes mellitus among the elderly: the 2004 National Health Examination Survey III, Thailand. J Singapore medical journal. 2008;49(11):868.
3. World Health Organization. Country and regional data on diabetes 2019 [Available from: https://www.who.int/diabetes/facts/world_figures/en/index2.html.
4. World Health Organization. Older Population and Health System:A profile of Thailand 2016 [Available from: https://www.who.int/ageing/projects/intra/phase_one/alc_intra1_cp_thailand.pdf.
5. Health System Reseach Institute. The 4th public health survey report by physical examination 2008. Nontha Buri: The Graphic Systems Company Limited; 2009.
6. Nonthaburi Municipality. General conditions and basic information 2018 [Febuary 16,2018]. Available from: https://www.nakornnont.go.th/home/#.
7. Nonthaburi Provincial Health Office. General

information and health status 2018 [July 22,2018]. Available from: http://203.157.109.15/nont/file_upload/blocks/HealthData2561.pdf.

8. Pender NJ, Murdaugh CL, Parsons MA. Health promotion in nursing practice. New Jersey: Parson Education, Inc.; 2006.
9. Davidhize R, Eshelman, J. & Moody, M.,. Health promotion for the aging adult. Geriatric Nursing. 2002;23(1):30-5.
10. Thai Health Strategy Office . The providing policies and directions meeting documents. Thai Health Strategy Office and the Non-communicable Diseases Control Network Plan; 2016.
11. Orathai PP, S.,. Power analysis, testing and sample size estimation using G* Power program. Bangkok: Dee D.; 2013.
12. Anuruang S. Community-based intervention to improve hypertension management in Thailand [Doctoral Dissertation]: University oF Technology Sydney; 2015.
13. Nittaya Pensirinapa. Empowerment for risk behavior modification To cardiovascular disease: concepts and practices. Bangkok: Charan Sanitwong Printing Co., Ltd; 2014.
14. Nittaya Pensirinapa. Teaching documents: community work on public health: Sukhothai Thammathirat Open University Press; 2014 [Available from: https://digitallib.stou.ac.th/handle/6625047444/2441.
15. Jirawan Hasaroke. Community Health Community: A Case Study of Don Wan Subdistrict, Mueang District, Maha Sarakham Province. Maha Sarakham: Primary Health Training and Development Center Northeast region Khon Kaen Province 1998.
16. Duangsamn Ninthanon. CS. The results of a health promotion program By applying self-efficacy theory and group process together with social support In type 2 diabetes patients in Erawan Hospital, Erawan District, Loei Province. KKU Research Journal 2010;10(3).
17. Yuvadee Rodjarkpai. SK, Prasit Kamonpornmongkol.,. Effect of Empowering Program for Self-protection Hehavior in People at Risk of Diabetes Nong Yai district, Chonburi Province. The Public Health Journal of Burapha University. 2012;7(2).
18. Suwankruhasn N, Pothiban L, Panuthai S, Boonchuang P. Effects of a self-management support program for Thai people diagnosed with metabolic syndrome. Pacific Rim International Journal of Nursing Research. 2013;17(4):371-83.
19. Kanit Ngowsiri. The Effects of Holistic Health Promotion Program on Quality of Life in Elderly. Suan Sunandha Rajabhat University; 2016.

Health Literacy, Occupational Health and Safety Factors and Quality of Life of Municipal Waste Collectors in the Northeast of Thailand

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Abstract

Waste collectors usually expose to several occupational health and safety risks which may affect their health and wellbeing. Health literacy might help reducing occupational harms. Our aims were to assess the health statusand to determine the influence of health literacy (HL) and occupational health and safety (OHS) factors on quality of life (QOL) of local administration organization waste collectors in Thailand. This cross-sectional study was conducted among 529 participants who were recruited by using a multistage random sampling from local administration organizations in 4 provinces of the Northeast of Thailand. A self-administered structured questionnaire was used to assess OHS factors, HL, socioeconomic status (SES) and QOL. The Generalized Linear Mixed Model (GLMM) was used to determine the association between OHS, HL and QOL when controlling for other covariates. 62.95% of the participants reports as had good health status. However, 51.04% had musculoskeletal disorders (MSDs), 36.37% had work related injuries and 20.04% had chronic disease. Only 42.53% had adequate to excellence level of HL and the same proportion had good QOL. The GLMM analysis indicated factors that were significantly associated with good quality of life when controlling the effect of regions of municipal waste collectors in the Northeast of Thailand were: did not have MSDs, had adequate to excellence levels of health literacy, had low level of stress related with social support on work, had higher level of education, had high level of knowledge on garbage collection work, had low stress related with job security. Less than half of municipal waste collection workers had good QOL. HL, free from MSDs, knowledge about waste collection, low levels of stress on job security, and social support on job had influence on QOL as well as educational attainment.

Keywords: *Health literacy, Municipal waste collectors, Occupational health and safety, Quality of life.*

Introduction

Municipal waste collection is a job involves a variety of physical, chemical, and biological hazards[1]. The duties of waste collectors usually include picking-up waste from points of production, emptying waste collecting containers onto trucks, and delivering the waste to disposal and processing facilities. The waste collection jobs are frequently lifting, carrying, pushing, and pulling of heavy objects[1,2] which put them at high risk of musculoskeletal disorders (MSDs).Other common injuries are fractures, ocular trauma, and bites, and diseases include skin and gastrointestinal disorders. Besides the recurrent heavy physical activity, waste collectors are also exposed to bacteria, fungus, endotoxins, dioxins, dust, allergens, irritant inhalants, mutagens vehicle exhaust, atmospheric conditions, noise, and psychological stress. Waste collectors can be protected by using safety procedures on and around

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garbage trucks and with personal protective equipment. However, many of them are not usually use the protective equipment[1]. These physical and psychological health problems have impact on their quality of life. WHO defines Quality of Life as an individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept affected in a complex way by the person's physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment[3]. Health literacy might help reducing occupational harms, health literacy isthe degree to which individuals have the capacity to obtain, process and understand basic health information and services need to make appropriate health decisions[4,5].

There have been increasing trends of occupational health and safety, as the result the inability to work or absenteeism from work are increasing, for instance 22% of worker were absent from the job due to abnormalities in the skeletal and musculoskeletal system[6]. Moreover, among the employees with daily hiring, the frequency of taking leave or absence from work which resulted in terminating their jobs, making them shortage of incomes to support families[7]. The impact of occupational health and safety problems caused terminated job or fired from job which influence on the quality of life. Many previous studies conducted on the relationship between health literacy, occupational health and safety problems with the quality of life of people in various occupations except waste collectors. In theNortheast of Thailand, the biggest region, there are no comprehensive study on quality of life among this group. This study aimed to assess the health status and the relationships of health literacy (HL) and occupational health and safety (OHS) problems, with quality of life (QOL) of local administration organization waste collectors in Thailand.

Material and Method

Study Design: This cross-sectional study was conducted among 529 participants who were recruited by using a multistage random sampling from local administration organizations in4 provinces of the Northeast of Thailand, including Udonthani, Nakhon Ratchasima, KhonKaen, Mahasarakham provinces. The inclusion criteria were, municipal waste collectors, who were working in the sanitation department for at least one-year work experience and willing to cooperated. Workers who had underlying conditions including osteoporosis, osteoarthritis, myasthenia gravis, SLE, gout, systematic inflammation, nerve injury, a history of MSDs due to injuries, psychological disorders were excluded. A self-administered structured questionnaire was used to assess OHS, HL, socioeconomic status (SES) and QOL.

Data Analysis: A simple logistic regression was used to identify individual the association between each independent variable and weight loss products use. The independent factors that had p-value <0.25. were processed to a multivariable analysis using the generalized linear mixed model (GLMM) to identify the association between OHS, HL and QOL when controlling the effect of other covariates, of which 4 provinces were selected to include as random effects. The magnitude of association was presented as adjusted odds ratio (Adj.OR), 95% confidence interval (CI) and p-value <0.05 as statistically significant level.

Results

Among a total of 529 municipal waste collectors, all males with the average age 42.50years old. Nearly 70% was married and more than half was a head of his family. Their average monthly income was 10,399.38 Baht and almost 60% was in-debt. Around 70% of them was temporary workers. Most of them were smoking (70.13%) and consuming alcohol (84.88%). Most of them report having had adequate physical activity (62.19%) and had no sleep problems (70.80%). The average working experiences was around 10 years, and the average daily working hours was 7hours per day. Almost 60% of them had low to moderate levels of knowledge on garbage collection work. However, more than 70% of them had moderate levelsof attitude related to garbage collection work. For health literacy, nearly half of them had adequate and excellent levels of health literacy.

Most of the participants reported as having good health status (62.95%). Almost a quarter (24.38%) were overweight and as high as (35.35%) were obese. Around 20% had chronic diseases (hypertension, diabetes, allergy, asthma CVD, peptic ulcer), 36.67 % had work related injuries, and 51.04% suffering MSDs. Less than half of the municipal waste collectors in the Northeast of Thailand had good QOL 42.53%. Majority of them had fair QOL (56.90%) (Table 1).

Table 1: Number and percentage of Quality of Life (QOL) of Municipal Waste Collectors in the Northeast of Thailand (n=529)

QOL	Number	Percent	95% CI
Poor level (26-60 scores)	3	0.57	0.18-1.75
Fair level (61-95 scores)	301	56.90	52.63-61.07
Good level (96-130 scores)	225	42.53	38.37-46.80

The GLMM indicated six factors that were significantly associated with good quality of life among municipal waste collectors in the Northeast of Thailand. These factors were; did not have MSDs (adj.OR 2.72, 95% CI=1.83-4.05), had adequate and excellence levels health literacy (adj.OR 2.26, 95% CI=1.53–3.33), had low level stress related with social support on work (adj.OR 2.34, 95% CI=1.53–3.58), had higher level of education (adj.OR 1.95, 95% CI=1.31–2.91), had high level of knowledge on garbage collection work (adj.OR 1.56, 95% CI=1.05–2.32), had low level of stress related with job security (adj.OR 1.56, 95% CI=1.06–2.30), when controlling the effect of regions (Table 2).

Table 2: The Multi variable Analysis of Factors Associated with Quality of Life among Municipal Waste Collectors in the Northeast of Thailand using the GLMM, a Model Presenting Odds Ratios, Adjusted Odds Ratios, 95% CI and P-value. (n = 529)

Factors	Number	% Good QOL	Crude OR	Adjusted OR	95%CI	p-value
Musculoskeletal disorders (MSDs)						<0.001
Yes	270	31.85	1	1		
No	259	53.67	2.45	2.72	1.83-4.05	
Health Literacy						
Inadequate - problematic	304	33.22	1	1		<0.001
Adequate - Excellence	225	55.11	2.50	2.26	1.53–3.33	
Work related stress with social support						<0.001
Moderate-High	172	27.33	1	1		
Low	357	49.86	2.69	2.34	1.53–3.58	
Education						0.001
Lower education	280	37.86	1	1		
Higher education	249	47.79	1.56	1.95	1.31–2.91	
Knowledge on garbage collection work						0.028
Low–Moderate	338	39.05	1	1		
High	191	48.69	1.41	1.56	1.05–2.32	
Work related stress with job security						0.024
Moderate-High	226	37.61	1	1		
Low	303	46.20	1.46	1.56	1.06–2.30	

Discussion

Less than half of municipal waste collectors in the Northeast of Thailand had good QOL (42.53%). This might explain by the multivariable analysis identified 6 factors that have influence on having good QOL of the municipal waste collectors. The finding from this study was in line with a study of the quality of life of Thai workers in a dyeing factory in 5 provinces near Bangkok reported that 50.9% of the worker had average level of quality of life and 49.1% were at good level[8]. However, it was not consistent with a study in China which was conducted among construction workers, found that 67.50% of them had low quality of life[9]. The reasons

for different result might due to the different in social and economic conditions of China and Thailand as well as job characteristics and work environments as well as HL,knowledge, attitude and stress.

This present study illustrated that more than half of the participants had MSDs (51.04%), 36.37% had work related injuries and 20.04% had chronic disease. These findings were similar to the results of a study in Northwest Ethiopia among rubbish cleaners 2015, indicated that 34.3% of rubbish collectors were injured[10]. More over the study from the Taiwan which found that 37% of garbage waste collector had been injured from a sharp object[11]. It might be because of the working as garbage collector is heavy work and it must be done in an dangerous environment, in addition this kind of job, some of them need to work by trapezing on trucks[1]. In addition, another reason for the high injury rate and increased severity was working without personal protective equipment in a hazardous environment[12]. More than 60% of them were absence of work-related injury and diseases and 51.04% got MSDs. It was not difference from the study among waste collectors in Iran which showed the abnormalities in the structure of the musculoskeletal system[13]. Due to waste collectors' job is a labor-intensive job combined with lifting, carrying, pushing, and hanging while moving vehicles that lead to have problem on the musculoskeletal system[14,15]. Moreover, absence of MSDs was strongly associated with good quality of life. Similar finding were from many studies indicated that abnormal skeletal and MSDs were commonly found in the waste collectors[16-18]. Due to physical illness, feeling sick, physical discomfort always affects the quality of life among people with MSDs than those without the disorder.

The result of our study showed that 42.53% had adequate to excellence levels of HL, this finding was consistent with a study in Spain found 50.88% of the general population had health intelligence. This may be health literacy covers the access to health information, understanding, appraise and making decision on their health[19]. Difference outcomes of good health which influenced not only HL but also personal factors, social status and education[20]. In addition, this study showed waster collectors who had adequate-excellence levels of health literacy were more likely to have good quality of life than those with inadequate-problematic health literacy. May be due to better access to health information and understanding the health information via health providers and mass media could influence them to apply to improve their health behaviors which had impacts on their QOL. Previous studies also stated that HL especially access to health information and services are related to health-related quality of life[21,22].

The municipal waste collectors who had low level of stress on job security and social support were more likely to have good quality of life. This maybe because of appropriate welfare and compensations for garbage collectors. Therefore, they had good living conditions as well as having enough income to sustain life. Through interaction and network among each other in community, waste collectors can develop themselves to have good social capital. This is consistent with some studies found that having a high level of social capital leads to better quality of life and well-being[23,24].

It is recommenced that health sectors should work with local administration organizations need to work systematically to improve health literacy, knowledge and attitude of the municipal waste collectors. Administration organizations should improve occupational health and safety especially to prevent MSDs and injuries. Better communication and supports on job security, and social support on job were in needed.

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References

1. Dorevitch S, Marder D. Occupational hazards of municipal solid waste workers. Occupational Medicine-Oxford. 2001;16(1):125-33.
2. Mulloy KBJOm. Sewage workers: toxic hazards and health effects. 2001;16(1):23-38.
3. World Health Organization. Introducing the

WHOQOL instruments 2019 [Febuary 11, 2020]. Available from: https://www.who.int/healthinfo/survey/whoqol-qualityoflife/en/.

4. Kindig DA, Panzer AM, Nielsen-Bohlman L. Health literacy: a prescription to end confusion: National Academies Press; 2004.
5. Centers for Disease Control and Prevention. Health Literacy: What is Health literacy? 2019
6. Morken T, Riise T, Moen B, Hauge SH, Holien S, Langedrag A, et al. Low back pain and widespread pain predict sickness absence among industrial workers. BMC Musculoskeletal disorders. 2003;4(1):21.
7. Li X, Gignac MA, Anis AH. Workplace, psychosocial factors, and depressive symptoms among working people with arthritis: a longitudinal study. The Journal of rheumatology. 2006;33(9):1849-55.
8. Kittipichai W, Arsa R, Jirapongsuwan A, Singhakant C. Quality of life among Thai workers in textile dyeing factories. Global journal of health science. 2015;7(3):274.
9. Qin Y, Nuntaboot K, Health. Quality of Life of Construction Workers in Guangdong Province, People's Republic of China. Journal of Nursing Science. 2012;35(2):111-20.
10. Eskezia D, Aderaw Z, Ahmed KY, Tadese F. Prevalence and associated factors of occupational injuries among municipal solid waste collectors in four zones of Amhara region, Northwest Ethiopia. BMC public health. 2016;16(1):862.
11. Yang C-Y, Chang W-T, Chuang H-Y, Tsai S-S, Wu T-N, Sung F-C. Adverse health effects among household waste collectors in Taiwan. Environmental research. 2001;85(3):195-9.
12. Cointreau S. Occupational and environmental health issues of solid waste management: special emphasis on middle-and lower-income countries. Urban Papers. 2006;2.
13. Mehrdad R, Majlessi-Nasr M, Aminian O, Malekahmadi SSF. Musculoskeletal disorders among municipal solid waste workers. Acta Medica Iranica. 2008:233-8.
14. Bogale D, Tefera W. Assessment of occupational injuries among Addis Ababa city municipal solid waste collectors: a cross-sectional study. BMC Public Health. 2014;14(1):169.
15. Bleck D, Wettberg W. Waste collection in developing countries–Tackling occupational safety and health hazards at their source. Waste management. 2012;32(11):2009-17.
16. Aminuddin MSH, Rahman HA. Health risk survey for domestic waste management agency workers: case study on Kota Bharu Municipal Council (MPKB), Kelantan, Malaysia. nternational Journal of Environmental Science Development2015;6(8):629.
17. An H, Englehardt J, Fleming L, Bean J. Occupational health and safety amongst municipal solid waste workers in Florida. Waste Management Research1999;17(5):369-77.
18. Poulsen OM, Breum NO, Ebbehoj N, Hansen ÅM, Ivens UI, van Lelieveld D, et al. Collection of domestic waste. Review of occupational health problems and their possible causes. Science of the Total Environment. 1995;170(1-2):1-19.
19. Sorensen K, Van den Broucke S, Fullam J, Doyle G, Pelikan J, Slonska Z, et al. Health literacy and public health: a systematic review and integration of definitions and models. BMC public health. 2012;12(1):80.
20. Nutbeam D. Health literacy as a public health goal: a challenge for contemporary health education and communication strategies into the 21st century. Health promotion international. 2000;15(3):259-67.
21. Wallace LS, Rogers ES, Weiss BD. Relationship between health literacy and health-related quality of life among Tennesseans. Tennessee medicine: journal of the Tennessee Medical Association. 2008;101(5):35-9.
22. Suka M, Odajima T, Okamoto M, Sumitani M, Igarashi A, Ishikawa H, et al. Relationship between health literacy, health information access, health behavior, and health status in Japanese people. Patient education counseling2015;98(5):660-8.
23. Deshmukh PR, Dongre AR, Rajendran K, Kumar S. Role of social, cultural and economic capitals in perceived quality of life among old age people in Kerala, India. Indian journal of palliative care. 2015;21(1):39.
24. Lucumí DI, Gomez LF, Brownson RC, Parra D. Social capital, socioeconomic status, and health-related quality of life among older adults in Bogotá (Colombia). Journal of aging health Care Women Int. 2015;27(4):730-50.

Health Risk Assessment on Human Exposed of Nitrogen Dioxide in Adults Around Steel Industry

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Abstract

Background: Nitrogen dioxide (NO_2) is a pollutant gas that can cause symptoms that are bad for the environment and human health. As a result of exposure to nitrogen dioxide in humans through inhalation will cause acute and chronic respiratory disorders. Sources of nitrogen dioxide emissions can come from repeated combustion processes in the steel industry using coal as an iron reducing agent in the furnace.

Objectives: This study aims to evaluate the public health risks around the steel industry in the village of Sukadanau, West Cikarang sub-district.

Method: Anthropometric characteristics and activity patterns are used to calculate intakes. Intake (I*nk*) and Reference Concentration (R*f*C) produce RQ (*Risk Quotion*) with RQ *real time*> 1 indicating the existence of health risks so that risk management is needed.

Results: Adults who live around the steel industry are at risk of exposure to nitrogen dioxide gas in the surrounding air. The study found that at a radius of <500 meters from the industry having RQ*real time* > 1 and found signs respiratory disorders to respondents.

Conclusion: With the method of analyzing environmental health risks from exposure to nitrogen dioxide, it is known that there are significant health risks for the community that can be used as preventive measures to prevent worse health problems.

Keywords: *Nitrogen dioxide, health risk, steel industry, human exposure.*

Introduction

Indonesia is the 3rd largest steel importer in the world, at 11 million tonnes in 2016 for all steel product[1]. One of steel industries that plays a role in Southeast ASIA is located in West Cikarang and is in the center of community settlements in the administrative area where the industry is located has 25,817 people who have the potential to have an effect from emissions released by the industry into ambient air. The use of fossil fuel in the iron and metal (steel) industry will increase greenhouse gas emissions. Production activities in the iron and steel industry tend to go through high temperature processes with very large fuel consumption, as a result most of these processes are sources of NO_2 emissions especially those produced from equipment technology such as boilers and furnaces[2].

Previous and recent epidemiologic studies consistently indicate associations between short-term increases in ambient NO_2 concentrations and increases in respiratory effects aggregated across specific conditions such as asthma, COPD, and respiratory infections[3]. This study is going to use health risk assessment method of U.S. EPA is used to evaluate heath risk from a model prediction data following four steps as Hazard

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identification, Dose-response, Exposure assessment and Risk characterization. Normally, health assessment includes health issues that can be measured,such as chemical and pollution exposure concentrations while focusing less on qualitative information such as community perceptions of health issues[4].

Materials and Method

This research is descriptive with a study design in *cross sectional* which exposure and outcome are collected at the same time or in a certain time.

The population is adults who live around the location of the steel industry. Samples taken were adults, with criteria aged> 18 years and living at least 1 year in a location around the industry, Cikarang Barat, Bekasi. The sample in this study was determined using the calculation of estimation of proportions. Based on the calculation the sample size in this study was 94 samples. Samples in this study were divided based on Radius < 500 m, 500 - 1000 m and > 1000 m with the steel industry. From each radius, the population of each radius is calculated using the formula proportional stratified random sampling.

This research uses a method approach in the form of Environmental Health Risk Analysis which is based on the Guidelines for assessing human health risks from environmental hazards by enHealth (2012) consisting of 4 stages namely Hazard Identification, Exposure Analysis, Dose-Response Analysis and Risk Characterization. This method cannot see the correlation between variables so it is limited to the presence or absence of health risks that will arise in humans.

Frequency distribution analysis is carried out to see the size of the mean, minimum and maximum values for nitrogen dioxide concentration data, age, activity pattern data and anthropometric data. Conduct a health risk analysis by calculating the NO_2 exposure intake to respondents to calculate the amount of intake received by an individual by the formula:

$$Intk = \frac{C \times R \times t_E \times f_E \times D_t}{W_b \times t_{avg}}$$

Ink : Intake (intake), the number of risk agents entering the human body (mg/m^3/day)

C : concentration of risk agents (mg/m^3)

R : rate of intake (0.83 m^3/hour)

t_E : time of exposure (hour/day)

f_E : frequency of exposure (day/year)

D_t : duration of exposure, length of stay (years)

W_b : respondent's weight (kg)

t_{avg} : average time period (30 x 365 days/year for non-carcinogenic substances)

Next look at the risk characteristics expressed by RQ. Individuals are declared to have a health risk if RQ> 1 and declared not to have risk if RQ <1. The RQ formula is as follows:

$$RQ = \frac{\text{Intake}}{RfC\ (\textit{Reference Concentaration})}$$

Risk management needs to be done in risk groups with RQ > 1 by calculating the maximum NO_2 concentration limit, t_E, f_E and D_t with the following equation:

Concentration limit	$C_{max} = \frac{RfC \times W_b \times t_{avg}}{R \times f_E \times t_E \times D_t}$
Time limit	$t_E = \frac{RfC \times W_b \times t_{avg}}{R \times C \times f_E \times D_t}$
Frequency limit	$f_E = \frac{RfC \times W_b \times t_{avg}}{R \times C \times t_E \times D_t}$
Duration limit	$D_t = \frac{RfC \times W_b \times t_{avg}}{R \times C \times t_E \times f_E}$

Results

Hazard Identification:

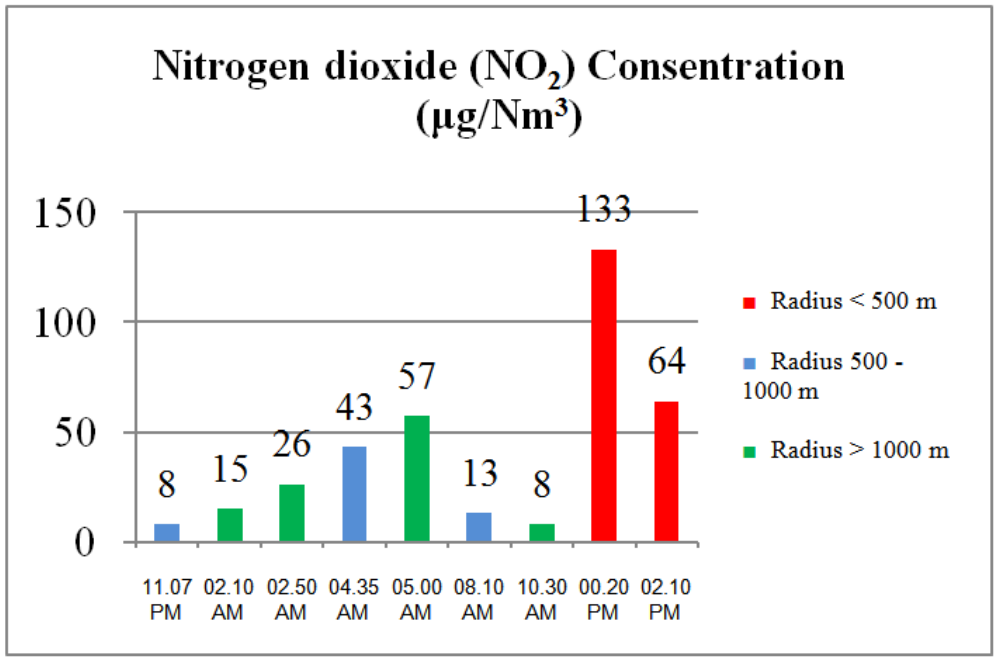

Fig. 1: NO_2 Consentration in 9 Location

Exposure Analysis: Based on the results of the study, several results were obtained regarding the characteristics of 94 adult respondents. Characteristics of respondents in the studyinclude: weight, daily exposure, frequency of exposure, exposure duration and intake NO_2 *real time* calculated using the *Kolmogorov-smirnov test*in table 1.

Table 1. Univariate Analysis Results

No.	Anthropometric Variables & Activity Patterns		Min	Max	Mean / Median	SD	p-value Kolmogorov-smirnov
1	Weight (kg)	(W_b)	41	100	66.35* / 64.50	13.21	0.060
2	Daily exposure (hours/days)	(t_E)	7	24	21.53 / 24.00*	4,08	0.000
3	Frequency of exposure (days/year)	(f_E)	305	365	357.33 / 359.00*	11.92	0.000
4	exposure Duration (years)	(D_t)	1	65	20.24 / 23.00*	15.47	0.000
5	Intake NO_2 real time (mg/kg/day)	(I)	0.0000	0.3567	0.0037 / 0.0018*	0.0057	0.000

Note: *mean used

The distribution of anthropometric characteristics of adult respondents is shown in table 2 based on test *Kolmogorov-smirnov*.

Table 2. Distribution of Anthropometric Characteristics of Adult respondents

Anthropometric Characteristics	Amount (Person)	Percentage (%)
Weight (Kg)		
<66.35	50	53.2
≥ 66.35	44	46.8
Exposure Time (hours/day)		
<24 hours	33	35.1
24 hours	61	64.9
Frequency of Exposure (day/year)		
<359	43	45.7
≥ 359	51	54.3
Duration of Exposure (year)		
<23	46	48.9
≥ 23	48	51.1
NO_2 $intake_2$ real time (mg/kg/day)		
<0.0018	43	45.7
≥ 0.0018	51	54.3

Dose-Response Analysis: A dose-response analysis is carried out to establish quantitative values of the toxicity of a risk agent for each form of chemical species. The size of the toxicity of a *risk agent* with the effects of non-carcinogens in Environmental Health Risk Analysis (EHRA) for inhalation represented by R*f*C *(Reference Concentration)*. Rated R*f*C for NO_2 has been available in the EPA/NAAQS 1990 of 0,02 (mg/kg/day) with crisis effects of respiratory tract disorders.

Risk Characterization: Risk characterization are efforts to determine whether the exposed population has a risk of *risk agents* entering the body expressed as RQ *(Risk Quotient)*. Health risk is stated to exist and needs to be controlled if RQ> 1.

Table 3. Risk Level of NO_2 Exposure based on Radius from Steel Industry Point

Radius	Level of Risk		Total
	RQ ≤ 1 real time (n)	RQ > 1 real time (n)	
< 500 m	3 (50%)	3 (50%)	6
500 – 1000 m	20 (100%)	0 (0%)	20
> 1000 m	68 (100%)	0 (0%)	68
Total	91	3	94

In the RQ *real time* from the number of 6 respondents in the radius < 500 there are 3 people (50%) respondents who have a RQ *real time* value > 1 which means the need for risk control or management.

Risk Management: Risk management is a way of controlling risk by selecting and implementing risk mitigation caused by environmental hazards[5]. Some possible risk controls to reduce the risk of non-carcinogenic exposure to NO_2 in adults around the steel industry namely reducing concentration of NO_2, reduce exposure time, reduce the frequency of exposure and duration of exposure. The calculation respondents that has $aRQ_{real\ time}$> 1 is as follows:

Table 4. Maximum Limit Value for Risk Management

	Respondent	1	2	3
Individual Characteristic	C(mg/m^3)	0.133	0.133	0.133
	RfC(mg/kg/day)	0.02	0.02	0.02
	W_b(kg)	64	65	73
	t_E(hour/day)	24	24	24
	f_E(day/year)	337	365	365
	$D_t(years)_{life\ span}$	30	30	30
Maximum Limit Value	C_{max}(mg/m^3)	0.070	0.065	0.073
	t_E(hour/day)	12.56	11.78	13.23
	f_E(day/year)	176	179	201
	D_t(years)	15.7	14.7	16.5

Discussion

The steel industry in Sukadanau Village is one of the largest industries and plays an important role in the Southeast Asian region. In one year the industry can produce 1.2 million tons of steel. In line with this,

emissions from production activities from boiler and furnace machines are produced continuously. The repeated heating activity of steel production and the use of large fuels can produce pollutants sources of NO_2[2]. In accordance with Yu Liu's research, that in his research found the most prominent source of NO_2 comes from fossil fuels that are burned from industrial processes[6].

Based on WHO's Global Air Quality Guideline in 2005 on the guideline value for NO_2 the normal limit of the concentration of NO_2 is 200 µg/Nm^3 in air ambient[7]. It can be seen that from nine measurement locations none exceeded the normal limit with the highest value in the location <500 m of the steel industry with a value of 133 µg/Nm^3 or equivalent to 0.133 mg/m^3. However, the estimated risk due to exposure to NO_2 can occur due to differences in anthropometric characteristics and activity patterns.

Evidence shows that adverse health effects remain at concentrations of pollutants that are below current air quality standards and at low air pollution levels in many countries. In addition, air pollution is an important concern in many developing countries, where emissions have increased without strict air quality policies. This has added to the worsening air quality conditions, especially in urban areas[8].

Nitrogen dioxide concentrations aretaken for one hour at each point of measurement location. Starting at 11:00 pm until 03.10 pm in the morning. The concentration of NO_2has increased starting from the first measurement in the morning until late afternoon, and increasing at night with measurements at 00.10 pm. This diurnal trend of NO_2 is consistent with EPA's explanation for NO_2 that this is caused by meteorological influences, with concentrations increasing at night when atmospheric mixing decreases due to low wind speeds and low mixing layer heights[3].

In table 1 it can be seen that the frequency of respondent exposure is 24 hours/day on average. In table 2 it is also known that the highest frequency of exposure is 24 hours/day. This is because most of the study respondents were housewives in residential locations so that most of their activities were in the area where they lived.

Calculations *Intake* there are variations from each respondent due to differences in anthropometric characteristics and activity patterns. The highest value of intake on respondents obtained from respondents with the duration of exposure (D_t) 24 years exceeds the average of 23 years.

In the calculation of RQ (*Risk Quotion*) there are 3 respondents who have a value of $RQ_{real\ time} > 1$. Of all respondents who have an $RQ_{real\ time} > 1$ are respondents who live in a radius of <500 m from the steel industry. This is influenced by the concentration of NO_2 at a radius of <500 m from the steel industry which is very high at 0.133 mg/m^3 and decreases after more than 500 m distance. This is consistent with the theory that the concentration of NO_2 will decreases at a distance of 500 m from the source of emissions[3]. This is not much different from the results of Masito's research which says that the distance of 300 m is the area affected from the point of taking NO_2[9].

$RQ_{real\ time} > 1$ is where the result is an insecure value (potentially causing non-carcinogenic effects) in the surrounding community in the steel industry area. So that there is a need for risk management measures using an economic and social approach, a technology approach and stakeholders[10]. Based on the calculation it can be seen that the maximum safe concentration for a period of 30-year exposure (projected *lifespan*) is taken from the respondents most at risk with the highest f_E value and the lowest concentration of 0.065 mg/m^3. The limit is the safe concentration limit to avoid health risks. Furthermore,at the concentration of exposure using a maximum value of 0.133mg/m^3, then the maximum safe time is 11.78 hours/day the frequency of safe exposure is 176 days/year and the duration of safe exposure is 14.7 years. The difference in values is due to the different anthropometric characteristics and activity patterns of the respondents. The risk group can do this by managing the time, frequency and duration of exposure so as not to pose a health risk.

The effects arising from exposure to NO_2 tend to cause respiratory disturbances because the dominant exposure pathway is through inhalation. In this study it was found that respondents with $RQ_{real\ time} > 1$ experienced symptoms of respiratory disorders such as coughing and phlegm. Research in Italy shows that there is a relationship between the concentration of NO_2 and impaired lung function using a spirometer. FER statistical test results ($FER = FEV_1/FVC$) have a significant correlation with NO_2 ($p<0.001$)[11]. Further evidence supporting the short-term relationship between NO_2 and an increased risk of death from respiratory disease has also been widely reported, especially in urban areas of China[12,13].

Conclusions

Measurement of health risks from the concentration of NO_2 in adults around the steel industry in Sukadanau Village, Cikarang Barat District resulted in $RQ_{real\ time} > 1$ at a radius of <500 m. Respondents with $RQ_{real\ time} > 1$ are known to experience symptoms of respiratory disorder in the form of coughing and phlegm, so there is a need for risk management to anticipate worse health problems. Risk management can be done by reducing the exposure time to no more than 11 hours/day and the frequency of exposure to 176 days/year.

Efforts of relevant institute to reduce emissions in ambient air are needed to overcome health problems that are getting worse. Local government efforts in reducing industrial exhaust emissions can be done by making and realizing policies for industries that do not conduct periodic audits and issue emissions exceeding the normal limits.

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Reference

1. The Indonesian Iron And Steel Industry Association (IISIA). Indonesia Steel Industry : Development & Opportunities. 2017.
2. US. EPA. Alternative Control Techniques Document -- NOx Emissions from Iron and Steel Mills. North Carolina Contract No EPA-453/R-94-065. 1994;
3. US. EPA. Integrated Science Assessment for Oxides of Nitrogen (Final Report). Washingt DC Contract No EPA/600/R-08/071 [Internet]. 2016;(January). Available from: http://ofmpub.epa.gov/eims/eimscomm.getfile?p%7B_%7Ddownload%7B_%7Did=526855
4. World Health Organisation (WHO). Air Quality Guideline for Europe 2nd Ed. 2017; Available from: http://www.who.int/hia/tools/other_IA/en/.
5. Rahman R. Book of Design Teaching Environmental Health Risk Analysis. Depok: University of Indonesia; 2017.
6. Liu Y, Sun J, Gou Y, Sun X, Li X, Yuan Z, et al. A Multicity Analysis of The Short-term Effects of Air Pollution on The Chronic Obstructive Pulmonary Disease Hospital Admissions in Shandong, China. Int J Environ Res Public Health [Internet]. 2018;15(4). Available from: https://www2.scopus.com/inward/record.uri?eid=2-s2.0-85045727416&doi=10.3390%2Fijerph15040774 & partnerID=40 & md5=49585b813b0864ca7b0efa453b0d988a
7. World Health Organisation (WHO). Air Quality Guidelines for Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide. 2005; Available from: https://www.who.int/airpollution/publications/aqg2005/en/
8. Health Effect Institute. Outdoor Air Pollution and Health in the Developing Countries of Asia: A Comprehensive Review [Internet]. Boston; 2010. Available from: http://pubs.healtheffects.org/getfile.php?u=602.
9. Masito A. Risk Assessment Ambient Air Quality (NO2 And SO2) And The Respiratory Disorders To Communities In The Kalianak Area Of Surabaya. J Kesehat Lingkung. 2018;10(4):394.
10. EnHealth. Environmental Health Risk Assessment-Guidelines for Assessing Human Health Risk from Environmental Hazards. 2012;
11. Carbone U, Montuori P, Novi C, Triassi M. Respiratory Function in Power Plant Workers Exposed to Nitrogen Dioxide. Occup Med (Chic Ill). 2014;64(8):644–6.
12. Cao J, Yang C, Li J, Chen R, Chen B, Gu D, et al. Corrigendum to " Association Between Long-term Exposure to Outdoor Air Pollution and Mortality in China: A Cohort Study" [J. Hazard. Mater. 186 (2011) 1594-1600]. J Hazard Mater. 2011;191(1–3):398.
13. Chen R, Pan G, Kan H, Tan J, Song W, Wu Z, et al. Ambient Air Pollution and Daily Mortality in Anshan, China: A Time-Stratified Case-Crossover Analysis. Sci Total Environ. 2010;408(24):6086-91.

The Relationship of Nutritional Status and Gingivitis in Elementary School Children

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Abstract

Background: Gingivitis is an inflammatory condition that occurs in oral cavity soft tissue named gingiva. Inflammation of the oral cavity can affect the general condition of the body, both in adults and children. Children's general condition can also be influenced by nutritional status. In Surabaya, Indonesia, underweight is a serious nutritional problem with a high prevalence in elementary school children.

Objective: Analyzing the relationship between nutritional status and gingivitis in children aged 11-12 years in the city of Surabaya.

Method: This observational analytic study was conducted on elementary school age children in 5 regions in Surabaya. The gingiva is examined by probing the gingival sulcus. Nutritional status checks were carried out by measuring Body Mass Index which was then converted to z scores. The data was then processed through descriptive statistical method and cross tabulation between gingivitis and nutritional status in children.

Results: The prevalence of gingivitis in Surabaya in elementary school children is 46.30%. Most children in Surabaya have normal nutritional status. However, the problem of underweight nutrition in Surabaya is classified as a high prevalence of 11.11%. These conditions indicate a serious nutritional problem.

Conclusion: From this study, it can be concluded there is no significant relationship between gingivitis and the nutritional status of children. However, descriptively, children who have less nutritional status are more likely to experience gingivitis.

Keywords: *Gingivitis, Nutritional Status, Children.*

Introduction

Gingivitis is a periodontal disease that is often overlooked. Indonesian Basic Health Survey data shows that there are more than half the cases of gum disorders in Indonesia do not get treatment[1]. Gingivitis can be experienced by children and adults. The gingivitis cases and its severity increases from childhood to adolescence and adulthood.[2] The peak prevalence of gingivitis from children is in children aged 11-13 years which is 80%[3]. Beimstein et al. and Amran et al. show that the prevalence of gingivitis in puberty children are higher than in children aged 5 years[2,3]. In East Java, the prevalence of gum disorders in 12-year-old children is 1.2%[4].

Underweight in East Java is still a serious public health problem. WHO shows that public health problems are considered serious if severe travel is less than 10-14%, and is considered very high if it is 15%[5]. The prevalence of lean according to BMI/A (Body Mass

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Index by Age) in children aged 5-12 years in East Java is 11.2% which consists of 4% very thin and 7.2% thin. The prevalence of thinness in East Java is higher than the national prevalence[6].

Gingivitis can be prevented and reversible. However, if it is left untreated, it causes more complex damage to the resorption of alveolar bone called periodontitis. Based on epidemiological studies, 60-70% of cases of gingivitis in children with infectious diseases at a young age will develop into periodontitis as adults. This is related to the risk of microbial-host interactions at a young age[3]. Periodontitis is one of the most common causes of tooth loss[7]. In addition, periodontitis has a relationship with cardiovascular disease[8]. Early diagnosis and immediate treatment can effectively prevent the development of this disease. WHO in the Global Goal 2020 dental and oral health encourages national, regional, and local governments set dental and oral health standards, one of which relates to periodontal disease[9].

Gingivitis is an inflammatory condition in the gingiva. Even, minor inflammatory reactions can affect the overall condition of the body with a systemic immune response. Goehler et al. state that interleukin-1β is the main inflammatory mediator in gingivitis[10]. Circulation of interleukin in the blood affects the vagus abdominal nerve and causes depression in the appetite mechanism. Decreased appetite causes reduced food intake, resulting in decreased nutritional status[4]. Interleukin-1β also causes an increase in corticotropin releasing factor (CRF) in blood circulation and a decrease in neuropeptide y (NPY) in the blood which can cause a weight loss effect[11]. In addition, interleukin-1β activates mitochondria in cells that are inflamed so that the release of energy at these locations increases causing weight loss[12]. Weight loss is an indicator of decreased nutritional status.

Nutritional status affects the life and development of children. Children with underweight or underweight conditions have a greater risk of mortality. Children who experience growth disorders or shortness caused by poor diet and recurrent infections have a higher risk of morbidity and mortality. These conditions also affect school performance, intellectual capacity, and affect mental development[13].

Based on this background, the relationship between nutritional status and gingivitis in children aged 11-12 years in Surabaya is important to be investigated. Therefore, it can provide information and additional knowledge and become the basis for consideration of strategies for improving nutritional status through oral and dental health.

Method

This research used observational analytic cross-sectional study design. The study population was all elementary school students aged 11-12 years in Surabaya in August 2017. The number of research subjects was determined by cluster sampling technique with a minimum number of 34 children. In this study, gingivitis is an independent variable with a nominal data scale. Gingivitis was measured by a modified WHO Community Periodontal Index (CPI). Nutritional status is a dependent variable with a nominal data scale. Nutrition status classification is based on BMI/A.

The data collection process begins by providing an explanation of the aims and objectives of the study, as well as agreement with the guardian's parents that the children will be the subject of the study. Research subjects and guardian parents were welcomed to fill out questionnaires containing about age, sex, food intake, activity, and history of the child's illness, as well as the level of parental education. Research subjects measured height and weight using a stepping scale and microtoise. Subsequent research subjects were examined by gingiva using a mouthpiece and probe. After the data collection has been completed proceed to the data processing. Data were processed and tested using descriptive and cross-sectional statistics to determine the relationship between gingivitis and nutritional status.

Results

The study was conducted in 6 elementary schools in the Surabaya region which were randomly selected with a total of 54 research subjects. In the primary school group, 23 children (27.38%) are boys and 31 children (36.90%) are girls. The results of the examination are presented below.

Table 1. Nutritional Status of Respondents

Nutritional Status	N	%
Underweight	2	3.70
Light	4	7.41
Normal	26	48.15
Overweight	11	20.37
Obesity	11	20.37
Total	**54**	**100**

Table 1 shows that most respondents had normal nutritional status, while the least was light nutritional status.

Table 2. Distribution of respondents based on Nutrition Status by sex

		Nutritional Status				
		Underweight	**Light**	**Normal**	**Overweight**	**Obesity**
Sex	Male	2(8.7%)	0(0.0%)	9(39.1%)	4(17.4%)	8(34.8%)
	Female	0(0.0%)	4(12.9%)	17(54.8%)	7(22.6%)	3(9.7%)
Total		2(3.7%)	4(7.4%)	26(48.1%)	11(20.4%)	11(20.4%)

Table 2 shows that the majority of respondents' nutritional status of men and women is normal. The distribution of very thin nutritional status is mostly in men. Distribution of thin nutritional status is mostly in women. Table 3. Gingiva Status among Elementary Students

Group	**N**	**Gingivitis**		**No gingivitis**	
		n	**%**	**N**	**%**
Elementary School	54	25	46.30	29	53.70

Table 3 shows the status of gingiva in elementary school students showing that respondents experiencing very high gingivitis.

Table 4. Distribution of gingival status by sex

		Gingival Status		**Total**	**OR**
		No Gingivitis	**Gingivitis**		
Sex	Male	10(43.5%)	13(56.5%)	23(42.6%)	2.058
	Female	1961.3%	1238.7%	31(57.4%)	
Total		2953.7%	2546.3%	54(100%)	

Table 4 shows that men have a 2-fold higher risk of gingivitis than women.

Table 5. The risk of gingivitis is based on the nutritional status of children

Nutritional Status	**Gingival Status**		**Total**	**Prevalence Ratio**	**CI**
	No Gingivitis	**Gingivitis**			
	n (%)	**n ((%)**	**N (%)**		
Less	16(50%)	16(50%)	32(100%)	0,846	(0,518-1,382)
Good	13(59,1%)	9(40,9%)	22(100%)		

Table 5 shows the percentage of gingivitis in nutritional status that is more or less higher, when compared with good nutritional status. However, based on the value of the Prevalence Ratio, nutritional status is not a risk factor for gingivitis.

Discussion

In this study, gender was not a risk factor for poor nutritional status because the intake of food in boys and girls was the same. These results are different from the research by Ndiku et al. (2011) which state that the nutritional status of men is better than women. In this case, the amount of food intake of men is greater than women[14].

The results of the measurement of nutritional status in elementary school students show the problem of underweight and obese nutritional status. Referring to WHO, this condition is classified as a nutritional problem with a very high prevalence because it is ≥15%. While

the prevalence of underweight nutritional status in the elementary group is 11.11%. According to WHO, this condition is classified as a serious nutritional problem because its prevalence is in the range of 10-14%. The prevalence of elementary school students is 20.37% which shows a serious nutritional problem.

Gingival status in this study was examined by probing the gingival sulcus of each tooth. Bleeding on probing (BOP) is a sign of gingivitis. The high prevalence in elementary children can be due to hormonal factors at puberty[15]. At puberty, the volume of gingival crevicular fluid (GCF) increases. An increase in GCF volume is an indication of gingival inflammation. This is explained by the mechanism of androgen hormones that affect vascular permeability in the gingival sulcus. Hormone-related inflammation at puberty is also explained by an increase in the number of proinflammatory cytokines TNF-α and IL-1β in GCF that are affected by increased progesterone hormones in women[16].

In this study, the distribution of gingivitis was more common in boys than girls. This is because women have a higher concern for appearance than men. The results of this study are in accordance with research by Furuta (2011) stating that men have a greater risk of gingivitis. That is due to knowledge and oral hygiene behavior factors. Knowledge and behavior of maintaining good dental health can reduce plaque accumulation so that the prevalence of gingivitis in women is lower[17]. In other studies, there were no differences in the percentage of gingivitis by sex because the frequency of brushing teeth in men and women in the study was the same[18]. In this study, parental education status was not related to gingivitis in children. From the results of the cross tabulation between parent education and the frequency of children's toothbrushes, the frequency of toothbrushes for children with higher education is lacking. This can explain why in this study parental education is not a risk factor for gingivitis. This is consistent with previous studies that high parental knowledge is not a determining factor in tooth brushing habits[19].

The results of this study indicate that nutritional status is not a risk factor for gingivitis, because the inflammatory conditions in the gingiva of the study subjects are not chronic. The inflammatory immune response affects food intake and energy release in chronic inflammation which can cause weight loss[20]. In this study, there were no examinations that showed chronic gingival inflammatory conditions.

The results of cross tabulation between nutritional status with gingivitis in the elementary group showed that children with very thin nutritional status could experience gingivitis. Enwonwu (1994) statesthat children with underweight nutritional status disrupt the response of proteins to tissue damage that hinders the healing process caused by a lack of protein to form immune cells[21]. These results are consistent with the study of Muhammad (2015) which shows gingivitis in children with poor nutritional status is higher than children with good nutritional status[22].

The results of this study show that increasing nutritional status will decrease the prevalence of gingivitis. While the prevalence of gingivitis increases in the group of obesity nutritional status. Al-Zahrani et al. (2003) state that obesity is a risk factor for gingivitis[1]. In conditions of obesity, there is an increase in the number of proinflammatory cells[2]. The interaction between proinflammatory cells and bacteria in plaque is an etiological factor of gingivitis[20]. This explains the increased prevalence of gingivitis in children with obese nutritional status.One of the factors causing gingivitis is bad oral hygiene. Poor oral hygiene is characterized by plaque accumulation. One of the factors that influence plaque accumulation is tooth brushing behavior. The descriptive analysis shows that in the elementary group who seldom brush their teeth can experience gingivitis. Children with good tooth brushing frequency have a lower percentage of gingivitis. Newman (2015) states that gingivitis is an interaction between microorganisms found in dental plaque biofilms, tissue, and host inflammatory cells[23]. Therefore, if plaque accumulation is reduced, the risk of gingivitis is reduced.

This study has several limitations, namely that in cross-sectional studies, it cannot include chronic conditions of gingivitis and daily food intake. The food intake studied in this study cannot describe micronutrient intake in children. Crowded teeth and poor sanitary conditions need to be included in the exclusion criteria in the study. Based on this study, it can be concluded that there is no significant relationship between nutritional status and gingivitis. However, the nutritional status of elementary school children can have a greater chance of experiencing gingivitis. In subsequent studies, it is expected to be able to obtain socioeconomic data, chronic conditions of gingivitis, and oral hygiene data. Exclusion criteria in the form of poor sanitation conditions can be added.

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Reference

1. Indonesian Health Ministry. Basic Health Survey. Jakarta: Indonesian Health Ministry; 2018.
2. Al-Zahrani MS, Bissada NF, Borawskit EA.Obesity and Periodontal Disease in Young, Middle-age, and Older Adults. J Periodontol. 2003;74(5):610-5.
3. Amran AG, Alhajj MN, Al-Rafik NA. Evaluation of Gingival Health Status among 6 and 12 years old Children in Dhamar City. The Journal of Contemporary Dental Practice. 2016;17(6):440-44.
4. Peuhkuri K, Heikki V, Riitta K.Even low-grade inflammation impacts on small intestinal. World J Gastroenterol. 2010;16(9):1057-62.
5. WHO. Challenges to improvement of oral health in the 21st century. International Dental Journal, 2004;54:128.
6. Nelms MN, Sucher KP, Lacey K. Nutrition Therapy and Pathophysiology. 3rd ed. USA: Cengage Learning; 2016.
7. Furuta M, Ekuni D, Irie K, Azuma T, Tomofuji T, Ogura T. Sex Differences in Gingivitis Relate to Interaction of Oral Health Behaviors in Young People. J Periodontol. 2011;82(4):558-65.
8. Bellissimo N. Desantadina MV. Pencharz PB. Berall GB. Thomas SG. Anderson GH.A Comparison of Short-term Appetite and Energy Intake in Normal Weight and Obese Boy Following Glucose and Whey-Protein Drinks.Int J Obes. 2008;32(2):362-71.
9. Vollmer S, C Bommer, A Krishna, K Harttgen, SV Subramanian. The association of parental education with childhood undernutrition in low- and middle-income countries: comparing the role of paternal and maternal education. International Journal of Epidemiology. 2007; 1–12.
10. Montandon A, Elizangela Z, Toledo BE. Prevalence and Reasons for Tooth Loss in a Sample from a Dental. International Journal of Dentistry. 2012:1-5.
11. Rodan R, Khlaifat F, Smadi L, Azab R, Abdalmohdi A. 2015. Prevalence and severity of gingivitis in school students aged 6–11 years in Tafelah Governorate, South Jordan. BMC Res Notes. 2015;8:662.
12. WHO. Nutrition Landscape Information System country profile indicators. In Interpretation Guide. Switzerland: WHO Document Production Services; 2010.
13. Ulku B, Ali C, Tanrikulu S, Kantarci A, Evin A, Funda Y et al. Gingival Inflammation and Interleukin 1-b and Tumor Necrosis Factor-Alpha Levels in Gingival Crevicular Fluid During the Menstrual Cycle. J Periodontol. 2009;80:1983-90.
14. Catona J, Ryan ME. Clinical studies on the management of periodontal diseases utilizing subantimicrobial dose doxycycline (SDD). Pharmacol Res. 2011;63:114-120
15. Gemmell E, Carter CL, Grieco DA, Sugerman PB, Seymour GJ. P. gingivalis-specific T-cell lines produce Th1 and Th2 cytokines. J Dent Res. 2002:81:303-7.
16. Indonesian Health Ministry. Basic Health Survey. Jakarta: Indonesian Health Ministry; 2013.
17. Enwonwu CO. Cellular and molecular effects of malnutrition and their relevance to periodontal diseases. J Clin Periodontol. 1994;21(10):643-57
18. Dhadse P, Gattani D, Mishra.The link between periodontal disease and cardiovascular disease. J Indian Soc Periodontol. 2010;14(3):148–54.
19. Schmidt U. Tchanturia K. Harrison A. Davies H. Robert M. Oldershaw A. Nakazato M. Stahl D. Morris R. Treasure J. Cognitive Flexibility and Clinical Severity in Eating Disorders. Journal Plos One. 2011;6(6)
20. Bimstein E. Huja PE. Ebersole JL. The Potential Lifespan Impact of Gingivitis and Periodontitis in Children. J Clin Pediatr Dent. 2013;38(2):95-9.
21. Block SA. Maternal nutrition knowledge versus schooling as determinants of child micronutrient status. Oxford Economic Papers. 2007;59:330–353
22. Muhammad NO, Wesal AA, Amen FM. Prevalence of dental caries, gingival status, and enamel defect and its relation to nutritional status among kindergarten children in Sulaimani city. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS). 2015;l14(12):84-94.
23. Newman M, Takei H, Klokkevold P, Carranza F. Clinical Periodontology. 12th ed. Missouri: Elsevier; 2015.

Major Stunting Determinants in Infants: A Prevention Model

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Abstract

The number of stunting cases in West Aceh Regency increases every year. This study was an observational study with case-control design exexamine the dominant stunting factors among toddlers in West Aceh Regency amine the dominant stunting factors among toddlers in West Aceh Regency. This study was conducted from February 10 to June 30, 2018, in *Johan Pahlawan* District of West Aceh Regency of Aceh Province. The location was chosen through a purposive sampling technique by observing the highest number of children under five experiencing stunting in West Aceh Regency. The number of samples in this study was 192 children. The results of this study showed that there was a significant relationship between the occurrence of stunting in children under five and the number of family members; parental height; Socioeconomic status (SES); low birth weight (LBW); nutritional knowledge; and food intake, where the p-value < 0.05.

Keywords: *Dominant factor, stunting, toddler, number of family members, socio-economic status.*

Introduction

In 2012, the World Health Assembly Resolution 65.6 embraced a Comprehensive implementation plan on maternal, infant and young child nutrition[1] which indicated six worldwide nourishment targets for 2025.[2] This policy briefly achieves the first objective of a 40% stunting decrease in children under five years old[1]. Stunting during childhood is one of the massive obstacles to human improvement internationally influencing around 162 million children under five years old. Stunting, or being unreasonably short for one's age, is characterized as a height that is in two standard deviations underneath the World Health Organization (WHO) child growth standards.[1]

Stunting is an issue of perpetual malnourished health which is brought about by a long-time absence of supplement consumption because of mistaken feeding practice that does not meet the nourishing needs. Indonesia positioned on the fifth for the children with stunting conditions. More than 33% of Indonesian children under five years in Indonesia are underneath average height. The National Medium Term Development Plan or *'Rencana Pembangunan Jangka Menengah Nasional'* (RPJM) and Strategic Plan or *'Rencana Strategis*' (RENSTRA) 2015-2019 has set the goal to decrease stunting in children under five years old by 9.5%. Meanwhile, in 2013, the stunting rate is 37% implies that there is a 28.5% decrease in monetary decline, and this should urgently be solved shortly.[3]

The Nutrition in the First 1,000 Days State of the World's Mothers (2012) elicits that the condition influenced the causes during 1000 days of a child's life beginning from the womb until their two years of age.[4] Specifically, the predominance of stunted children in Aceh in Aceh area in 2016 was 41.5%, increasing from 2017, which was 37.2%.[5] One of the indirect reasons for stunting cases is the number of members in the family. This number of a family is under recent research results which have reasoned that the aspects influencing the stunting case incorporated with the number of family members,[6-7] parents' height,[8]Socio-economic status (SES),[9] and history of LowBirth Weight (LBW).[10]

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In deliberation of the depiction narrated above, the objective of this study was to examine the dominant stunting factors among toddlers in West Aceh Regency.

Materials and Method

This study is an observational study with a case-control design. This study was conducted from February 10 to 30 June 2018 in Johan Pahlawan District of West Aceh Regency of Aceh Province. The location was chosen through a purposive sampling technique by observing the highest number of children under five experiencing stunting in West Aceh Regency. The number of samples in this study was 192 children. The instrument used to measure the variables was a structured questionnaire for interviews; to measure height was a height meter with a precision level of 0.1 cm, and to measure food intake was a 24-hour diet recall. A body length according to age with a Z-score less than -2 SD was to determine stunting in children.[11] The data analysis performed by univariate and bivariate analysis using the chi-square test. The test used the confidence intervals (95% CI) and significance level $p < 0.05$. The multivariate analysis was carried out by a logistic regression test.The sample of this study was 182 children who divided into two groups; 96 children for the control group and 96 children for the case group.

Results

Table 1 below explains that the food intake and parental height (paternal and maternal) differed significantly between the case group and the control group.

Table 1. Frequency of Variable Distribution

Variable	Cases (n=96)		Control (n=96)	
	n	%	n	%
Number of Family Member				
a. >Three persons	73	76.56	30	31.25
b. Three persons	23	23.44	66	68.75
c. ≤ Three persons				
Paternal Height				
a. 155 cm	25	26.56	90	93.75
b. ≤ 155 cm	71	73.44	6	6.25
Maternal Height				
a. >145 cm	23	23.44	80	83.37
b. ≤ 145 cm	73	76.56	16	16.63
Socio-economic (SES)				
a. High (> UMP)	24	25	69	71.88
b. Low (< UMP)	74	75	27	28.12
Low Birth Weight (LBW)				
a. LBW	80	83.38	30	31.25
b. Normal	16	16.62	66	68.75
Nutritional Knowledge				
a. Good	32	33	63	65.62
b. Not Good	64	67	33	34.38
Food Intake				
a. Good	17	17.7	72	74.94
b. Not Good	79	82.3	24	25.06

* significant p < 0,05, PMW = Province Minimum Wage or UMP (Upah Minimum Provinsi)

Table 1 explains that there was a significant relationship between the occurrence of stunting and the food intake; parental height; nutritional knowledge; SES; the history of LBW; and the number of family members. The highest OR found in food intake, with 8.09, which indicated that children who had poor food intake had an opportunity for 8.09 for stunting. It followed by maternal height (6.12), paternal height (5.43), nutritional knowledge (4.93), SES (4.79), LBW (3.78), and the number of family members (3.56).

Table 2. Bivariate Analysis of Variables

Variable	Toddler Height				p-Value	OR (95% CI)
	Stunting		Normal			
	n	%	n	%		
Number of Family Member						
a. >Three pesons	73	76.56	30	31.25	0.03	3.56 (1.4-2.78)
b. Three persons	23	23.44	66	68.75		
c. ≤ Three persons						
Paternal Heigh						
a. > 155 cm	25	26.56	90	93.75	0.002	5.43
b. ≤ 155 cm	71	73.44	6	6.25		(1.6-3.36)
Maternal Heigh						
a. >145 cm	23	23.44	80	83.37	0.001	6.12
b. ≤ 145 cm	73	76.56	16	16.63		(1.03-7.23)
Socio-economic (SES)						
a. High (>PMW)	24	25	69	71.88	0.007	4.79
b. Low (<PMW)	74	75	27	28.12		(2.01-4.82)
Birth Weight (LBW)						
a. LBW	80	83.38	30	31.25	0.03	3.78
b. Normal	16	16.62	66	68.75		(1.2-3.12)
Nutritional Knowledge						
a. Good	32	33	63	65.62	0.005	4.93
b. Not Good	64	67	33	34.38		(1.97-3.89)
Food Intake						
a. Good	17	17.7	72	74.94	0.00001	8.09
b. Not Good	79	82.3	24	25.06		(2.82-9.67)

*Significantp< 0,05, PMW=Province Minimum WageorUMP (Upah Minimum Provinsi)

Table 3. Logistic regression analysis

Variable	Model 1 OR 95% CI	Model 2 OR 95% CI	Model 3 OR 95% CI	Model 4 OR 95% CI	Model 5 OR 95% CI
Number of Family Member					
a. >three persons	2.77	2.04	3.02	2.67	3.19
b. ≤ 3 people	(0.22-7.98)	(0.33-7.82)	(0.68-10.05)	(0.43-7.56)	(0.95-10.98)
High of Father					
a. > 155 cm	5.60	4.73	4.54	5.54	4.83
b. ≤ 155 cm	(1.03-12.96)	(0.98-10.86)	(0.84-10.95)	(1.08-12.76)	(1.30-12.01)
High of Mother					
a. >145 cm	6.70	5.73	4.03	6.54	5.83
b. ≤ 145 cm	(1.53-13.96)	(1.09-12.86	(0.64-11.94	(1.48-13.85)	(1.10-12.31)
Socio-economic					
a. high (>PMW)	3.88	3.57	4.05	3.57	4.85
b. Low (< PMW)	(0.53-10.97)	(0.68-9.86)	(0.98-11.65)	(0.73-11.56)	(0.91-11.91)

Variable	Model 1 OR 95% CI	Model 2 OR 95% CI	Model 3 OR 95% CI	Model 4 OR 95% CI	Model 5 OR 95% CI
Birth Weight					
a. LBW	3.65	2.84	3.25	2.97	4.19
b. Normal	(0.72-9.98)	(0.38-8.82)	(0.78-11.05)	(0.43-8.56)	(0.95-11.98)
Nutritional Comprehension					
a. Good	4.78	3.57	4.95	3.59	4.45
b. Not Good	(0.93-11.96)	(0.68-9.86)	(0.94-11.05)	(0.78-11.76)	(0.71-11.01)
Food Supply					
a. Good	7.15	7.98	8.32	6.65	9.87
b. Not Good	(2.97-17.07)	(2.99-20.87)	(3.18-22.15)	(2.87-18.01)	(3.57-26.64)
R^2 (%)	0.23	0.27	0.19	0.18	0.34
n	182	182	182	182	182

*PMW=Province Minimum Wage or UMP (Upah Minimum Provinsi)

This study used multivariate logistic regression analysis where this test would describe the most appropriate model to be used to explain the relationship between independent variables and dependent variables. The bivariate test results of all independent variables in this study can be included in multivariate analysis because all of their p-values were <0.25.

Discussion

Further, the information about these research results provided. The relationship between the occurrence of stunting and the numbers of a family member, parental height, SES, BLW, parents' nutritional knowledge, and food intake examined carefully, and the discussion is as in the following.

First, there is a relationship between the number of family members and the occurrence of stunting. The result of bivariate analysis demonstrated that there was a noteworthy connection between the number of families and the stunting case (Table 2). The variable number of relatives incorporated into multivariate analysis since the value of bivariate analysis demonstrated p <0.25 or value of 3.16. This result implies that families with more than four individuals had 3.19 occasions the danger of having a stunted child compared to families with under four individuals (Table 3). This outcome is following an investigation that recommends that there is a connection between the number of family members and the occurrence of stunting.[12-14]

Second, the result of this study also demonstrated that parents' height (both father's and mother's) altogether identified with the occurrence of stunting (p-value<0.05), which can be found in Table 2. The parents' height can be incorporated into multivariate analysis since its result of a bivariate analysis indicated p < 0.25, and it was discovered that the paternal height of <150 cm had 4.83 occasions the risk of getting a stunted child (OR = 4.83) (Table 3). Another research recommends that being born from short parents is also a factor for stunting.[15-16]. The other study also suggests that parental height is altogether related to the occurrence of stunting.[17]

Third, the result of this study demonstrated that there was a critical connection among SES and the occurrence of stunting in children under five years old (p-value<0.05), which can be found in Table 2. Another investigation likewise proposes that SES identified with the occurrence of stunting in children under five years old five.[18] It further expressed that SES is the predominant factor in stunting case caused by the arrangement of nutritious food is unfulfilled.[19] SES is related to parents' salary to address family needs so that SES impacts the capacity of families to meet the healthful nutritional needs of children under five years old and different sorts of supplementary nourishment.

Fourth, the result of this study further demonstrated that there was a significant connection between LBW and the occurrence of stunting in children under five years old (p-value<0.05), which can be found in Table 2. Children with a background marked by LBW had 4.19 occasions the risk of stunting. This result supported by a study about the prevalence and determinants of

malnourished children and stunting in the area of Brazil which expresses that there is a noteworthy connection between children with LBW (<2,500 gr) and stunting occurrence.[20] A few studies demonstrate that children with LBW are at a high risk to experience neurological abnormalities and deferred growth and development in the long periods of life.[21] Consequently, it influences the development of their height. Another study likewise demonstrates that children with a weight of <2,500 gr connected to the occurrence of stunting.[22]

Fifth, the results of the bivariate analysis demonstrated that there was a significant connection between nourishing knowledge and the occurrence of stunting. It indicated that parents who had poor dietary knowledge had 4.93 occasions higher risk to have their children experience a lack of healthy food compared to children whose parents are well-informed about nourishment in food. On the contrary, the individuals who have inadequate information will give their children unseemly vitality and protein consumption and not as needs be to children's healthful needs. This finding is following a study that proposes that nutritional knowledge of parents identified with the occurrence of stunting.[23-25] Also, a study suggests that the woman's knowledge about health, in general, brings about having more beneficial effects on their children as it can minimize the occurrence of stunting.[26] The absence of nutritional knowledge of mothers in West Aceh regency caused a high pace of stunting in children under five years old.

Finally, the result of this study demonstrated that food intake is also related to the stunting occurrence. This information can be seen in Table 2, where the p-esteem is 0.00001 as well as OR value= 8.09, which demonstrated that children under five years old with inadequate food intake had 8.09 occasions the risk of stunting. There was a suggestion that there is a connection between food intake and the occurrence of stunting.[27] Nourishment security in families is essential toward the appearance of stunting in children under five years old. Pregnant mothers who consume low supplement food intake and experience infectious diseases will deliver birth to babies with LBW and underneath standard body length. The factor of good condition, particularly toward the fantastic start of a child, can augment the genetic potential so that they can come to their ideal height.[26] Further, Wondimagegn states that it is important to enhance people's cultural beliefs and cultural realities to decline the stunting rate.[27]

Conclusion

In conclusion,the results obtained in this study showed that there was a significant relationship between the occurrence of stunting in children under five and the number of family members; parental height; SES, LBW, nutritional knowledge; and food intake with p-value <0.05. The results of multivariate analysis obtained R^2 in the fifth model which indicated that the variable of the number of family members, parental height, SES, LBW, nutritional knowledge and food intake contributed 34%to the occurrence of stunting in West Aceh Regency of Aceh Province.

List of Abbreviations: ES: Socioeconomic status; LBW: low birth weight; RENSTRA: *Rencana Strategis*; RPJMN: *Rencana Pembangunan Jangka Menengah Nasional'*; PMW: Province Minimum Wag; UMP (*Upah Minimum Provinci*).

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References

1. World Health Organization. Standards for improving the quality of care for children and young adolescents in health facilities. Geneva: World Health Organization; 2018.
2. World Health Organization. Child growth standards and the identification of severe acute malnutrition in infants and children. A joint statement. Geneva: World Health Organization; 2009.
3. Kemenkes Republik Indonesia. Riset Kesehatan Dasar (Basic Health Research). Jakarta: Kementerian Kesehatan Republik Indonesia; 2018.
4. Millennium Challenge Account. Stunting dan Masa Depan Indonesia (Stunting and Indonesian future). Jakarta: MCA Indonesia; 2015.
5. Dinas Kesehatan Aceh Barat. Angka Kejadian Stunting pada Balita (Stunting Incidence Rate in Toddlers). Aceh Barat: Dinas kesehatan Aceh Barat; 2017.
6. Meilyasari F. Faktor Risiko Kejadian Stunting

Pada Balita Usia 12 Bulan Di Desa Purwokerto Kecamatan Patebon Kabupaten Kendal (Risk Factors for Stunting Incidence in Toddlers at 12 Months in Purwokerto Village, Patebon District, Kendal Regency). Journal of Nutrition College. 2013; 3(2).

7. Fikadu, et. al.. Factor Associated With Stunting Among Children Age 24 To 59 Months In Meskan District, Gurage Zone. South Ethiopia; 2014.
8. Johnson, M, Inc and Brookstone. Nutrition in The First 1000 Days State Of The World's Mother 2012. Save The Children. 2012
9. Kusuma, K.E, Nuryanto. Faktor Risiko Kejadian Stunting Pada Anak Usia 2-3 Tahun (Studi di Kecamatan Semarang Timur) (Risk Factors for Stunting Occurrence in Children Aged 2-3 Years (Study in East Semarang District).). Unpublished bachelor thesis. Universitas Diponegoro: Semarang; 2013.
10. Rosha, BC. Determinant Analysis Of Stunting Children Aged 0-23 Months In Poor Areas In Central And East Java.Penelitian Gizi Makan. 2012; 35(1): 34-41.
11. World Health Organization. Global targets 2025. To improve maternal, infant and young child nutrition. 2015
12. Oktarina, Z. Risk Factors of Stunting among Children [24—59 months] in Sumatera. Jurnal Gizi dan Pangan November.2013; 8(3): 175—180.
13. Jesmin, A. Prevalence and determinants of chronic malnutrition among preschool children: a cross-sectional study in Dhaka city, Bangladesh. International Centre for Diarrhoeal Disease Research, Bangladesh. Health and Popular Nutrition. 2011; 29(5):494-499
14. Kleynhans, IC. Stunting among young black children and the socio-economic and health status of their mothers/caregivers in poor areas of rural Limpopo and urban Gauteng–the NutriGro Study. SAJCN. 2006; 19(4).
15. Lestari, W. Faktor risiko stunting pada anak umur 6-24 bulan di kecamatan Penanggalan kota Subulussalam provinsi Aceh (Risk factors for stunting in children aged 6-24 months in the sub-district of Penanggalan, Subulussalam, Aceh Province). Jurnal Gizi Indonaresia. 2014;3(1): 37-45.
16. Reyes, H. The family as a determinant of stunting in children living in conditions of extreme poverty: a case-control study. BMC Public Health. 2004.
17. Willey B.A. Socio-economic predictors of stunting in preschool children-a population-based study from Johannesburg and Soweto Barbara A Willey, Noel Cameron, Shane A Norris, John M Pettifor, Paula L Griffiths. SAMJ; June 2009, Vol. 99, No. 6.
18. Ngaisyah, RD. Hubungan Sosial Ekonomi Dengan Kejadian Stunting Pada Balita Di Desa Kanigoro, Saptosari, Gunung Kidul (Socio-Economic Relationship With Stunting In Toddlers In Kanigoro Village, Saptosari, Gunung Kidul). Jurnal medika respati. 2015; 10(4).
19. Correia, LL. Prevalence and determinants of child undernutrition and stunting in the semiarid region of Brazil. Rev Saude Publica.2014; 48(1):19-28
20. Dalimunthe, SM. Gambaran Faktor-Faktor Kejadian Stunting Pada Balita Usia 24- 59 Bulan Di Provinsi Nusa Tenggara Barat Tahun 2010 (Overview of Factors for Stunting Occurrence in Toddlers Age 24-59 Months in West Nusa Tenggara Province, 2010). Unpublished bachelor thesis. Syarif Hidayatullah Islamic University, Jakarta; 2015.
21. Kusumawati, E. Model of Stunting Risk Factor Control among Children under Three Years Old, Jurnal Kesehatan Masyarakat Nasional. 2015;9(3).
22. Ibrahim IA, Faramida R. Hubungan Faktor Sosial Ekonomi Keluarga dengan Kejadian Stunting Anak Usia 24-59 Bulan di Wilayah Kerja Puskesmas Barombong Kota Makassar Tahun 2014 (Relationship between Family Socio-Economic Factors and Stunting Occurrence of Children 24-59 Months in the Work Area of the City of Barombong Health Center Makassar City in 2014). Public Health Science Journal. 2014; 6(2).
23. Ni'mah K., Nadhiroh SR. Faktor yang berhubungan dengan kejadian Stunting pada balita (Factors related to the incidence of Stunting in infants). Media Gizi Indonesia. 2015; 10(1): 13–19.
24. Abebe Z. Health Extension Workers' Knowledge and Knowledge-Sharing Effectiveness of Optimal Infant and Young Child Feeding Are Associated With Mothers' Knowledge and Child Stunting in Rural Ethiopia. Food and Nutrition Bulletin. 2016; 37(3): 353-363.
25. Kementerian PPN/Bapenas. Pedoman Pelaksanaan Intervensi Penurunan Terintegrasi Kabupaten/kota

(Ministry of PPN/BAPPENASs. Guidelines for Implementing District/City Integrated Decrease Interventions). Jakarta; 2018.

26. De onis M, Ssner M.B dan Borghi, P. Prevalence and trends of stunting among pre-school children. Public Health Nutrition. 2011; 15(1): 142–148.
27. Wondimagegn, Z.T. Magnitude and determinant of stunting among children in Africa: A systematic review. Current Research in Nutrition and Food Science. 2014; 2(2): 88-93.

Association of Manganese Level in Drinking Water and Other Factors with Hypertension in the Around Landfill Population in Depok, Indonesia

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ABSTRACT

Background: Hypertension is a risk factor for cardiovascular disease, such as stroke and heart disease. Hypertension is also a silent killer which has caused 9 million preventable deaths and 1.3 billion people have hypertension worldwide. In Indonesia, cardiovascular disease is the second leading cause of death. One of the hypertension factors still under study is excessive manganese intake. The landfill is a source of release of manganese into the environment. This study aimed to determine the relationship and risk of manganese level and other factors on hypertension in the people who live around the landfill in Cipayung, Depok.

Method: The study design was cross sectional with 107 respondents who consumed ground water as raw material for drinking water. Measurement of manganese in water used the method (SNI) 6989.5: 2009 on how to test manganese by Atomic Absorption Spectrophotometry (AAS).

Result: The results showed significant results on the variables of obesity (0.042, OR: 2,460) and age (0,0001, OR: 10,675) on hypertension. The level of manganese in drinking water to hypertension did not show significant results, but as a controlling variable (0.450, OR: 1.584). While other variables (blood sugar levels, smoking, ethnicity, family history, socioeconomic and gender) did not show significant results, but had an OR more than 1, which were respectively 2.05, 2.48, 3.19 (active smokers), 1.79 (passive smokers), 1.02, 1.12, 0.96 and 2.45.

Conclusion: The conclusion from this study is no relationship between manganese levels in drinking water with hypertension, but obesity and age have a significant relationship to hypertension.

Keywords: *Manganese, drinking water, hypertension, landfill.*

Introduction

Hypertension or high blood pressure is a serious medical condition that can significantly increase the risk of disease, such as heart, brain, kidney and other diseases. Around 1.13 billion people worldwide suffer from hypertension, most (2/3) living in low and middle income countries. Hypertension is a leading cause of premature death worldwide[1]. In 2030, the United Nations (UN) is committed to reducing 1/3 of premature deaths from non-communicable diseases[2].

In Indonesia, hypertension in the population aged ≥ 18 years (measurement results) in 2018 has increased, reaching 34.1%. While the province of West Java ranks second as the province with the most hypertension sufferers which exceeds the national figure[3]. In Depok, in 2016 there were 34,244 cases of hypertension reported out of 759,710 of patients taking blood measurements[4]. Based on the sequence of disease patterns, most outpatients (aged 45-75) in all Depok hospitals in 2017, hypertension ranks third (10.05%) after diabetes

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mellitus and Congestive Heart Failure (CHF) and ranks sixth (19,590 patients, 6.61%) in all age groups in general. In the primary health care, hypertensive outpatients reached 141,084 (14.91%) and ranked the second highest disease[4].

High blood pressure is also called the "silent killer" because it often has no signs or symptoms and many people do not know that they suffer from hypertension[5]. Hypertension, also known as high blood pressure which is a condition in which blood vessel pressure is constantly increasing[1]. Blood pressure is divided into 3 categories namely, normal (≤120/80 mmHg), prehypertension (systolic: 120-139 mmHg and diastolic 80-89 mmHg) and hypertension ≥140 mmHg[6]. Risk factors for hypertension include prehypertension, diabetes, kidney disease, high sodium and low potassium diets, high fat diets, low consumption of vegetables and fruits, lack of physical activity, obesity, excessive alcohol consumption, smoking, age over 65 years, history family, sex, race or ethnicity[5,1].

In addition to the above risks, one of the chemical elements that can affect blood pressure is Manganese (Mn) although the results of the study are still controversial. Based on population studies in Korea, that Mn levels in the blood are positively related to increasing hypertension[7]. However, another study states that manganese is negatively correlated with blood pressure[8]. Most studies on the relationship between manganese and blood pressure have been carried out from the perspective of manganese toxicity. These studies report that manganese levels in the blood are high, because excessive manganese exposure increases blood pressure[8]. Based on the study of Kostial et al (1974) reported that manganese increases blood pressure in animal studies. However, Šarić and Hrustić (1975) report that low blood pressure in workers exposed to manganese. In particular, it is difficult to explain the mechanism behind the correlation between manganese intake and blood pressure. However, it has been reported in several studies that abnormal manganese levels decrease manganese-SOD activation, which inhibits the anti-oxidative function of this enzyme and decreases the defense capacity of vascular endothelium dysfunction and causes hypertension[8].

Mn is a metal group element in the form of gray solids[9]. Mn is an essential element needed by the body to maintain health, but in excessive amounts can cause various health problems[10]. Mn organ targets include the respiratory system, central nervous system, blood and kidneys[9]. Landfill is one of the main sources of groundwater contamination in the area around the landfill due to the presence of leachate flow. These contaminants come from organic materials, inorganic macro components, heavy metals, metalloids and Xenobiotic Organic Compounds (XOCs)[11]. Leachate contains high concentrations of anionic and inorganic cations (eg bicarbonate, sulfate, iron, manganese, sodium, chloride) and dissolved organic matter (eg aldehydes, alcohols, short sugar chains)[12].

Cipayung Depok Final Disposal Site has been built since 1984 with an area of ± 10.8 hectares with an area of 5.1 hectares of landfill consisting of pond A (2.1 hectares), pool B (2.4 hectares) and ponds C (off 0.6 hectares). In 2011 pool C was closed because landfill conditions were too high and too dependent on residents' housing, so it only depends on zones A and B. In 2015 Cipayung landfill Depok increased landslides into the central area so zones A and B became one with elevations reaching ± 30 meters[13].

The purpose of this study was to study the relationship of Mn content in soil air and other factors (obesity, blood sugar levels, age, smoking, ethnicity, family research, socioeconomic and sex) to hypertension in the study community community living in the area around Places Cipayung Depok Final Disposal (Landfill). The population is in two kelurahan, namely Cipayung Kelurahan and Pasir Putih Kelurahan.

Method

The research method used cross sectional. The research sample consisted of 107 people who were administratively scattered in 2 Kelurahan namely Cipayung Kelurahan and Pasir Putih Kelurahan. Sampling is done by cluster sampling. The inclusion criteria of the research were, a minimum stay of 5 years, used ground water as a source of drinking water, and had a life span of 18-60 years. While the exclusion criteria were, respondents who had a history of hypertension before living in the area around the Cipayung Landfill Depok and had a history of blood clots (hemophilia).

Testing of Mn content in ground water as a source of drinking water used the Indonesian National Standard (SNI) method 6989.5: 2009 on how to test Mn by Atomic Absorption Spectrophotometry (AAS) in the range of Mn levels of 0.1 mg/L to 10 mg/L with a wavelength of 279.5 nm. Blood pressure meter measurements used the

ABN series and blood sugar measurements when using the GCU easy touch. Obesity measurement was done through Body Mass Index (BMI) measurement which was the result of weight distribution (kg) by height squared (meters) and other characteristic data through questionnaires.

Results

A significant relationship between risk factors for hypertension and hypertension is indicated by the age variable (0,0001, OR 9.58). While other variables (obesity, blood sugar levels, smoking, ethnicity, family history, socioeconomic, Mn levels in groundwater and gender) did not show significant results, but had an OR of more than 1, which were 2.05, 2.48, respectively, 3.19 (active smokers), 1.79 (passive smokers), 1.02, 1.12, 0.96, 1.31 and 2.45.

Table 1. Prevalence of Hypertension Based on Cluster Sampling.

Cluster Points	Hypertension		Total
	No	Yes	
1	13 (24.5%)	13 (24.1%)	26 (24.3%)
2	18 (34.0%)	19 (35.2%)	37 (34.6%)
3	14 (26.4%)	15 (27.8%)	29(27.1%)
4	8 (15.1%)	7 (13.0%)	15(14.0%)

Based on the sampling cluster, the most hypertension occurred in cluster number 2, namely 19 people (35.2%). A total of 16 people consumed ground water with Mn> 0.4 mg/L and 9 of them had blood pressure> 120/80 mmHg (Table 1).

Table 2. Final Multivariate Modeling

Variable	Sig	Odds Ratio (OR)	CI (95%)
Body Mass Index (BMI)	0.042	2.460	1.033-5.860
Age	0.001	10.675	3.240-35.169
Mn concentration in groundwater	0.450	1.584	0.481-5.222

In multivariate modeling, of the 10 variables analyzed 6 of them could be entered into the model because the significance is less than 0.25, including obesity (0.066), blood sugar levels (0.189), age (0.0001), active smoking (0.140), passive smoking (0.144) and gender (0.144). While the ethnicity, family history and socioeconomic variables were not included in the modeling because the significance exceeded 0.25. The level of Mn in ground water had a significance of more than 0.25, but substantively the level of Mn in ground water was considered necessary with regard to hypertension, so that the variable was still included in the modeling. The final results of the modeling obtained, that the variables that were risk factors for hypertension in the community living around landfills are obesity (0.042 OR: 2,460) and age (0,0001, OR: 10,675), while the Mn variable in ground water was a variable controller (OR: 1.584) (Table 2).

Discussion

Obesity has a significant relationship (0.042) with hypertension and has a greater risk of 2,460 to experience hypertension. Obesity is a major risk of hypertension[14,15]. Based on Wang's research (2014) that obesity has a very strong relationship with the incidence of hypertension[16]. Being overweight, especially when associated with increased visceral adiposity, is a major cause of hypertension, accounting for 65% to 75% of the risk of human primary (essential) hypertension[17].

In the study results found that blood sugar levels> 140 mg/dL have a greater risk of 2.482 experiencing hypertension. This is consistent with other studies that cystotic pressure has a significant relationship with plasma glucose and fasting blood glucose[18,19]. In etiology, diabetes and hypertension share common pathways such as SNS (Sympathetic Nervous System), RAAS (Renin Angiotennsin Aldosterone System), oxidative stress, adipokines, insulin resistance, and PPAR (Peroxisome Proliferator Activated Receptor)[20].

Age> 35 years has a greater risk of experiencing 10,675 hypertension. This is consistent with CDC data that the prevalence of hypertension increases according to age group, age group 18–39, 7.5%; 40–59, 33.2%; and 60 and over, 63.1%[21,22]. People who smoke actively (OR 3,188) and passive (OR 1,786) have a risk of developing hypertension. This is in accordance with the research of Thuey et al (2009) that hypertension has a relationship with smoking dose[23,24].

People with a family history of hypertension had a greater risk of 1,122 to develop hypertension. This is in accordance with the research of Liu et al (2015) that family history has a significant relationship with hypertension[25]. Higher prevalence in family history with hypertension is also associated with the prevalence of obesity, central obesity and metabolic syndrome[26].

Mn concentration> 0.4 mg/L in ground water used

as a source of drinking water has a risk of 1,314 to cause hypertension, although several studies have different results. The results of this study are similar to those of Lee and Kim (2011) that the concentration of Mn in the blood is associated with an increased risk of hypertension in a representative sample of the adult population in Korea[7]. While the study of Wu et al (2017) the concentration of Mn in urine has a negative correlation ($p < 0.01$) with systolic pressure and diastolic[27]. Based on the results of this study, found a greater risk of hypertension in men than woman is OR 2,450. These results are in accordance with research of Choi et al (2017) the prevalence of hypertension was higher in men (34.6%) than in women (30.8%)[28]. However, after the age of 60 years, hypertension was more prevalent in females than in males. Based on the research of Alhawari et al (2017) significant gender differences in systolic pressure (= 0.003) with mean differences = 18.08 mmHg (CI: 16.13 to 19.9) and diastolic pressure (= 0.011) with differences in mean mean = 3.6 mmHg (CI: 2.06 to 5.14), higher in men than in women[29].

Conclusions

There is no relationship between manganese levels in drinking water with hypertension, but obesity and age have a significant relationship with hypertension. The variables of obesity (0.042, OR: 2,460) and age (0,0001, OR: 10,675) showed significant with hypertension. The level of manganese in drinking water to hypertension did not show significant results as a controlling variable (0.450, OR: 1.584). The variables, blood sugar levels, smoking, ethnicity, family history, socioeconomic and gender did not show significant results, but had an OR more than 1, which were respectively 2.05, 2.48, 3.19 (active smokers), 1.79 (passive smokers), 1.02, 1.12, 0.96 and 2.45.

Ethical Considerations: This study was approved by The Research and Community Engagement Ethical Committee Faculty of Public Health Universitas Indonesia (Ket-698/UN2.F10/PPM.00.02/2019).

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References

1. WHO. Hypertention [Internet]. 2019 [cited 2019 Dec 4]. Available from: https://www.who.int/news-room/fact-sheets/detail/hypertension
2. United Nations. Transforming Our World: The 2030 Agenda for Sustainable Development [Internet]. 2015 [cited 2019 Dec 4]. Available from: https://sustainabledevelopment.un.org
3. Health Ministry of The Republic of Indonesia. Riset Kesehatan Dasar [Internet]. 2019 [cited 2019 Dec 4]. Available from: https://www.depkes.go.id/
4. Health Department of The Republic of Indonesia. Profil Kesehatan Kota Depok [Internet]. 2018 [cited 2019 Dec 4]. Available from: https://www.depkes.go.id
5. Centers for Disease Control and Prevention (CDC). High Blood Pressure [Internet]. 2019 [cited 2019 Dec 4]. Available from: https://www.cdc.gov/bloodpressure/index.htm
6. Centers for Disease Control and Prevention (CDC). Condition that Increase Risk for High Blood Pressure [Internet]. 2019 [cited 2019 Dec 4]. Available from: https://www.cdc.gov/bloodpressure/conditions.htm
7. Lee, B.-K., & Kim Y. Relationship between blood manganese and blood pressure in the Korean general population according to KNHANES 2008. Environ Res. 2011;111(6):797–803.
8. Lee, Y.-K., Lyu, E.-S., Oh, S.-Y., Park, H.-R., Ro, H.-K., Heo, Y.-R., … Choi M-K. Daily Copper and Manganese Intakes and Their Relation to Blood Pressure in Normotensive Adults. Clin Nutr Res. 2015;4(4):259.
9. Centers for Disease Control and Prevention (CDC). Manganese Compounds and Fume (as Mn) [Internet]. 2019. Available from: https://www.cdc.gov/niosh/npg/npgd0379.html
10. Agency for Toxic Subtances and Disease Registry (ATSDR). Toxicological Profile for Manganese [Internet]. U.S. Department of Health and Human

Services. 2012. Available from: https://www.atsdr.cdc.gov/toxprofiles/tp151.pdf

11. Beretta, G. P., & Cossu R. Groundwater Quality Monitoring in Landfill Areas. Solid Waste Landfilling. 2018;985–1034.
12. Postigo, C., Martinez, D. E., Grondona, S., & Miglioranza KSB. Groundwater Pollution: Sources, Mechanisms, and Prevention. In: Encyclopedia of the Anthropocene. 2018. p. 87–96.
13. Department of Sanitation and Garden Depok. Mengenal Lebih Dekat TPA di Cipayung Depok. 2019.
14. Jiang, S.-Z., Lu, W., Zong, X.-F., Ruan, H.-Y., & Liu Y. Obesity and hypertension. Experimental and Therapeutic Medicine. 2016;12(4):2395–2399.
15. Aronow WS. Association of obesity with hypertension. Ann Transl Med. 2017;5(17):350–350.
16. Wang, S.-K., Ma, W., Wang, S., Yi, X.-R., Jia, H.-Y., & Xue F. Obesity and Its Relationship with Hypertension among Adults 50 Years and Older in Jinan, China. PLoS One. 2014;9(12):e114424.
17. Hall, J. E., do Carmo, J. M., da Silva, A. A., Wang, Z., & Hall ME. Obesity-Induced Hypertension: Interaction of Neurohumoral and Renal Mechanisms. Circ Res. 2015;116(6):991–1006.
18. Midha T. Correlation between hypertension and hyperglycemia among young adults in India. World J Clin Cases. 2015;3(2):171.
19. Williams B. Blood pressure and diabetes: a fatal attraction. Eur Heart J. 2013;34(44):3395–3397.
20. Cheung, B. M. Y., & Li C. Diabetes and Hypertension: Is There a Common Metabolic Pathway? Curr Atheroscler Rep. 2012;14(2):160–166.
21. Fryar, C.D; Ostchega, Y; Hales, C.M; Zhang, G; Moran D. Hypertension Prevalence and Control Among Adults: United States. NCHS Data Br No 289 Oct 2017. 2017;
22. Penuela, R., & Penuela T. PP.17.17. J Hypertens. 2015;33:e286.
23. Thuy, A. B., Blizzard, L., Schmidt, M. D., Luc, P. H., Granger, R. H., & Dwyer T. The association between smoking and hypertension in a population-based sample of Vietnamese men. J Hypertens. 2010;28(2):245–250.
24. Leskiv, I., Povroznyk, N., Mulka, L., Cherevychnyk, N., & Dzyaman M. PP.16.11. J Hypertens. 2015;33:e272.
25. Liu, M., He, Y., Jiang, B., Wang, J., Wu, L., Wang, Y., … Yao Y. Association Between Family History and Hypertension Among Chinese Elderly. Medicine (Baltimore). 2015;94(48):e2226.
26. Ranasinghe, P., Cooray, D. N., Jayawardena, R., & Katulanda P. The influence of family history of Hypertension on disease prevalence and associated metabolic risk factors among Sri Lankan adults. BMC Public Health. 2015;15(1).
27. Wu, C., Woo, J. G., & Zhang N. Association between urinary manganese and blood pressure: Results from National Health and Nutrition Examination Survey (NHANES), 2011-2014. PLoS One. 2017;12(11):e0188145.
28. Choi HM, Kim HC, Kang DR. Sex differences in hypertension prevalence and control: Analysis of the 2010-2014 Korea National Health and Nutrition Examination Survey. Spracklen CN, editor. PLoS One [Internet]. 2017 May 25;12(5):e0178334. Available from: https://dx.plos.org/10.1371/journal.pone.0178334
29. Alhawari, H. H., Al-Shelleh, S., Alhawari, H. H., Al-Saudi, A., Aljbour Al-Majali, D., Al-Faris, L., & AlRyalat SA. Blood Pressure and Its Association with Gender, Body Mass Index, Smoking, and Family History among University Students. Int J Hypertens. 2018;1–5.

The Influence of Probiotic Lactobacillusreuteri on Changes in Levels of Cytokines IL 23 Puerperal First Day on MUS Muscullus Exposed to Bacteria Staphylococcusaureus

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Abstract

Puerperal infection is inflammation of all genitalia in the puerperium caused by aerobic and anaerobic bacteria, one of which is Stapylococcus aureus which can attack and survive in epithelial cells and endothelial cells, then recognized by the Precenting Cell Antigen (APC). The APC will secrete cytokines as triggers for the activation of Thais, Th1, Th2, Treg and Th17. Interleukin-23 (IL 23). The purpose of this study was to prove the effect of L. reuteri probiotics on increasing levels of IL-23 cytokines in puerperal mice induced by S. aureus on the first days.

True Experimental research method post test Only Control group in vivo 40 tails Balb/c pregnant 10th day was divided into 4 groups K-, K+, P1, P2. Then performed surgery to take blood from the heart which will then produce blood plasma after centrifugation followed by measurement of IL 23 levels by the ELISA kit method with no. Catalog M2300 R & D brand

Analysis of data using the Independent Sample T Test with the help of SPSS For Windows 23 software. The results of the comparison between the negative control (K-) with the treatment group on the first day proved that an increase in IL 23 cytokine levels occurred, a comparison between groups observation on the first day proved to be an increase in IL 23 cytokine levels, the results of a comparison test between P1 and P2 on the first day there was an increase in IL 23 cytokine levels an increase but not statistically significant the administration of L. reuteri probiotics can increase the levels of cytokines IL 23 in puerperal mice induced by S. aureus therefore probiotics can be useful in the puerperium to increase body immunity to prevent infection during the puerperium

Keywords: *Lactobacillus reuteri, Staphylococcus aureus, IL 23.*

Introduction

The incidence of puerperal infection is 13% higher because operative delivery/cesarean cesarea is compared to vaginal delivery while operative delivery is currently occurring mostly due to medical indications and on its own request. The puerperal infection is inflammation of all genitalia in the puerperium caused by aerobic and anaerobic bacteria, one of which is Stapylococcus aureus (S. aureus) which spreads through the perineal wound and endometrial surface.(1)

S. aureus has polysaccharide capsules or thin membranes that play a role in bacterial virulence. Infections originating from external sources such as open sores from the mucosa (vaginal mucosa etc.).(2)

Treatment of infections due to S. aureus bacteria initially using antibiotics but in recent studies found that S. aureus isolated from hospitals are generally resistant

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to circulating antibiotics, more than 85% of patients experience resistance to oxacillin. Therefore natural remedies as an alternative antibiotic that have been studied are one of them is probiotics namely normal flora bacteria in the mouth, gastrointestinal tract and urogenital tract obtained through fermented probiotic intake (for example cheese, yogurt, olive oil). The results of a study by Evrard, that the effect of probiotics on dendritic cells at high treatment doses on Lactobacillus rhamnosus (L. rhamnosus) Lcr35 causes monocyte immune responses in humans resulting from immature dendritic cells. Induction increase in the production of Th1/Th17 proinflammatory cytokines such as TNF, IL 1β and IL 23. The produced IL 23 will make Th0 differentiate into TH 17 which releases IL 17 and IL 22 cytokines as proinflammatory cytokines.(3)

In reproductive health services the use of L. reuteri probiotics as a treatment for urinary tract infections, vulvovagina candidiasis, bacterial vaginosis in humans while the target of a recent infectious disease therapy through differentiation from Th 17 cells on stimulation of IL 23 cytokines which will produce IL cytokines 22 so that the researchers wanted to know the effect of L. reuteri probiotics as prevention of puerperal infection as evidenced by increased levels of IL 23 and IL 22 cytokines in postpartum mice induced by S. aureus (4)

Material and Method

a. **Animal Try:** The experimental animals in this study were Mus muscullus strain Balb/c pregnant female 10th day obtained from Biotech Laboratorial Laboratory of Malang State Islamic University as many as 40 animals, divided into 4 groups. The animals were adapted for 1 day. first day and control groups, first and third day S. aureus groups, L. reuteri first groups, group L. reuteri + S. aureus first day.

b. **Probiotic Lactobacillus reuteri:** Probiotics used in this study were L. reuteri with ATCC 6475 strain obtained from the American Type Culture Collection (Manassas, VA 20108 USA), then cultured in Mrsbroth media. L. reuteri is given through oral sonde at a dose of 1 x 1010 CFU/mouse as much as 250 µl/mouse every day (once a day) from gestational age 13 days to post partum on the first day.

c. **Staphylococcus aureus bacteria:** It is a type of gram-positive bacteria obtained from the Microbiology Laboratory of the Faculty of Medicine, Universitas Brawijaya, then cultured with a nutrient broth and rinsed with NaCl, then induced into the vagina of the postpartum mice intravaginally with a 1cc syringe which is replaced with a lo section of surfloo. dose of 5 x 107 as much as 200 µl/mice at 0 to 12 hours post partum or immediately after giving birth

d. **Measurement of IL cytokine levels 23:** Observed from blood plasma taken from cardiac blood which is carried out systematically then measured levels of IL 23 with the Elisa kit method with no. Catalog M2300 R & D brand

e. **Statistical Analysis:** All research data were analyzed statistically with significance level $p \leq 0.05$ and 95% confidence level using SPSS software vs 23.0. The data were tested for normality using the Saphiro-Wilk test followed by the parametric test T test (independent sample t test)

Findings:

a. **Comparison result of the control group with treatment (-) on the first day:** Based on the results of the free sample t test (independent sample t test) data IL-23 levels in the puerperal model mice are displayed in full in the table below

Table 1 comparison if control groups (-) with treatment on day 1

Observation Group	IL Level-23 (pg/mL)	
	Mean ± SD	p - value
K-	49.45±5.07	-
K+	76.51±2.92	0.000
P1	100.70±7.73	0.000

Information:

K- = Negative Control Group (no treatment given)

K + = group given S.aureus treatment

P1 = group given L.reuteri treatment

Showed that there was a significant difference (p-value = 0,000 <) the average IL-23 level in puerperal mice between negative control groups (K-) (49.45 ± 5.07 pg/mL) and positive control groups (K +) (76.51 ± 2.92 pg/mL), there is a significant difference (p-value = 0.000 <) the average level of IL-23 in puerperium model mice between the negative control group (K-) (49.45 ± 5.07 pg/mL) with the group giving L. reuteri probiotics (P1) (100.70 ± 7.73 pg/mL) means that the treatment of L. reuteri probiotics in puerperal mice can increase IL-23 levels.

b. Comparison test results between groups of observation on day 1: Based on the results of the free sample t test (independent sample t test) data IL-23 levels in the puerperal model mice are displayed in full in the table below

Table 2: Comparison between groups of observations day 1

Observation group	IL Level-23 (pg/mL)	
	Mean ± SD	p - value
K+	76.51±2.92	-
P1	100.70±7.73	0.001
P2	129.33±15.14	0.000

Information:

K + = group given S.aureus treatment

P1 = group given L.reuteri treatment

P2 = group given L.reuteri + S. aureus treatment

Showed that there was a significant difference (p-value = 0.001 <) the average IL-23 level in puerperium mice between positive control groups (K +) (76.51 ± 2.92pg/mL) with the group giving L. reuteri probiotics (P1) (100.70 ± 7.73 pg/mL), there is a significant difference (p-value = 0.000 <) the average IL-23 level in puerperal mice between positive control groups (K +) (76.51 ± 2.92pg/mL) with the group giving Probiotic L. bacteria reuteri + S. aureus (P2) (129.33 ± 15.14 pg/mL) means that the administration of L. reuteri + S. aureus bacteria is more able to increase IL-23 levels than only the administration of S. aureus bacteria in puerperium mice.

c. Comparison test results between groups of L.reuteri probiotics with giving of L.reuteri + S.aureus probiotics on day 1: Based on the results of the free sample t test (independent sample t test) data levels of IL-23 and IL-22 levels in the puerperium model mice are displayed in full in the table below

Table 3 Comparison between groups giving L. reuteri probiotics with L. reuteri + S. aureus Probiotics on day 1

Observation groups	IL Level-23 (pg/mL)	
	Mean ± SD	p - value
P1	100.70±7.73	-
P2	129.33±15.14	0.015

Information:

P1 = group given L.reuteri treatment

P2 = group given L.reuteri + S. aureus treatment

Showed that there was a significant difference (p-value = 0.015 <) the average levels of IL-23 in puerperal mice between the groups giving probiotic L. reuteri (P1) (100.70 ± 7.73 pg/mL) with the group giving Probiotic L. reuteri + S. aureus (P2) (129.33 ± 15.14 pg/mL), means that the administration of L. reuteri + S. aureus Probiotics is more able to increase IL-23 levels than the administration of L. reuteri probiotics alone in puerperium mice

Discussion

In the negative control group there was absolutely no treatment whatsoever but it appeared that on the third day observation the IL-23 level was greater than the first day observation according to Figure 5.3. The puerperal period Mus muscullus Balb/c strain occurs within 24 hours where on the third day there has been a change in the reproduction of mice from the puerperium to the estrus period so that the immune system changes in the body of mice increased levels of IL 23 on the third day in the control group This is because the mice are in the estrous period. (5)

Complications of genetal infection due to S. aureus in puerperal mothers mostly occur on the third day, S. aureus is the most common vaginal pathogen which is one of the most frequently involved bacteria in infection, S. aureus colonization of the vaginal mucous membranes can cause Toxic Shock Syndrome which has an impact on maternal mortality. (6)

Local and systemic immune cell response mechanisms for S colonization. nasal aureus as a prevention of disease entry does not fully explain how this bacterium can die, although there are some clues in emphasizing local proinflammatory cytokines to provide signals that facilitate colonization of settled bacteria(7). S. aureus bacteria that are in dendritic cells are able to stimulate the production of cytokines IL 6, IL 1 and IL 23 which will all encourage the differentiation of CD4 + T cells towards Th 17 cells (5)

Th17 cells are a different strain from CD4 + T cells characterized by IL 17 release. In addition Th 17 also excludes IL 22 as a member of IL 10. The expression of IL 22 begins with changes in signaling in growth factors β in IL 6 and other proinflammatory cytokines. IL 22 production will depend on IL 23 production(8)

Normal flora have a role in developing protective host mechanisms. Resident bacteria that are not

pathogenic require ecological needs for their lives so that pathogenic bacteria (non-residents) that will proliferate in locations inhabited by normal flora will have difficulty competing with resident bacteria[9]. But if the normal flora is depressed, the growth of pathogenic bacteria will be more rapid and can cause disease, S. aureus is one of the most pathogenic bacteria found in the vagina and is one of the bacteria that causes most infections. This bacterial colonization of the vaginal mucosa can be a cause of toxicoseptic shock[10]

Conclusion

There an effect probiotics lactobacillus reuteri on changes in the nature of all that and the keeping up of 23 on mice parturition of being exposed to the staphylococcus bacteria aureus

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References

1. Qonitun U, Qiftiyah M, Rosdianah Aziz I, Anggo S, Nugraha A, Esyuananik, et al. The efect of lactobacillus reuteri probiotic to improve the amount of il 23 and il 22 cytokine on mus muscullus of postpartum model inducted by staphylococcus aureus. In: Journal of Physics: Conference Series. 2019.
2. St. Leger AJ, Desai J V., Drummond RA, Kugadas A, Almaghrabi F, Silver P, et al. An Ocular Commensal Protects against Corneal Infection by Driving an Interleukin-17 Response from Mucosal γδ T Cells. Immunity. 2017;
3. Molina V, Médici M, Villena J, Font G, Pía Taranto M. Dietary Supplementation with Probiotic Strain Improves Immune-Health in Aged Mice. Open J Immunol. 2016;
4. Ondusko DS, Nolt D. Staphylococcus aureus. Pediatr Rev. 2018;
5. Gaffen SL, Jain R, Garg A V., Cua DJ. The IL-23-IL-17 immune axis: From mechanisms to therapeutic testing. Nature Reviews Immunology. 2014.
6. Otto M. Staphylococcus aureus toxins. Current Opinion in Microbiology. 2014.
7. Williams AE. The Adaptive Immune System. In: Immunology. 2011.
8. Lubberts E. The IL-23-IL-17 axis in inflammatory arthritis. Nature Reviews Rheumatology. 2015.
9. P.chakraborty. Normal Flora. a Text B Microbiol. 2013.
10. Jandhyala SM, Talukdar R, Subramanyam C, Vuyyuru H, Sasikala M, Reddy DN. Role of the normal gut microbiota. World J Gastroenterol. 2015.

Analysis of Working Period and Working Time to Health Complaints of Fish Smoking Workers Bandarharjo, Kota Semarang, 2019

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Abstract

Burning is very dominant process to accruing material pollutants. The smoke produced from burning coconut shells of fish smoking industry is a problem that can cause health complaints of fish smoking workers, it can produce pollutants such as CO_2, HC, NO_2, and particulates. It is necessary to analyze the working period and time of workers's health complaints. The purpose of this study is to analyze the working period and time of health complaints of fish smoking workers. The design is cross sectional, data collected by interviews using quisionare, analysis until bivariate stage. The results, form 65 total sample, mostly workers (60 people,92.3%) working > 5 years, mostly workers (61 people, 93.8%) working > 8 hours/day, mostly workers have a health complaints (47 people, 72.3%), there is no significant relationship between working period and health complaints (pv 0.611), there is no significant relationship between working time and health complaints (pv 0.061).

Keywords: *Working period, working time, health complaints.*

Introductions

Air pollution is an important factor of environmental pollution. Air pollution consists of outdoor air pollution and indoor air pollution. One of source outdoor air pollution is industrial smoke[1]. Many kind of industy, both home industry or large industry have grown rapidly in terms of quantity and type. It obviously have a negative impact to the environment, such as water, air, and soil pollution[2].Air pollution, especially particulate matter can affect human's health even in low concentrations[3]. Estimated that more than two million deaths per year are caused by exposure to air pollutions[4].

Fish smoking is one of home industries that can cause air pollution. One of the centers of fish smoking industry is in Bandarharjo, Kelurahan Semarang Utara, Kota Semarang. The smoke produced by burning coconut shells as fuel for fish smoking, and that is a problem in the fish smoking room. From Gordon[5] in Nisrinah[6] health effects caused by indoor pollution which is use of solid fuels for cooking are chronic lung diseases including chronic obstructive pulmonary disease and bronchitis. One of the pollutants found in the smoke from combustion can cause pneumonia, respiratory system disorders, eye irritation, allergies, chronic bronchitis[7]. A study from Ghaffari[8] mentions that exposure from particulates is more dangerous to human than exposure from ozone, carbon monoxide and nitrogen oxides. Health complaints at fish smoking workers can be influenced by factors from the characteristics of workers. The factors that can cause health complaints there are sex, age, disease history, working period, working time, smoking activities, nutritional status of workers, and physical activity[9]. From Nirmala[10] workers who have worked> 5 years have a potential to suffers lung function disorders compared to workers who have a working period of <5 years. The working process of fish smoking, requires workers to be in a work environment with exposure to smoke that lasts for quite a long time, as a result workers become very vulnerable to health complaints[11]. The

aim of this study is to find out the relationship between working period and working time to health complaints of fish smoking workers. The benefit of this study is to provide information regarding health complaints caused by working period and working time of fish smoking workers.

Material and Method

The population of this study is workers of smoking fish Bandarharjo, Kota Semarang consisting of 25 houses of the fish smoking industry with 151 workers. In this study, the proportion of previous studies was 55.6%[12] Based on the formula Lemeshow[13] the number of research samples with a confidence level of 95%, 10% precision and a proportion of 0.556 are 58 people. To avoid missing answers from respondents, it is necessary to add 10% of the total sample obtained so that the total sample size are 65 people. The samples taking by simple random sampling method to provide opportunities for samples to be able to participate in research. This study used a cross sectional design, data collected by interviews using quisionare about individual characteristic such as gae, gender, health complaints, working time, working period, weight, and height. Data analysis until bivariate stage.

Findings:

General Description of the Research Area: Kelurahan Bandarharjo, Semarang is directly borders to the Java Sea, and that is the estuary area of Semarang River. One of the main livelihoods at Kelurahan Bandarharjo is fishermen. Total of Bandarharjo fish smoking home industries are 25 houses, which are divided into small, medium and large scale. The division of the scale or type of fish smoking house is based on the number of stoves, number of workers, and production capacity per day. The production process is carried out every day from 6:00 to 18:00 WIB. If the fish material not abundant due to the season, some industry owner save the needs of the fish by freezing the fish to ice. The raw materials for fish come from local fishermen. The total amount of smoked fish per day is around 50-100 kg. The fuel used in the fish smoking industry is coconut shell, which is included in the category of hardwood species consisting of lignin, cellulose, hemicellulose and ash with a moisture content of 6% -9%[14].

The stages of smoked fish production start from the preparation of coconut shells that have been dried as fuel, then clean and wash the fish cleanly, and finally the process of smoking the fish. The time range for fish smoking process from 15 to 30 minutes depending on the type of fish. The indicator of the fish is depend of a color change. Some of the smoke from fish smoking industry come out through the chimney that is found in each of the fish smoking houses and some out through the door, or some of the smoke billows in the fish smoking room.

Working Period of Fish Smoking Workers: There are 65 total respondent of this study.

Table 1. Working Period of Fish Smoking Workers Bandarharjo, Kota Semarang, 2019

Working Period	Total	Percentage (%)
≤5 year	5	7,7
>5 year	60	92,3
Total	**65**	**100**

Source: Primary data

Based on table 1, most of the workers have worked> 5 years, which is 60 people (92.3%).

Working Time of Fish Smoking Workers: The frequency distribution of working period fish smoking workers can be seen in table 2.

Table 2. Working Time of Fish Smoking Workers Bandarharjo, Kota Semarang, 2019

Working Time	Total	Percentage (%)
≤8 hour/day	4	6,2
>8 hour/day	61	93,8
Total	65	100

Source: Primary data

Based on table 2, most of workers worked> 8 hours/ day, which is 61 people (93.8%).

Health Complaints of Fish Smoking Workers: The existence of health complaints on workers is a subjective complaint that is felt when working both complaints of breathing or eye complaints. Identification of eye complaints experienced by workers is painful eye complaints, watery eyes and red eyes. Meanwhile identification of respiratory complaints experienced by workers is nasal irritation complaints, shortness of breath, coughing and coughing up phlegm.

Table 3. Health Complaints of Fish Smoking Workers Bandarharjo, Kota Semarang 2019

Health Complaints	Total	Percentage (%)
With complaints	47	72,3
No complaints	18	27,7
Total	65	100

Source: Primary data

Based on table 3, there are 47 workers (72,3 %) have a health complaints and 18 workers (27,7 %) have no health complaints.

Complaints to the eye caused by exposure to the smoke from the coconut shell combustion in the process of fish smoking continuously for more than 8 hours each day, so that can cause irritation in those characterized by red eyes, painful eyes and watery eyes[15]. Meanwhile workers who have respiratory complaints such as nasal irritation, shortness of breath and coughing. Respiratory complaints arise due to a disturbance in the respiratory tract which is exposed to air pollutants such as PM2.5 which is found in the smoke from burning coconut shell[10].

A fish smoking who have health complaints are caused by the concentration of pollutants contained in the smoke from the combustion of coconut shell which exceeds the quality standard. Based on a study by Nirmala 2014, workers who were in the fish smoking place with a concentration of PM 2.5 that exceeded the quality standard experienced a painful eye complaint (61.5%) and experienced shortness of breath.

Analysis of Working Period to Health Complains of Fish Smoking Workers: The analysis of working period to health complaints of fish smoking workers was carried out descriptively using cross tabulation.

Table 4. Analysis of Working Period to Health Complaints

Health Complaint	Working Period (Year)		N	OR (95%)	PV
	>5	≤5			
With complaints	44	3	47	1,833 (0,280-11,996)	0,611
No complaints	16	2	18		
Total	60	5	65		

Based on table 4, there are 44 workers who have health complaints with a working period of> 5 years, and 3 workers have health complaints with a working period of <5 years. Meanwhile workers who have a working period of> 5 years and have no health complaints are 16 people, and workers who have a work period of <5 years with no health complaints are 2 people. Working period variabel and workers health complaints have categorical data scales with a significance level of 95%, then the statistical test used is Fisher Exact to test the relationship of worker health complaints, so that the value of p value is 0.611 because the p value > 0.05, then the results of the analysis can be concluded that there is no relationship between the period of working and the health complaints of fish smoking workers. The results of the analysis also obtained OR = 1,833, meaning that workers who worked> 5 years had odds of 1,833 for not having health problems compared to workers who worked <5 years.

There was no significant relationship because this study was only carried out on a small scale (the data obtained was less varied). Workers with a working period> 5 years are more at risk of experiencing health complaints. Based on Nirmala[10] states that, the longer a person have to works, the more workers are exposed to the danger posed by the work environment. Exposure to dust contained in the smoke from combustion will continue and be inhaled and accumulated by workers within years, as a result it can lead to health complaints.

However, health complaints for fish smoking workers can also come from other factors such as weather conditions, workload, individual endurance, vitamin intake and food consumed by workers so that there are other factors that have not been studied in this study which can be a factor affect the health complaints experienced by Bandarharjo fish smoking workers. This is in line with the research conducted by Ode[16] which states that there is no relationship between the period of work with health problems, especially the vital capacity of lung traffic police.

Analysis of Working Time to Health Complains of Fish Smoking Workers: The results of working time analysis on health complaints of fish smoking workers can be seen in table 5.

Table 5. Analysis of Working Time to Health Complaints

Health Complaints	Working time (hour/day)		n	OR (95%)	PV
	>8	≤8			
With complaints	46	1	47	9,200 (0,889-95,221)	0,061
No complaints	15	3	18		
Total	61	4	65		

Based on table 5, there are 46 workers who have health complaints with a working time of> 8 hours/day, and only 1 worker has a health complaint with a working time of <8 hours/day. Meanwhile workers who have work time> 8 hours/day and have no health complaints are 15 people, then workers who have work time <8 hours/day and no health complaints are 3 people. Work time variables and health complaints workers have categorical data scales with a significance level of 95%, then the statistical test used is Fisher Exact to test the relationship between working time and workers health complaints, so that the value of p value is 0.061 because the value of p value> 0.05, the results of the analysis can be concluded that there is no relationship between work time and workers's health complaints fish smoking. From the results of the analysis also obtained the value of OR = 9,200, meaning that workers who working > 8 hours/day have odds of 9,200 for not experiencing health problems compared to workers who work <8 hours/day.

No relationship between working time and worker's health complaints caused by the length of a person's work hours is not in line with the amount of exposure. Based on observations, it was shown that even working hours between one worker and another worker almost same, but the exposure dose received was different. For example, one health problem that arises is lung function disorders. A worker who, despite the long working hours, maybe have normal lung function if his working period is still short and does not have a smoking habit. This research is in line with the research by Pinugroho[17] which concluded that there was no correlation between duration of exposure to pulmonary function disorders with p = 0.740. In this study, might be happend bias selection. It caused by there are some respondents ignore to participate at this research. And then, the most of workes are women, so it make the homogeneous data. And also might be happend bias information, caused by relying on the respondent's memory such as the question of age, and many workers have forgotten when they started working as Bandarharjo fish smoking workers.

Conclusion

The results of this study, the most workers there are 60 people (92.3%) working > 5 years, most workers there are 61 people (93.8%) working > 8 hours/day, most workers have a health complaints, there are 47 people (72.3%), there is no significant relationship between working period and health complaints (pv 0.611), there is no significant relationship between working time and health complaints (pv 0.061). for next study, the number of respondents is expected to be more so that the data obtained becomes heterogeneous. Questions related to health complaints are further deepened, for example by conducting a direct health check to get clearer information so that the analysis can be as expected.

Conflict of Interest: There is no conflict of interest at this research.

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Ethical Clearance: In this study, respondents were given the freedom to determine whether they were willing or unwilling to participate in a series of activities voluntarily. Information obtained from respondents is kept confidential and is only used for research purposes. During the study, respondents were free from discomfort and insecurity. If the respondent feels insecure and uncomfortable during the study so that can cause psychological problems, the respondent can stop as a participant in the study. The ethics of this study is in accordance with the ethical protocol issued by the Department of Environmental Health and has passed the ethical review with number: Ket 349/UN2. F10/PPM.00.02/2019.

References

1. Novianti, D. Hubungan Konsentrasi PM 2,5 Udara Ruang terhadap Penurunan Fungsi Paru Ibu Rumah Tangga di Kelurahan Rawa Terate, Kecamatan Cakung, Jakarta Timur. 2008.
2. Utomo, S. W., Sutriyono, & Rizal, R. Pengertian, Ruang Lingkup Ekologi dan Ekosistem;2012.

3. Novirsa, R., & Achmadi, U. F. Analisis Risiko Pajanan PM2, 5 di Udara Ambien Siang Hari terhadap Masyarakat di Kawasan Industri Semen. 2012. Jurnal Kesehatan Masyarakat Nasional, 173–179.
4. Miri, M., Ghassoun, Y., Dovlatabadi, A., Ebrahimnejad, A., & Löwner, M. Ecotoxicology and Environmental Safety. 2019. 174(December 2018), 137–145. https://doi.org/10.1016/j.ecoenv.2019.02.070.
5. Gordon, S, B., Bruce, N, G., Grigg, J., Hibberd, P, L., Kurmi, O, P., Lam, K, B, H., … Martin, W, J. Respiratory Risks from Household Air Pollution in Low and Middle Income Countries.2014. The Lancet Respiratory Medicine.
6. Nisrinah. Analisis Risiko Kesehatan Lingkungan Akibat Pajanan Benzo [A] Pyrene pada Proses Pengasapan Ikan (Kajian Dampak Benzo [A] pyrene pada Pekerja Industri Ikan Asap di Bandarharjo, Semarang). 2019.
7. Istirokhatun, I.W, T. W., & A, P. Analisa Pengaruh Kelembaban Kayu terhadap Konsentrasi PM2,5 dalam Dapur Berbahan Bakar Kayu. Jurnal Presipitasi. 2011.
8. Ghaffari, H. R.. Asthma disease as cause of admission to hospitals due to exposure to ambient oxidants in Mashhad, Iran. 2017. Environmental Science and Pollution Research.
9. Rahardjo, R..Hubungan antara Paparan Debu Padi dengan Kapasitas Fungsi Paru Tenaga Kerja di Penggilingan Padi Anggraini, Sragen, Jawa Tengah. 2010
10. Nirmala, D. S., & Prasasti, C. I. Konsentrasi pm 2,5 dan analisis karakteristik pekerja terhadap keluhan kesehatan pekerja pengasapan ikan di kelurahan tambak wedi surabaya. 2014. Jurnal Kesehatan Lingkungan, 57–68.
11. Budiono, I. Faktor Risiko Gangguan Fungsi Paru Pada Pekerja Pengecatan Mobil. 2007
12. Aurorina, E. Hubungan Debu Total Ruang Pengasapan Ikan dengan Gangguan Fungsi Paru Pengasapan Ikan Bandarharjo Kota Semarang. 2003
13. Lemeshow, S., Jr, D. W. H., Klar, J., & Lwanga, S. K. (1990). Adequacy of Sample Size in Health Studies. WHO.
14. Harahap, H. Rancang Bangun Alat Pirolisis untuk Pembuatan Asap Cair dengan Memanfaatkan Limbah Tempurung Kelapa. 2011
15. James, B., Chew, C., & Bron, A. (2005). Lecture Notes on Oftalmologi.
16. Ode, W., Hariati, M., & Syawal, L. Hubungan Masa Kerja, Penggunaan Masker, dan Kebiasaan Merokok dengan Kapasitas Vital Paru (KVP) Pada Polisi Lalu Lintas di Kota Kendari. 2016, 1–6.
17. Pinugroho, B. S. Hubungan Usia, Lama Paparan Debu, Penggunaan APD, Kebiasaan Merokok dengan Gangguan Fungsi Paru Tenaga Kerja Mebel di Kecamatan Kalijambe Sragen.2016

Efforts to Improve the Health Status of Junior High School Students Through the Development of School Health Programs

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ABSTRACT

One form of health promotion for school students is the school health program in every region in Indonesia. The purpose of School Health according to the Ministry of Education and Culture in 2012 is to improve the quality of education and student achievement by improving the quality of clean and healthy life and health status of students and creating a healthy environment. This research was conducted using qualitative descriptive method with the aim of developing a model of implementing school health programs. Respondents in this study were students from junior high schools managed by the government and junior high schools managed by private parties implementing school health programs. The results of this study are expected to support existing models by improving school health management through a systems approach so that students can improve their performance through improving clean and healthy living behaviors and a healthy environment.

Keywords: *Health promotion, health school, development, junior high schools, systems approach.*

Introduction

School-age children are faced with very complex and diverse health problems. Various kinds of health problems arise in elementary school-age children, but problems that are commonly associated with healthy living behavior (Nugraheni, 2019)[(1)]. While for middle school and high school age children, the problem is related to risky behaviors such as drug abuse (Narcotics, Psychotropic and other addictive substances), unwanted pregnancies, unsafe abortion, sexually transmitted diseases (STDs), including HIV/AIDS, adolescent reproductive health, accidents, and other trauma (MOH, 2004)[(2)]. Efforts to foster school-age children can be done through the School Health program in every region in Indonesia. The School Health is one vehicle for improving student health status (Nugraheni, 2019)[(1)]. The target is students and other school communities with the aim of improving students healthy life skills. School health services that involve all relevant parties such as students, families, and community service providers, school nurses and school doctors play a more complex role to prevent, facilitate and handle health problems to improve the education of all students (Kolbe, 2019) [(3)]. So students can learn, grow and develop optimally and become quality human resources. According to Suliha (2002) the aim of School Health is to improve the ability of healthy living and the health status of students as early as possible and create a healthy school environment so as to enable harmonious and optimal growth and development of children in the context of quality Indonesian human formation[(4)].

Based on the Principles for the Development School Health that have been determined by the government, School Health has three main programs known as "TRIAS UKS". The three programs include health education, health services and fostering a healthy school environment. School Health activities must be carried out at all levels of education, from the level of kindergarten, elementary school, Junior High School (JHS) to Senior High School (SHS) and vocational education, both under the guidance of the Ministry of National Education and the Ministry of Religion, including Islamic boarding schools and out-of-school education channels (MOH, 2004)[(2)].

The fundamental problems that occur in the development and development of School Health include: Clean and Healthy Life Behavior has not reached the expected level, the existence of health problems in school-age children, limited human resources, available facilities and infrastructure, lack of optimal coordination between agencies, lack of the optimal role of the School Health Advisory Team, as well as the limited rules and regulations governing the management of School Health (Ministry of Education and Culture, 2012)[5].

The implementation's problem of School Health in Banyuwangi is not much different from the problems raised by the Ministry of Education and Culture. Strong effort and solid cross-sectoral cooperation are needed to implement the School Health program in accordance with established legislation so that the benefits of implementing the School Health program such as the realization of healthy schools and the creation of the next generation that are physically, mentally and spiritually healthy for a prosperous life.

Based on these conditions, it is necessary to take concrete steps to optimize the implementation of the School Health program, especially in service activities. So the need for innovation in the development model of the School Health program in an effort to improve the health of JHS students in Banyuwangi. The development innovation was carried out by optimizing all elements in the School Health program service and integrated with teaching and learning activities in schools. So as to be able to create personal students who have the ability and awareness of the importance of health.

Material And Method

This research use descriptive qualitative approach. This approach is used with the aim of delving deeply into the knowledge, opinions, opinions and views on the current implementation of the School Health program and exploring more information about the partnerships that have been built in optimizing the implementation of the School Health program. Data collection was carried out in four JHS in Banyuwangi which consisted of two public JHSs and two private JHSs for three months, starting April - June 2016. This study used in-depth interviews and FGD method conducted through several stages, namely situation analysis and primary data collection.

The variables of this study consisted of the characteristics of the informants, the knowledge of the informants, opinions, and views of informants about the implementation of School Health, management of School Health implementation, obstacles experienced, strengths possessed, future expectations regarding the implementation and utilization of School Health specifically implementing "TRIAS UKS".

Findings: There are three main activities of the School Health activity that are commonly known as the "TRIAS UKS". School Health is a form of health promotion and education efforts in the school environment. In modern school health programs include 10 interactive components such as health education, physical education and physical activity, environmental and nutritional services, health services, counseling, psychological and social services, physical environment, social and emotional climate, family involvement, community involvement, and health employee (Kolbe, 2019)[3]. For this reason, the implementation of School Health is based on the awareness of increasing the welfare of the school community in particular. In terms of this, School Health has an important role in health development in schools to prepare a healthy, smart and prosperous generation.

A. Implementation of the School Health Middle School Program in Banyuwangi Regency: To achieve School Health goals, promotive, preventive, curative and rehabilitative efforts are carried out as early as possible in accordance with the "TRIAS UKS", such as:

1. **Health Education in School:** Health education is a dynamic process of behavior change, where the change is not just the process of transferring material or theory from one person to another and not a set of procedures, but these changes occur because of the awareness of the individual, group, or society itself (Wahid IM & Nurul C, 2009: 9-10)[6]. The health education program must also emphasize behavioral change skills, such as goal setting and self motivation, to positively impact students' physical activity behavior (Dai, 2019)[7]. The results of the study show that in most of the JHS in Banyuwangi have implemented School Health programs in the field of health education such as:

    a. Increase knowledge, behavior, attitudes and skills for a clean and healthy life.

    b. Planting and habituating clean and healthy

life and deterrence of bad influences from outside.

c. Cultivating a healthy lifestyle so that it can be implemented in everyday life.

In addition, health education can be carried out through intracurric and extracurricular activities. The intracurric activity is a part of the school curriculum such as health science subjects, physical education and health subjects or subjects that can be inserted in health sciences. While extracurricular activities are health education that can be included in activities outside of school hours in order to instill student's healthy behavior.

2. **School Health Services:** School Health service activities are minimum standard service activities in schools. Health services can help health education for students (Giri, 2018)[8]. Not only the provision of material and information to students regarding their health, but also practice through relationships with health workers. School health also services include regular health examinations, open-door clinic, acute medical care for minor symptoms or injuries, some specialist care as well as the promotion of wellbeing and safety at school (Kivimaki, 2018)[9]. The results of interviews with School Health services can be seen that the information stated that there were services provided by School Health in schools. The implementation of School Health services in Banyuwangi includes:

   a. Early Growth and Stimulation Detection and Intervention
   b. Health screening and periodic health checks
   c. Dental and oral examination and treatment.
   d. Development of Clean and Healthy Life Behavior
   e. First Aid In Accident/First Aid In Disease
   f. Provision of immunization
   g. Physical Fitness Test
   h. Eradication of Mosquito Nest
   i. Adding blood tablets
   j. Giving worm medicine
   k. Use of the school yard as a family medicine park/live pharmacy.
   l. Health education and counseling
   m. Guidance and supervision of healthy canteens
   n. Nutritional information
   o. Post-illness recovery
   p. Health referrals for public health center/ hospitals.

3. **Development of a Healthy Environmental Life:** The development of the school environment aims to create a healthy environment in the school that allows every citizen of the school to achieve the highest degree of health in order to support the achievement of a maximum learning process for each student (Ministry of Education and Culture, 2012)[5]. Fostering a healthy school environment includes:

   a. Implementation of cleanliness, beauty, comfort, order, security, longing and kinship.
   b. Development and maintenance of environmental health including smoke free, pornography, psychotropic narcotics and other addictive substances and violence.
   c. Fostering cooperation between school communities.

Based on the explanation above, the "TRIAS UKS" activities have run quite well, although not yet as a whole. The School Health implementation team is still focused on the "TRIAS UKS" activities and the fulfillment of School Health facilities and infrastructure, in addition to the rather heavy extracurricular activities in JHS.

B. Model of School Health Program Development in Middle School: The program is a collection of real, systematic and integrated activities, carried out by one government agency or more or in the framework of cooperation with the community or which is the active participation of the community in order to achieve the goals and objectives that have been set (Pramono, 2011: 45)[10].

One example is the substance of special service management engaged in health at the school scope, namely School Health Unit. This school service management is basically made to facilitate learning and can meet the special needs of students at school. The implementation of School Health activities still refers to the "TRIAS UKS". There has been no development of the middle school health program. The following is the identification of the expectations of the School Health

Implementation Team:

1. Obtain School Health guidelines
2. Medication assistance
3. The presence of medical personnel at the School Health
4. Repair of rooms and School Health facilities
5. Training a small doctor
6. Implementation of the School Health Competition as a form of existence and mutual motivation
7. Education about the dangers of free sex, HIV and drugs.
8. The activity of forming the character of independence
9. Involvement of educational institutions

Based on the identification of the above expectations, it can be concluded that the development of School Health at the Implementing Level is strengthening the input components and enriching activities in the process components. While the implementation of School Health activities at the District and District Guidance Team Levels is still focused on organizing and coordinating the Team Builder mechanism. So, the function of fostering and developing School Health has not been implemented optimally.

WHO in Notoatmodjo (2012) launched five (5) health promotion strategies in schools, namely advocacy, cooperation, capacity building, research and partnerships[11]. Thus, the model of developing the JHS School Health in accordance with the conditions of the JHS in Banyuwangi is strengthening the management of School Health with a systems approach. The following is a scheme for strengthening the management of JHS School Health in Banyuwangi Regency.

Caption:

1. **Input:** In the implementation of the School Health program in Banyuwangi Regency, the staff who organized this program were the School Health Implementation Team (headmaster, supervisor of School Health, teacher council, Student Council, School Health administrators), the savings team of the School Health level and the district level supervisors team. For facilities that support the implementation of this program such as the School Health room, administration desk, mattress, pillow, bolster, blanket, registration book, cupboard, medicines and so on. The implementing of the School Health program is using manual method. All of these input factors must work together in order to realize behavior change to achieve optimal health status.
2. **Process:** The management function is starting from planning, organizing, actuating and controlling.
   a. **Planning:** Planning is the initial stage in the management process. Planning according to Koontz and O'Donnell (1964) is "*involving selecting the objectives and policies, programs and procedures for achieving them-either for the entire enterprise or for any organized part"*[12]. Planning includes decision-making activities because it includes the selection of decision alternatives.

Implementation of the School Health program planning in Banyuwangi, planning was carried out by the School School Health Implementation Team but was not integrated with the District and District Head of the School Health Development Team because the organizing of the School Health Development Team in Banyuwangi didn't work. This can occur because there is no planning for public health center specifically for School Health at the District Level.

While the planning of School Health guidance at the District Level is integrated with the Health Office and the majority is joined by the public health center's program. So that the planning of the JHS School Health program in Banyuwangi is only limited to planning by the School Health Implementation Team itself.

   b. **Organizing:** Organizing can be formulated as an overall management activity in grouping people and assigning tasks, functions, authorities, and responsibilities of each with the aim of creating useful and effective activities in achieving predetermined goals (Manullang, 2008)[13]. According to Terry (2006) Organizing includes[14]:
      1. Divide the components of activities needed to achieve goals into groups
      2. Dividing tasks to someone manager to hold the grouping

3. Establish authority between groups or organizational units

The School Health executive team that came from students namely 7th, 8th and 9th grade students fulfilled the requirements after the School Health training. In line with the organization of the School Health program implementation team in schools, it was not balanced with the organization of District and District advisory teams. Because the sub-district advisory did not know about the team implementing this development. Thus, it resulted in the non-implementation of the task of School Health Guidance Teams in conducting the development of School Health in Banyuwangi.

c. Actuating: Activation and Implementation (actuation) is an action to make all group members want to try to achieve organizational goals in accordance with planning (Prayitno, 1997)[15]. In management, other terms will often be encountered for mobilization and implementation functions, namely motivating, directing, influencing, commanding.

The implementation of School Health must be in accordance with the health needs of students. Implementation of these activities can be in the form of "TRIAS UKS". These needs can cover physical, psychological, social and spiritual needs. The implementation of health business activities can be carried out well if all the residents of the school, supporting facilities and infrastructures and various cross-sectoral agencies can contribute to the success of this activity.

d. Controlling: Planning is closely related to the function of supervision or control because it can be said that the plan is a standard or tool of supervision for the work being done. George R Terry (2006) suggested "*control is to determine what is accomplished, evaluate it, and apply corrective measures, if need, to insure result in keeping with the plan*". Furthermore, Newman said "*control is the performance that conforms to plan*"[14].

Control of purpose of school health activities includes monitoring and evaluation efforts supported by recording and reporting. Control must be carried out periodically and continuously, one of the method used by the Government (Regional) in monitoring and evaluating the implementation of health activities in schools. The main objective of control is to make what is planned become a reality (Manullang, 2008)[13].

The supervision of the School Health program in Banyuwangi is carried out by the implementation team and the subdistrict and district development team. At the supervisory level, the evaluation is carried out in each semester. However,0020supervision of the sub-district and district supervisors team did not work due to barriers to integration with monitoring programs in the puskesmas.

3. **Output:** The output factor of the implementation of this school health business is the change in behavior from unhealthy habits to clean and healthy living habits and a healthy environment.

4. **Outcome:** The outcome factor of the implementation of this school health effort is the increasing quality and achievement of students both academically and non-academically according to the purpose of education at school.

5. **Impact:** The impact of the results of the implementation of health business is expected to increase the level of health of students so that the growth of students continues to increase and free from sources of disease.

Conclusion

Based on the results and finding of research on the development of the School Health program in JHS in Banyuwangi it can be concluded that the planning of the School Health program is still routine which results in less optimal organization. However, the implementation of the School Health program is in accordance with the "TRIAS UKS" and its supervision is already good at the level of the implementation team. It's just that the School Health program development has not been implemented optimally.

Therefore it is necessary to make efforts to optimize the implementation of the School Health program in accordance with the Policy Principles for the Development and Development of School Health and the School Health Development Team. With the model of developing a JHS School Health program in Kabupaten Banyuwangi, "*Strengthening School Health Management with a System Approach*" is expected to be able to optimize the implementation of the School Health program.

Conflict of Interest: In this article conflict of interest is nil.

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Ethical Clearance: Ethical approval was obtained from Health Research Ethics Committe, Faculty of Public Health Airlangga University with ethical approval number: 396-KEPK. All the respondents who agreed to participate in the study signed an informed consent statement voluntarily, and the anonymity and confidentiality of each respondent has also been guaranteed and stated in the informed concent.

References

1. Nugraheni H. Survey of satisfaction on school health unit service at elementary school. Indonesia: Indian Journal of Public Health Research and Development; 2019.
2. Departemen Kesehatan RI. Kualitas Sumber Daya Manusia Ditentukan Pendidikan dan Kesehatan [Internet]. Depkes RI. 2004 [cited 1 Juli 2016]. Available from http://www.depkes.go.i3. K o l b e LJ. School health as a strategy to improve both public health and education. Bloomington: Annual Review of Public Health; 2019
4. Suliha U, Herawani, Sumiati, Yati R. (Pendidikan Kesehatan: Pendidikan Kesehatan. Jakarta (Indonesia): EGC Buku Kedokteran; 2002.
5. Kemendikubud. Pedoman Pembinaan dan Pengembangan Usaha Kesehatan Sekolah. Jakarta; 2012.
6. Wahid IM, Nurul C. Ilmu kesehatan masyarakat: teori dan aplikasi. Jakarta: Salemba Medika; 2009.
7. Dai CL. School health program: impacting physical activity behaviors among disadvantaged students. Las Vegas: Journal of School Health; 2019.
8. Giri AK, Sunita Behera, Abhiruchi Galhotra. Concept of primary eye care & school health in India. India: Indian Journal of Community & Family Medicine; 2018.
9. Kivimaki H, Vesa S, Kirsi W, et al. Access to a school health nurse and adolescent health needs in the universal school health service in Finland. Finland: Scandinavian Journal of Caring Sciences; 2018.
10. Pramono A. Strategi kepemimpinan kepala sekolah dalam melaksankan program sekolah cuma-cuma dan memberdayakan partisipasi masyarakat (studi kasus di SMP Harapan I Dlanggu Mojokerto) [tesis]. Malang: Pascasarjana Universitas Negeri Malang; 2011.
11. Notoatmodjo S. Promosi kesehatan di sekolah. Jakarta: PT. Rineka Cipta; 2012.
12. Knootz H, Cyrill O'D. Principles of management: an analysis of managerial fuctions. Madison: McGraw Hill; 1964.
13. Manullang M. Dasar-dasar manajemen. Yogyakarta: Gadjah Mada University Press; 2008.
14. Terry GR. Prinsip-prinsip manajemen cetakan kedelapan. Alih Bahasa J Smith DFM. Jakarta: Binarupa Aksara; 2006.
15. Prayitno, Amti E. Seri pemandu pelaksanaan bimbingan dan konseling di sekolah seri II pelayanan bimbingan dan konseling sekolah lanjutan tingkat pertama. Jakarta: Direktorat Jenderal Pendidikan Dasar dan Menengah; 1997.

Particulate Matter 10 µm (PM_{10}) Exposure and Lung Function Disorder of Workers in Traditional Ceramic Industry Plered, Indonesia

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Abstract

The purpose of this research is to explain the correlation between workers health risks level (risk quotient/ RQ) (influenced by the concentration of particulate matter 10 µm (PM_{10}) exposures), characteristics and patterns of individual activities (including age, sex, smoking behaviors, and working periods) to lung function disorder of workers in traditional ceramic industry.

This research was a quantitative study that used a cross sectional study design and was conducted in July-September 2019. Measurement of PM_{10} concentration in the air used High Volume Air Sampling (HVAS) with gravimetric method. The number of sample of workers was 107 workers. Interviews through questionnaires were conducted to the 107 workers. While the spirometry test (lung function measurement) by using a spirometer was conducted only to 30 sample of workers with the criteria of longest working period.

There is a correlation between PM_{10} concentration and worker health risks level (risk quotient/RQ). However, there is no correlation between RQ, age, sex, smoking behaviors and working periods toward lung function disorder incidence.

Keywords: *PM_{10}, risk quotient/RQ, characteristics and patterns of individual activities, lung function, traditional ceramic industry.*

Introduction

PM_{10} can come from several sources, including natural activities and the effects of human activities in industry, transportation, and agriculture.[1] Many studies have reported that PM_{10} has become a problem in the world, including Indonesia, since when PM_{10} emissions are generated, but not managed properly, it may cause air pollution, which can risk the human health. Traditional Ceramic Industry Plered is ahome industry where the process and technology used was still simple, so that the PM_{10} emissions resulted has not yet concerned.

The study concerning air pollution by particulates has been conducted by Ahmad *et al*.[2] in Haripur, Pakistan. That study used PM_{10} and $PM_{2.5}$ measurement method which obtained from the activity in the cement industry. Eighty percent of the samples (both PM_{10} and $PM_{2.5}$) were over the National Environmental Quality Standards (NEQS), set by Pakistan. Similar study has also been conducted by Fongmoon *et al*.[3] in Thailand, focused on the toxic effects of PM_{10} toward genes and mouse lungs collected from ceramics factories. The study showed that PM_{10} was not mutagenic toward *S. typhimurium* but could harm rat lung tissue.

Materials and Method

1. **Partcipants:** The number of sample of workers was 107 workers.

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2. **Data Collection:** The 107 sample of workers were interviewed using a questionnaire concerning characteristics and patterns of individual activities including age, sex, smoking behaviors, and working periods. Measurement of PM_{10} concentration in the air used High Volume Air Sampling (HVAS)with a gravimetric method according to SNI 7119.15: 2016 guidelines.[4] Measurements were conducted for 1 hour at six observation points which represent six villages in this study location.

3. **Measurement and Statistical Analysis:** RQ was calculated through an Environmental Health Risk Assessment.[5] Exposure analysis is an important part of the risk assessment, which by measuring or calculating therisk agent intake. Intake (I) for non-carcinogens was calculated using an equation.

$$I = C \times R \times t_E \times f_E \times D_t / W_b \times t_{avg}$$

I : intake mg/kg/day

C : risk agent concentration, mg/m^3 for air medium, mg/L for drinking water, mg/kg for meals

R : intake or consumption rate, m^3/hour for inhalation, L/day for drinking water, g/day for meals

t_E : exposure time, hour/day

f_E : exposure frequency, day/year

D_t : exposure duration, year (real time or projection: 30 years for residential default values)

W_b : body weight, kg

t_{awg} : average time period (30 years x 365days/year for non-carcinogenic substances, 70 years x 365days/years for carcinogenic substances)

Health risks characterization is expressed as risk quotient (RQ). Health risks are stated exist and need to be controlled if RQ>1.

$$RQ = I/ RfC$$

The spirometry test (lung function measurement) using a spirometer was performed toward only 30 sample of workers (5 people at each observation point) with the longest working period criteria. The lung function is normal if the value of % FVC (FVC/pred) = ≥ 80 and % FEV (FEV_1/FVC) = ≥ 75. Whereas restriction lung function disorder if %FVC (FVC/pred) < 80 and % FEV (FEV_1/FVC) = ≥ 75 and obstruction lung function disorder if % FVC (FVC/pred) = ≥ 80 and % FEV (FEV_1/FVC) < 75.[6]

The analysis used in this study were univariate analysis, bivariate analysis (correlation and linear regression test and independent T test), and also multivariate analysis in the form of logistic regression.

Results

From the 107 sample of workers, 70 workers (65.42%) were male, of which 36 male workers (33.64%) were smokers and the rest of 71 workers were not-smokers (66.36%). The average age of workers was 44.9 years and the working period average of workers was 15 years (Table 1).

Table 1. Workers distribution based on the variable including age, sex, smoking behaviors, and working periods

Variable	Frequency			Mean	SD	Min-Max	95% CI
	Male	Female	Total				
Age							
< 44.9 years	39	17	56	44.9	13.515	18-78	42.31-47.49
	36.45%	15.89%	52.34%				
>= 44.9 years	31	20	51				
	28.97%	18.69%	47.66%				
Sex	70	37	107				
	65.42%	34.58%	100.00%				
Smoking Behaviors							
Not Smoking	34	37	71				
	31.78%	34.58%	66.36%				
Smoking	36	0	36				
	33.64%	0,00	33.64%				

Working Periods							
< 15 years	35	16	51	15	12.234	1-50	14.99-19.68
	32.71%	14.95%	47.66%				
>= 15 years	35	21	56				
	32.71%	19.63%	52.34%				

The results of PM_{10} concentration measurements at six observation points shows that PM_{10} average concentration at six observation points is 0.2 mg/ m^3 which exceeds the Threshold Value (NAV) of 0.1 mg/m^3.[7] Due to the result obtained which exceeds the Threshold Value (NAV) there was a risk that need to be controlled.

Then the calculation of worker health risks level (risk quotient/RQ) was conducted. From the calculation, it has been found that the average RQ is 0.0036 (Table 2). Based on the guidelines if the value does not exceed 1, it can be said that there is no risk that needs to be controlled.[5]

Table 2. Worker health risk level (risk quotient/RQ)

Variable	**Mean**	**SD**	**Minimal-Maximal**	**95 % CI**
Worker Health Risk Level (risk quotient/RQ)	0.0036	0.00587	0-0.02	0.0024-0.0047

Furthermore, using the correlation and linear regression test, the researchers tried to find the correlation between PM_{10} concentration and RQ. The correlation showed a strong correlation (r= 0.440) and had a positive pattern, it means that by the increasing PM_{10} concentration, RQ also increases. The coefficient value with a determination of 0.193 means that the obtained regression line equation can explain 19.3% of the variation in RQ or the obtained line equation is good enough to explain the variable of RQ. The result of statistical test found that there was a significant correlation between PM_{10} concentration and RQ (p=0,000) (Table 3).

Table 3. Correlation analysis and regression concentration of PM_{10} with worker health risk level (risk quotient/RQ)

Variable	**r**	**R^2**	**Line equation**	**P value**
PM_{10}concentration	0.440	0.193	Worker Health Risk Level (risk quotient/RQ) = 0,003+0,038* PM_{10} concentration	0.000

From the line equation obtained, the researcher could predict the relation of the dependent variable (worker health risks level (risk quotient/RQ) with the independent variable (PM_{10} concentration) (Figure 1).

By referring to the correlation between PM_{10} concentration and worker health risks level (risk quotient/RQ), then spirometry tests or lung function tests on 30 workers were performed with the longest working period criteria. Of the 30 sample of workers, 26 workers (86.67%) were male, of which 9 male workers (30%) were smokers and the rest were non-smokers as many as 21 people (70%). 27 workers (90%) suffer from lung function disorders. The average age of workers was 44.9 years and the working period average was 15 years.

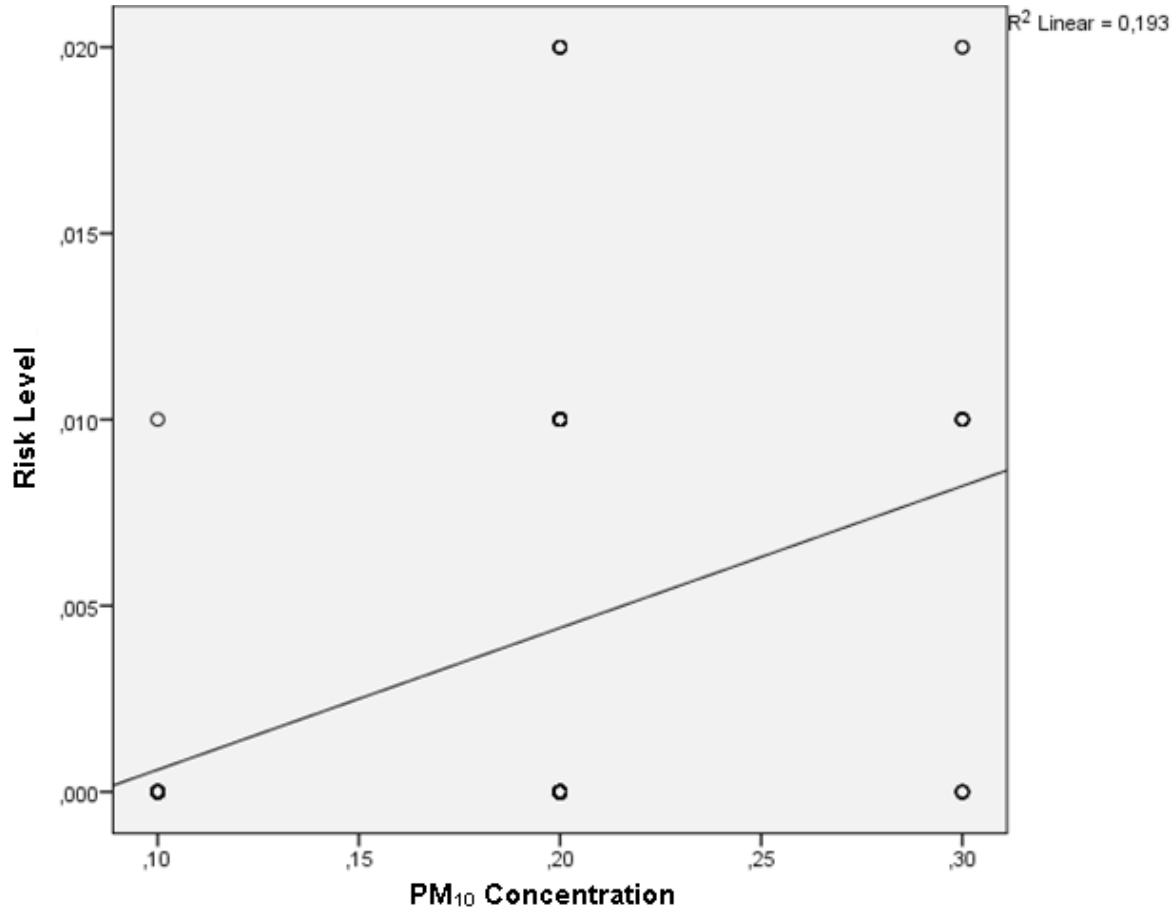

Figure 1. Prediction diagram of the relationship between PM_{10} concentration and worker health risk level (risk quotient/RQ)

While the 30 workers distribution based on the variables including age, sex, smoking behaviors, and working periods toward lung function disorders were the majority of workers suffer from lung function disorder (abnormal lung function) as many as 23 men (76.77%), the workers who not smoker were 18 people (60%) and the workers with working time > = 15 years were 18 people (60%). As for the age variable, between workers aged < 49.7 years and those aged >= 49.7 years, the proportion was spread evenly between those who have normal lung function and those who suffer from lung function disorder (abnormal lung function).

Referring to the finding of lung function disorder happen in 27 workers (90%) then by using an independent T test, the researchers tried to find a relation between the worker health risks level (risk quotient/RQ) and lung function disorder. In Table 4, it is known that from the result of the T test was obtained p=0.736 which means that statistically there was no significant difference in the average worker RQ between workers who suffer from lung function disorders (abnormal lung function) with those not (normal lung function). Even the average RQ in workers who suffer lung function disorder (abnormal lung function) was even lower than workers who have normal lung function.

Table 4. Worker health risk level (risk quotient/RQ) according to worker's lung function

Lung Function	Mean	SD	P value
Normal	0.0067	0.01155	0.736
Abnormal	0.0041	0.00572	

The researchers suspected there were other factors that cause a high incidence of lung function disorders in 30 workers. Therefore, by using logistic regression analysis, the researchers tried to find out other factors that cause a high incidence of lung function disorders. Logistic regression analysis was carried out with other

independent variables including age, sex, smoking behaviors and working period. However, in Table 5, it is known that there was no variable that have p<0.05, so there were no variables that were significantly related to the incidence of lung function disorder.

Table 5. Logistic regression modeling results

Variable	B	P Value	OR	95 % CI
Worker Health Risk Level (risk quotient/RQ)	93.046	0.624	2,57E+40	0.000-9.999E+201
Age	0.021	0.829	1.021	0.847-1.229
Sex	20.315	0.999	0.000	0.000
Smoking Behaviors	20.675	0.999	952915768.58	0.000
Working Periods	0.121	0.438	0.886	0.654-1.202

Discussion

Through correlation and linear regression test in this study, a strong correlation and positive pattern between PM_{10} concentrations and worker health risk level (risk quotient/RQ) was found. This result was similar to that in the study conducted by Kowalska *et al*.[8] in Poland that confirmed a significant increase in daily fine particulate matter concentration in the air affect to the increase of the health risks. However, in the case of the relation between RQ and lung function disorder which were analyzed using the independent T tests, the statistic result was obtained, that there was no significant difference RQ average between the worker who suffer lung function disorder (abnormal lung function) and those that were not (normal lung function).

Meanwhile, the researchers suspected there were other factors that caused a high incidence of lung function disorders in 30 workers. Logistic regression analysis was performed with other independent variables including age, sex, smoking behaviors, and working period. But the result showed that there was no variable that have p<0.05, it means no variable which was significantly related to the incidence of lung function disorder.

For the age variable, the result was similar to that in the study conducted by Pruthy and Multani[9] in one of the hospitals in India. The study has resulted that the values of all conducted lung function tests, including FVC, FEV1, PEFR, FEV1/FVC, SVC and MVV toward 50 people with the average age of people was < 30 years old, showed a correlation with age, a negative correlation in this case (r = -0.446, -0.495, -0.427, -0.312, -0.392 and -0.919, respectively). So it can be concluded that lung function decreases significantly with age. While in this study, the average age of worker samples was < 49.7 years which was actually quite strongly related to the occurrence of lung function disorder.

In the case of sex variable, the result was similar to that in the study conducted by Umakaapa, Rahim and Saleh[10] in Indonesia toward the worker of textile industry. Based on statistical tests, the result has showed that the worker sex had no relation with lung function disorder. However, a different matter has been conveyed by Oviera, Jayanti, and Suroto[11]in their study toward the worker of wood processing industry in Indonesia which found that after bivariate analysis, a relation between sex and vital capacity was obtained (p-value 0.007). After further review, that relation was influenced by proportion variations between men and women in the sample. In the study that got results there was no relation between sex and lung function disorder, it was caused by one of the sex more dominant. While the study that found a relation between sex and lung function disorder, the proportion between men and women tended to evenly spread.

In the case of smoking behaviors variable, the result was not similar to that in the study conducted by Willemse *et al*.[12] in Europe, which found that smoking behaviors was related to lung function disorder, where smoking can cause lung function disorder, such as chronic obstructive pulmonary disease which clinically known COPD toward 15-20% of smokers. Meanwhile, this study was similar to that in the study conducted by Wardhani, Rachmawati, and Rinawati[13] in Indonesia toward the worker of casting factory which resulted that there was no relation between smoking behaviors and

lung function disorder. Similar to this study, in that study, there were more worker samples who not smoking.

In the case of working periods variable, the result of this study was not similar to that in the study conducted by Umakaapa, Rahim, and Saleh[10] in Indonesia toward the worker of textile industry. Based on statistical tests, the study showed that there was a relation between working periods (p = 0.095) and lung function disorder. The working periods determines the exposure duration of the worker facing the dust which can affect lung function disorder. The longer the working period is more likely the worker get the risks. But the result of this study was not in accordance with the above hypothesis, but similar to that in the study conducted by Pinugroho and Kusumawati[14] to ward furniture workers in Indonesia. The result showed the exposure duration variable (p=0.740) had no relation with lung function disorder. This can be explained that the longer the working period does not mean the worker get longer exposure. Field findings showed that although working hours were generally the same between the workers, they got different exposure doses. In addition, the workers who have a long working period, had lower risk due to they did not have the smoking habit.

Conclusion

Thus, the conclusion is that factors including worker health risks level (risk quotient/RQ), age, sex, smoking behaviors, and working periods are not related to lung function disorder incidence. Hence, there may be other factors that may cause lung function disorder such as other exposure sources or other factors that have not been included in this study, such as nutritional status, medical history, mask use behavior, occupation history, consumption patterns, and physical activity.

Conflict of Interest: No declared.

Ethical Clearance: This research has been approved by the Ethics Committee of the Faculty of Public Health, Universitas Indonesia.

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References

1. EPA [Internet]. United States (US): EPA; 2019. Particulate Matter-Basic Information, United States Environmetal Protection Agency; [updated 2019 June 11; cited 2019 November 5]. Available from: https://www.epa.gov/pm-pollution/particulate-matter-pm-basics.
2. Ahmad, W. et al.Assessment Of Particulate Matter (PM 10 & PM 2.5) and Associated Health Problems In Different Areas Of Cement Industry, Hattar, Haripur. J. Sc. & Tech. Univ. Peshawar [Internet]. 2013 [cited 2019 November 5]; 37(2): pp. 7–15. Available from: http://journals.uop.edu.pk/papers/7-16.pdf.
3. Fongmoon, D. et al.Particulate Matters Collected from Ceramic Factories in Lampang Province Affecting Rat Lungs. Journal of Zhejiang University: Science B [Internet].2014 [cited 2019 November 5]; 15(1): pp. 75–83. Available from: doi: 10.1631/jzus.B1300058.
4. SNI 7119.15:2016 [Internet]. Indonesia: National Standardization Agency of Indonesia (BSN); 2016. Ambient Air-Section 15: Test Method for Particle Size 10 µm (PM_{10}) Using High Volume Air Sampler (HVAS) Equipment with Gravimetric Method. [cited 2019 November 5]. Available from: https://www.slideshare.net/miemamk/sni-19711932005-tentang-udara-ambien-bagian-3-cara-uji-partikel-tersuspensi-total-menggunakan-peralatan-high-volume-air-sampler-hvas-dengan-metode-gravimetri.
5. Ministry of Health of Republic of Indonesia [Internet]. Indonesia: Ministry of Health of Republic of Indonesia; 2012. Guidelines for Environmental Health Risk Assessment. Jakarta: Ministry of Health of Republic of Indonesia. [cited 2019 November 5]. Available from: https://www.academia.edu/22127843/PEDOMAN_ANALISIS_RISIKO_KESEHATAN_LINGKUNGAN.
6. Aulia, Z. and Azizah, R. Karakteristik, Perilaku, Fungsi Paru Pekerja Dan Kadar $PM_{2,5}$ Di Industri Rumah Tangga Cecek Kabupaten Sidoarjo. Jurnal Kesehatan Lingkungan [Internet]. 2015 [cited 2019 November 5]; 8(1): pp. 128–136. Available from: https://media.neliti.com/media/publications/105003-ID-none.pdf.
7. Kementerian Kesehatan Republik Indonesia [Internet]. Indonesia: Kementerian Kesehatan Republik Indonesia; 2002. Keputusan Menteri Kesehatan Republik Indonesia Nomor 1405 Tahun 2002 tentang Persyaratan Kesehatan Lingkungan Kerja Perkantoran dan Industri. Jakarta:

Kementerian Kesehatan Republik Indonesia. [cited 2019 November 5]. Available from: https://www.gbcindonesia.org/download/doc_download/41-kepmenkes-no-1405-tahun-2002.

8. Kowalska, M. et al. The relationship between daily concentration of fine particulate matter in ambient air and exacerbation of respiratory diseases in silesian agglomeration, Poland.International Journal of Environmental Research and Public Health [Internet]. 2019 [cited 2019 November 5];16(7): p. 1131. Available from: doi: 10.3390/ijerph16071131.
9. Pruthi, N. and Multani, N. K. Influence of Age on Lung Function Tests.Journal of Exercise Science and Physiotherapy [Internet].2012 [cited 2019 November 5];8(1): pp. 1–6. Available from: doi: 10.18376//2012/v8i1/67598.
10. Umakaapa, M., Rahim, M. R. and Saleh, L. M.Faktor-Faktor yang Berhubungan dengan Gangguan Fungsi Paru pada Pekerja Bagian Produksi Industri Tekstil CV Bagasbs Kota Makassar. Jurnal FKM Unhas [Internet]. 2013 [cited 2019 November 5]; pp. 1–13. Available from: https://core.ac.uk/download/pdf/25493176.pdf.
11. Oviera, A., Jayanti, S. and Suroto. Faktor-Faktor Yang Berhubungan Dengan Kapasitas Vital Paru Pada Pekerja Industri Pengolahan Kayu Di PT. X Jepara.Jurnal Kesehatan Masyarakat (e-Journal) [Internet].2016 [cited 2019 November 5];4(1): pp. 267–276. Available from: https://media.neliti.com/media/publications/18521-ID-faktor-faktor-yang-berhubungandengan-kapasitas-vital-paru-pada-pekerja-industri.pdf.
12. Willemse, B. W. M. et al.The impact of smoking cessation on respiratory symptoms, lung function, airway hyperresponsiveness and inflammation. European Respiratory Journal [Internet]. 2004 [cited 2019 November 5]; 23(3): pp. 464–476. Available from: doi:10.1183/09031936.04.00012704.
13. Wardhani, A. K., Rachmawati, S. and Rinawati, S.Faktor-Faktor yang Berhubungandengan Gejala Gangguan Sistem Pernapasan Akibat Paparan Debu Silika (SiO2) Pada Area Hand Moulding I, Hand Moulding II, Hand Moulding III, Fetling dan Melting Pekerja Pabrik 1 Pengecoran PT BARATA INDONESIA (PERSERO). Jurnal Kesehatan [Internet].2018 [cited 2019 November 5]; 11(1): pp. 56–66. Available from: http://journals.ums.ac.id/index.php/JK/article/view/7008/4153.
14. Pinugroho, B. S. and Kusumawati, Y.Hubungan Usia, Lama Paparan Debu, Penggunaan APD, Kebiasaan Merokok dengan Gangguan Fungsi Paru Tenaga Kerja Mebel di Kec. Kalijambe Sragen. Jurnal Kesehatan [Internet]. 2017[cited 2019 November 5];10(2): p. 37. Available from: doi: 10.23917/jurkes.v10i2.5529.

ICSI Pregnancy Outcomes Following Hysteroscopic Tubal Electrocoagulation Versus Laparoscopic Tubal Disconnection for Patients with Hydrosalpinges

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Abstract

Objective: To investigate Intracytoplasmic sperm injection (ICSI) pregnancy outcomes and success rate of hysteroscopic tubal electrocoagulation for the treatment of hydrosalpinx-related infertility among patients who have laparoscopic contraindications.

Method: A prospective study was conducted among patients who had unilateral or bilateral hydrosalpinges identified on hysterosalpingography and vaginal ultrasonography, and who were undergoing ICSI cycles at the Department of Obstetrics and Gynecology, Faculty of Medicine, Cairo University, Egypt, between March 1, 2017 and May 31, 2018. All patients were divided in two groups; group 1 consisted of patients who had contraindications for laparoscopy was scheduled for hysteroscopic tubal electrocoagulation while group 2 consisted of the other patients who underwent laparoscopic tubal disconnection. Hysterosalpingography was performed 3 months after their procedure for all patients, to evaluate the success of the operation. After tubal occlusion being confirmed by HSG, an ICSI cycle was started with the long protocol with assessment of chemical pregnancy rate (quantitative BHCG 14 days after embryo transfer).

Results: Among 50 enrolled patients, 25 underwent hysteroscopic tubal electrocoagulation and 25 underwent laparoscopic tubal disconnection. The procedure was successful in terms of tubal occlusion for 29 (85.2%) of 34 hydrosalpinges in group 1 and 38 (97.43%) of 39 hydrosalpinges in group 2 (P = 0.091). And there were no intraoperative or postoperative complications were reported in either of the two groups.

Chemical pregnancy rate was 50 % in the first group and 58.3% in the second group (p = 0.580).

Conclusion: Hysteroscopic tubal electrocoagulation was found to be a good alternative to laparoscopic tubal disconnection for management of hydrosalpinges before ICSI cycles when laparoscopy is contraindicated with comparable chemical pregnancy rate.

Keywords: *Hydrosalpinx, Hysteroscopy, Infertility, Pregnancy outcome, Intracytoplasmic sperm injection, Laparoscopy.*

Introduction

High rate of infertility is one of the most common and under appreciated health problems in developing countries.[1] The most common cause of female infertility is tubal factor infertility that can occur due to occlusion and or peritoneal pathology causing adhesions and it was diagnosed in approximately 30% to 35% of younger and older infertile women.[2]

10–30% of women with infertility due to tubal factors were found to have hydrosalpinx, corresponding to approximately 5% of infertile women.[3, 4]

A large reduction (about 40–50%) in pregnancy

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rates was associated with hydrosalpinx, following in-vitro fertilization, embryo transfer (IVF-ET), [5] Many theories suggest the way by which hydrosalpingial fluid impacts implantation and pregnancy but the exact mechanism is unknown. Some authors suggested that the milieu fluid may be embryo toxic, [6] while others assumed that disintegration of the fertilized implanting embryos occur due to the refluxed fluid that causes a physical and mechanical barrier. [7]

Physical inhibition of the implantation and impairment of the expression of factors essential for the development and differentiation of the endometrium, such as β-integrin, leukemia inhibitory factor, and HOXA10 mRNA occur due to the presence of hydrosalpinx fluid in the endometrial cavity. [8, 9]

Studies focusing on endometrial receptivity have long been sought after to improve the results of IVF.[10]

Since the hydrosalpinx fluid is in free communication with the uterine cavity, any surgical intervention interrupting this communication could improve the pregnancy rates for patients who attempt IVF with hydrosalpinx, [11] and this could be achieved by either noninvasive or invasive surgical techniques.

Invasive surgical techniques have been demonstrated to be an effective option including laparoscopic salpingectomy and laparoscopic proximal tubal occlusion,[12] but with many drawbacks, including its invasiveness, the possibility of surgical injury (e.g. visceral injury, vascular damage, or unintended laparotomy), the potential risks from general anesthesia, and technical difficulty if there are pelvic adhesions.[13]The proximal occlusion of a hydrosalpinx by hysteroscopy might offer a feasible therapeutic alternative when laparoscopy is technically difficult or contraindicated.

Essure has been widely used for sterilization as it was known to achieve hysteroscopic tubal occlusion.[14] At 31 May 2017 it had been decided to discontinue sales of Essure as by early May 2017 the United States Food and Drugs Administration had received over 27 000 reports of possible Essure-related problems.[15]

So, the aim of the present study was to investigate the use, success rate and pregnancy outcome of hysteroscopic tubal electrocoagulation for the treatment of hydrosalpinx-related infertility among patients undergoing ICSI who have laparoscopic contraindications.

Materials and Method

The present prospective study was conducted among women with hydrosalpinx-related tubal infertility undergoing ICSI cycles at the Department of Obstetrics and Gynecology, Faculty of Medicine, Cairo University, Egypt, between March 1, 2017 and May 31, 2018. The Research Ethics Committee approved the study protocol, and informed consent was obtained from all participants.

For all participants hydrosalpinx was diagnosed by hysterosalpingography (HSG) as distally occluded fallopian tube that was pathologically dilated and by vaginal ultrasonography (mid-cycle) as an elongated tubular mass with echogenic wall and linear echoes in the lumen (Figure 1).

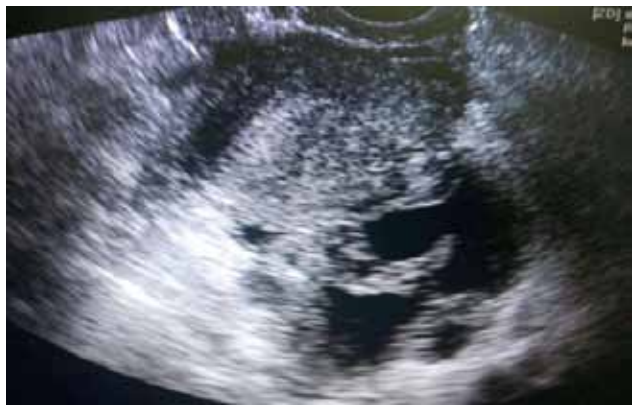


Figure 1: ultrasound picture showing hydrosalpinx

Patients who were included in group 2 underwent Laparoscopy to confirm the presence of the hydrosalpinx, and unilateral or bilateral tubal disconnection was performed when technically feasible by using bipolar coagulation and a proximal tubal cut. The other patients who were included in group 1 who had contraindications for laparoscopy as extensive abdominal or pelvic adhesions of various etiologies (e.g. previous surgery, pelvic inflammatory disease, and pelvic endometriosis) and morbid obesity were scheduled in the second week of their cycle to undergo hysteroscopic tubal electrocoagulation under general anesthesia. Unilateral or bilateral electrocoagulation of the cornual end of the tube and the surrounding part of the uterine horn was performed using a hysteroscopic electrocoagulation roller ball (Karl Storz Endoscopy, Tuttlingen, Germany) using a coagulating current of 40 to 50 Watts which was applied on each tubal ostia for 3 seconds (Fig. 2 and Fig. 3). HSG was repeated 3 months for all patients after their procedure to evaluate the success of the operation in form of proximal tubal occlusion.

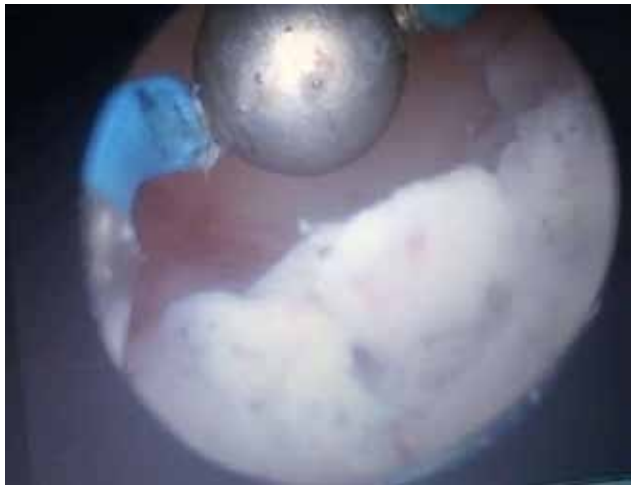


Figure 2: The electrocoagulation roller ball.

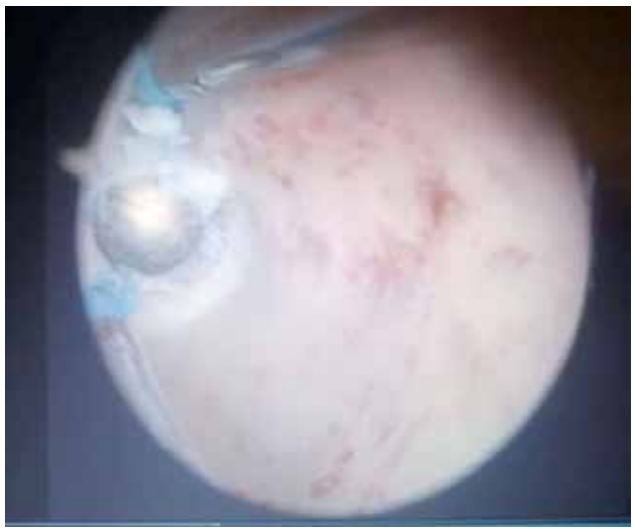
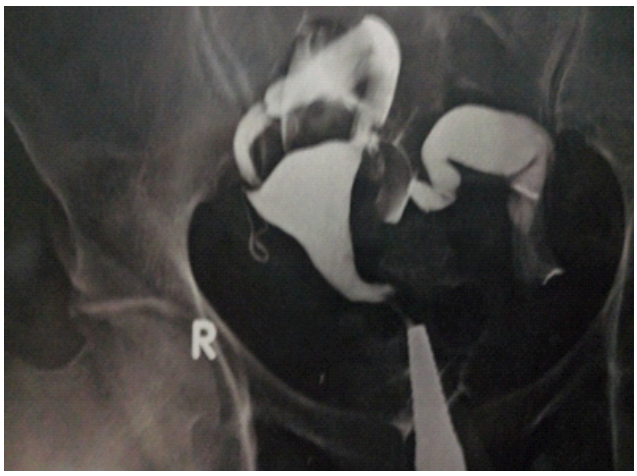


Figure 3: Hysteroscopic tubal electrocoagulation.

After tubal occlusion being confirmed by HSG (Fig. 3), an ICSI cycle was started with the long protocol with assessment of quality of eggs retrieved, quality of embryos and chemical pregnancy rate (quantitative BHCG 14 days after embryo transfer).



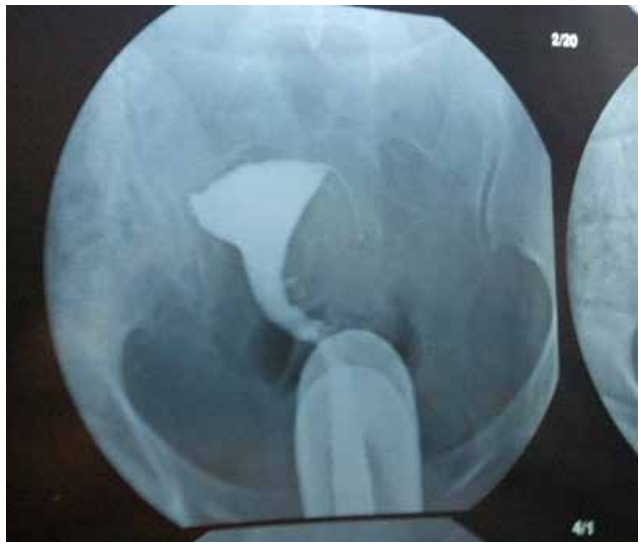


Figure 4: Showing HSG before (A) and after (B) laparoscopic tubal disconnection of a case with bilateral hydrosalpinges.

Data was analyzed using IBM SPSS Advanced Statistics version 22.0 (SPSS Inc., Chicago, IL). Quantitative data were expressed as mean and standard deviation or median. Qualitative data were expressed as frequency and percentage. The chi-square test was used to examine the relation between qualitative variables. For quantitative data, comparison between the two groups was done using 099:0421416Independent T-Test. A p-value < 0.05 was considered significant.

Results

50 patients undergoing ICSI cycles with unilateral or bilateral hydrosalpinges were included in this study. Overall, 25 patients had contraindications for laparoscopy were scheduled for hysteroscopic tubal electrocoagulation (group 1), while the other 25 patients underwent laparoscopic tubal disconnection (group 2). There was no significant difference between the two groups in age, type of infertility, (Table 1).

Table 1: Characteristics of participants.

Variable	Hysteroscopic tubal electrocoagulation (n = 25)	Laparoscopic tubal disconnection (n = 25)	P value
Age, y	28.84± 3.325	28± 4.301	0.444
Primary infertility	12(48)	14 (56)	0.571
Secondary infertility	13 (52)	11(44)	0.571

Values are given as mean ± SD or number (percentage).

The pre-procedure HSGs confirmed that there were no significant differences between groups (Table 2) regarding the number of patients with unilateral or bilateral hydrosalpinges .

Table 2: Pre- and post-procedure hysterosalpingography findings.[a]

Findings	Hysteroscopic tubal electrocoagulation (n = 25)	Laparoscopic tubal disconnection (n = 25)	P value
Pre-procedure			
Unilateral hydrosalpinx	16 (64)	11 (44)	0.156
Bilateral hydrosalpinx	9 (36)	14 (56)	0.156
Total hydrosalpinges	34	39	
Post-procedure			
Occlusion	29 (85.2)	38(97.43)	0.091

Values are given as number (percentage).

Overall, the procedure was successful in terms of tubal occlusion for 29 (85.2%) in 20 patients of 34 hydrosalpinges in 25 patients in group 1 and 38 (97.43%) in 24 patients of 39 hydrosalpinges in 25 patients in group 2 as shown in, with no significant difference between the two groups (P = 0.091). No intraoperative or postoperative complications were reported in either of the two groups.

Table 3:

Variable	Hysteroscopic tubal electrocoagulation (n = 20)	Laparoscopic tubal disconnection (n = 24)	P value
Positive	10 (50.0%)	14 (58.3%)	0.580
Negative	10 (50.0%)	10 (41.7%)	

Values are given as number (percentage).

Chemical pregnancy rate was 50 % in the first group and 58.3% in the second group as shown in figure 21, there was no significant difference between the two studied groups regarding the proportion of chemical pregnancies (p = 0.580)

Discussion

In the present study, hysteroscopic tubal electrocoagulation was scheduled for 25 patients with unilateral or bilateral hydrosalpinges and contraindications for laparoscopy. After the procedure, the percentage of unilateral or bilateral tubal occlusion did not differ between patients who had undergone hysteroscopic tubal electrocoagulation and those who had undergone laparoscopic tubal disconnection. And, there was no significant difference between the two groups regarding the success rate of the procedures.

Hysteroscopic procedures (either an Essure insert or electrocoagulation) are considered simpler and safer in contrast to the cumulative risks of laparoscopic procedures (salpingectomy or proximal tubal disconnection) for patients intending to undergo IVF in spite of their proven efficacy.[16]

A case report in which the ESSURE set was used for tubal occlusion was the only hysteroscopic route used as a method for tubal occlusion in cases with hydrosalpinx and it was a successful trial but this method is more expensive than the method we used.[17] Although an Essure device is an effective method of sterilization, the Essure coil might trail into the uterine cavity, with possible effects on both implantation and pregnancy, and the nickel titanium elastic outer coil might affect the developing embryo so there is some apprehension regarding its use in the treatment of a hydrosalpinx before IVF, in addition to the cost of the device.[18]

There was a prospective comparative study to determine the efficacy and feasibility of hysteroscopic tubal occlusion of functionless hydrosalpinx prior to IVF/ ICSI compared with laparoscopic tubal occlusion, they applied electro-coagulation of tubal orifices. Once the peritubal bulge was clearly seen, a roller ball electrode (size: 3 mm) was introduced inside it and activated at 50 Watts for about 8 s. They achieved complete occlusion in 9 cases out of 13. Pregnancy was achieved in 4 cases (31%).[19]

A pilot study previously compared hysteroscopic roller ball and needle electrode coagulation of the cornual end of the tubes for occlusion of a communicating hydrosalpinx among 10 patients scheduled for IVF. In the roller ball group (6 tubes/4 patients), one tube was successfully closed, three tubes remained partially open, and two tubes were found to be completely open. The needle electrode group (10 tubes/6 patients) had a 90% success rate of occlusion (only one tube was found to be open). However, that study had a very limited number of cases.[20]

A prospective clinical trial had investigated the success rate of hysteroscopic tubal electrocoagulation for the treatment of hydrosalpinx-related infertility among a relatively large number of patients with laparoscopic contraindications undergoing IVF, Overall, the procedure was successful in terms of tubal occlusion for 25 (93%) of 27 hydrosalpinges in the hysteroscopic group and 78 (96%) of 81 hydrosalpinges in the laparoscopic group, with no significant difference between the two groups . These results are close to our study results and that may be due to some common points that were used in both studies, as all the hysteroscopic procedures in both studies were performed in the early follicular phase and the instruments used were close to each other, as they used in this previous study the electrocoagulation roller ball as we used in our study.[21]

A recent study retrospectively analyzed data from 10 women with hydrosalpinx, who were unable to undergo laparotomy due to extensive pelvic adhesion and treated by operative hysteroscopy prior to 0:0420In Vitro Fertilization & Embryo Transfer (IVF-ET). The total of 10 women underwent the fulguration of the internal orifice of the uterine tube. After their hysteroscopy operation, 5 out of 10 patients acquired clinical pregnancy.[22]

Hysteroscopic tubal electrocoagulation might replace the Essure device for hydrosalpinx treatment before ICSI cycles. However, hysteroscopic monopolar surgery is associated with both the potential risk of electrosurgical injury and complications of distending media. In the present study, we have been using the lowest possible power setting with proper insulation to avoid electrosurgical injury, fluid input and output were monitored properly to avoid complications of distending media with keeping the uterine cavity distention pressure below the mean arterial pressure to avoid fluid and electrolyte disturbances. And so there was no intraoperative or postoperative complications reported in the present study.

The present prospective study has investigated the success rate and ICSI pregnancy outcomes of hysteroscopic tubal electrocoagulation for the treatment of hydrosalpinx-related infertility among a considerable number of patients with laparoscopic contraindications undergoing ICSI. To differentiate between tubal spasm and true tubal occlusion to avoid the false-positive results of the HSG, water-soluble dye and antispasmodics were used in pre- and post-procedure HSGs, and we used the findings from pre-procedure HSG as a control.

Conclusion

Hysteroscopic tubal electrocoagulation was found to be a successful alternative to laparoscopic tubal disconnection for treatment of hydrosalpinx before ICSI when laparoscopy is contraindicated. But its universal use is still a question that needs more randomized studies to be well answered.

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References

1. Leke RJ. The prevalence of infertility and its preventive measures in sub-Saharan Africa in sekadde-Kigondu C, chikamata D, Franken D. Management of infertility in AFRO & EMRO countries. Geneva, Switzerland :World Health organization Proceedings of a workshop 2002; 79-91.

2. Miller JH, Weinberg RK, Canino NL, Klein NA, Soules MR. The pattern of infertility diagnoses in women of advanced reproductive age. American journal of obstetrics and gynecology. 1999;181(4):952-7.
3. Arora P, Arora RS, Cahill D. Essure® for management of hydrosalpinx prior to in vitro fertilisation□a systematic review and pooled analysis. BJOG: An International Journal of Obstetrics & Gynaecology. 2014;121(5):527-36.
4. D'Arpe S, Franceschetti S, Caccetta J, Pietrangeli D, Muzii L, Panici PB. Management of hydrosalpinx before IVF: a literature review. Journal of Obstetrics and Gynaecology. 2015;35(6):547-50.
5. Practice Committee of American Society for Reproductive Medicine in collaboration with Society of Reproductive Surgeons. Salpingectomy for hydrosalpinx prior to in vitro fertilization. FertilSteril 2008; 90: S66–S68.
6. Spandorfer SD, Liu HC, Neuer A, Barmat LI, Davis O, Rosenwaks Z. The embryo toxicity of hydrosalpinx fluid is only apparent at high concentrations: an in vitro model that simulates in vivo events. Fertility and sterility. 1999;71(4):619-26.
7. Sharara FI, McClamrock HD. Endometrial fluid collection in women with hydrosalpinx after human chorionic gonadotrophin administration: a report of two cases and implications for management. Human reproduction (Oxford, England). 1997;12(12):2816-9.
8. Seli E, Kayisli UA, Cakmak H, Bukulmez O, Bildirici I, Guzeloglu-Kayisli O, Arici A. Removal of hydrosalpinges increases endometrial leukaemia inhibitory factor (LIF) expression at the time of the implantation window. Human Reproduction. 2005;20(11):3012-7.
9. Bildirici I, Bukulmez O, Ensari A, Yarali H, Gurgan T. A prospective evaluation of the effect of salpingectomy on endometrial receptivity in cases of women with communicating hydrosalpinges. Human Reproduction. 2001;16(11):2422-6.
10. Wang L, Qiao J, Li R, Zhen X, Liu Z. Role of endometrial blood flow assessment with color Doppler energy in predicting pregnancy outcome of IVF-ET cycles. Reproductive Biology and Endocrinology. 2010;8(1):122.
11. Johnson N, van Voorst S, Sowter MC, Strandell A, Mol BW. Surgical treatment for tubal disease in women due to undergo in vitro fertilisation. The Cochrane Library. 2010.
12. Kontoravdis A, Makrakis E, Pantos K, Botsis D, Deligeoroglou E, Creatsas G. Proximal tubal occlusion and salpingectomy result in similar improvement in in vitro fertilization outcome in patients with hydrosalpinx. Fertility and sterility. 2006;86(6):1642-9.
13. Practice Committee of the American Society for Reproductive Medicine. Salpingectomy for hydrosalpinx prior to in vitro fertilization. Fertility and sterility. 2004 82 (Suppl. 1), pp. S117–S119.
14. Smith RD. Contemporary hysteroscopic method for female sterilization. International Journal of Gynecology & Obstetrics. 2010;108(1):79-84.
15. Das S, Yoong WC, Govind A. Comment on □End of the road for Essure®?□. BMJ Sex Reprod Health. 2018;44(1):73-73.
16. Shah V, Panay N, Williamson R, Hemingway A. Hysterosalpingogram: an essential examination following Essure hysteroscopic sterilisation. The British journal of radiology. 2011 Sep;84(1005):805-12.
17. Rosenfield RB, Stones RE, Coates A, Matteri RK, Hesla JS. Proximal occlusion of hydrosalpinx by hysteroscopic placement of microinsert before in vitro fertilization–embryo transfer. Fertility and sterility. 2005;83(5):1547-e11.
18. Galen DI. Utilization of the Essure® micro-insert for the treatment of hydrosalpinx prior to in vitro fertilization. Fertility and Sterility. 2007;88:S16.
19. Darwish AM, El Saman AM. Is there a role for hysteroscopic tubal occlusion of functionless hydrosalpinges prior to IVF/ICSI in modern practice?. Acta obstetricia et gynecologica Scandinavica. 2007;86(12):1484-9.
20. Aboulghar MM, Azmy O, Nada A, Shawky O, Mostafa H. Hysteroscopic tubal electrocoagulation in cases with communicating hydrosalpinx and planning for IVF—a pilot study. Int J Med. 2008;1(2):81-5.

21. El-Mazny A, Abou-Salem N, Hammam M, Saber W. Hysteroscopic tubal electrocoagulation versus laparoscopic tubal ligation for patients with hydrosalpinges undergoing in vitro fertilization. International Journal of Gynecology & Obstetrics. 2015;130(3):250-2.
22. Bao HC, Wang MM, Wang XR, Wang WJ, Hao CF. Clinical application of operative hysteroscopy in treatment of complex hydrosalpinx prior to IVF. Iranian journal of reproductive medicine. 2015;13(5):311.

Working Environment Dust to Disorders of Lung Function of Workers Textile Industry Spinning

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Abstract

Background: Many factors affect the impaired lung function capacity. One of the pollutants in the air that is dangerous is the level of dust. Open the irritation of the upper respiratory tract. Exposure to dust in textile industry workers can pose a risk of pulmonary function disorders.

Aim: The purpose of the study was to determine the effect of work environment dust exposure on pulmonary function disorders in textile industry spinning workers.

Method: Analytical observational research design, with a cross sectional approach. The population is all 96 spinning workers in the textile industry. The sampling technique uses purposive sampling of 35 people, this study uses a spirometer to determine pulmonary function disorders. Low Volume Sampler (LVS) to measure dust levels in the work environment. Measurements were made at 6 different points in the spinning area.

Results: The measurement results obtained with an average working environment dust of 0.395 mg/m^3 which is classified above the NAV based on the Minister of Manpower Regulation No. 5 of 2018. 35 workers who became spinning section respondents, there were 27 respondents (77.14%) did not experience pulmonary function impairment and 8 (22.86%) experienced interference. The results showed that the work environment dust exposure had a significant effect on pulmonary function impairment with a p-value of 0.016 (p-value <0.05). The results of the measurement of the dust content of the work environment is still classified above the NAV, the company should immediately take steps to control the dust exposure source hierarchy.

Keywords: *Environment Dust, Lung Function, Textile Industry.*

Introduction

The textile industry is an industry that produces air pollution products, one of which is dust. Exposure to dust on textile industry workers can pose a risk of lung dysfunction[1]. Health effects of lung function have been documented in workers exposed to dust in small, medium and large industries[2].

Occupational lung disease is a group of diseases that are caused by long or single repeated exposure, severe exposure to irritating or toxic substances that cause acute or chronic respiratory disease[3]. Occupational diseases are caused by pathological responses from patients to their work environment[4]. There is a growing consensus about the adverse effects of organic dust on respiratory symptoms and functions of industrial workers[5].

With respect to cotton dust exposure, chest tightness was the most common respiratory symptom (20.3%). About 14.2% of cotton processing workers were encountering byssinosis.[6] Moreover, working in

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the department where there is higher exposure of cotton dust such as spinning and weaving and being aged were found to be the risk factors for respiratory problems related to cotton dust.[7]

Braum (1999) explains that there are many cities, especially in developing countries where the level of urbanization is growing rapidly, there is air pollution that has damaged the respiratory system, especially for people who are older, younger, smokers and those who suffer from chronic diseases respiratory tract[8].

The pathogenesis of bisinosis is the release of protein molecules that are part of the immune response released during an allergic reaction (histamine) that causes symptoms on the first day of work after a Sunday holiday. Exposure to cotton dust which continues for years causes irritation of the upper respiratory tract of the bronchi. After continued exposure chronic obstructive pulmonary disease occurs. Means it can be interpreted the longer the working period the more cotton dust settles in the respiratory tract, so the more severe the bisinosis disease suffered[9].

ILO data (2013) shows that every year there are more than 250 million accidents in the workplace and 160 million become sick because of the hazards at work. What's more, around 1.2 million workers die from accidents and occupational diseases. New materials for the production process are distributed annually in the workplace. But apparently many of them cause lung disease[10].

Indonesia is one of the developing countries that has many companies that produce dust as a result of the production process. Occupational lung disease is one group of occupational diseases whose target organs are lung[9].

The textile industry PT X is a textile company engaged in yarn spinning production activities. This industry produces cotton dust which is a risk factor for lung function disorders.

The results of the initial survey conducted at 3 points in the spinning/textile spinning production area showed the highest working environment dust levels of 0.24 mg/m3 and the lowest 0.19 mg/m3 with an average of 0.21 mg/m3. This figure is above the threshold value (NAB) of work environment dust with the type of cotton in the workplace which is equal to 0.2 mg/m3.

Based on these problems the researchers aimed to determine the effect of work environment dust exposure on lung function disorders.

Materials and Method

This study used an observational analytic design. The research approach uses a cross sectional study[11]. This research was conducted from November 2017 to July 2018 on spinning workers in the textile industry. The workforce population is 96 workers. After sampling used purposive sampling techniques with inclusion and exclusion criteria, the number of samples was 35 workers. The inclusion criteria were female laborers, non-smokers, no history of pulmonary disease and wearing masks when working.

The independent variable in this study is exposure to work environment dust, while the dependent variable is obstructive, restrictive and mixed pulmonary function disorder. Measurement of work environmental dust levels carried out at 6 points of the spinning area measured using a Low Volume Sampler (LVS) tool. The measurement procedure for environmental dust is based on SNI 16-7058-2004 regarding measurement of total dust.

Disorders of pulmonary function disorders are classified into three namely obstructive, restrictive and mixed based on % FVC and % FEV1 measured using a spirometer. Spirometer is a tool used to determine the percentage of Forced Vital Capacity (FVC) and Forced Expiratory Volume/Expiration Volume that is forced in the first second (FEV1). Normal lung function if % FVC $\geq$ 80 % and % FEV1 $\geq$ 70 % and experience obstructive disorders if % FVC> 80 % and % FEV1 <70 %, restrictive interference if % FVC <80 % and % FEV1 $\geq$ 70 %, mixed interference if % FVC <80 % and % FEV1 <70 %.

Data analysis used univariate analysis to distribute respondent characteristics and bivariate analysis by spearman correlation test to find out the relationship between variables and to see the correlation strength of these two variables.

Results

The characteristics of the respondents consisted of the age at work and the exercise habits of the respondents. Table 1 shows the characteristics of respondents where the average age of respondents is 45.11 years, minimum

age is 22 years and maximum is 52 years. For the working period the respondents have worked for 25.91 years with a minimum work period of 3 years and a maximum of 30 years. For the distribution of exercise habits there are 7 respondents who have exercise habits and 28 people who do not exercise regularly.

Table 1. Characteristics of Workers in the Textile Industry Spinning Section

Variable	Minimum (Years)	Maksimum	Average
Age	22	52	45,11
Work Periode	3	30	25,91
	Routine	Not a routine	
Sports habits	7	28	35

Source: Primary Data, 2018

Table 2 shows the point of reference for environmental dust levels. The results of the measurement of the highest dust levels are located on the location of the winding with results of 0.665 mg/m3, and the lowest at the location of the ring frame with the results of 0.263 mg/m3 with an average work environment dust level of 0.395 mg/m3.

Table 2. Point and Results of Measurement of Work Environment Dust Level in the Textile Industry Spinning Section

Measuremet Points	Measurement Results	Average
Drawing	0,341	0,395
Blowing	0,370	
Ring Frame	0,263	
Carding	0,407	
Roving	0,321	
Winding	0,665	

Source: Primary Data, 2018

Table 3. Lung Capacity of Workers in the Textile Industry Spinning Section

Lung Fungction Capacity	N	%
Normal	27	77,14
Obstruktif	1	2,86
Restriktif	6	17,14
Mixed	1	2,86

Source: Primary Data, 2018

Table 3 contains pulmonary function disorders and it is known that the highest number of respondents is in normal conditions or there are no lung abnormalities, namely 27 respondents or 77.14%. Most pulmonary function disorders are in the type of restrictive disorders with the number of 6 respondents or 17.14%. For types of obstructive and mixed abnormalities, there is 1 respondent or 2.86% respectively.

Table 4 contains the results of statistical tests between work environment dust and obstructive, restrictive and mixed pulmonary function disorders getting p-value = 0.016 ($p < 0.05$) which means there is a significant relationship, and r = -0.403 with the direction of the relationship negative (-). This shows the significance of the work environment dust with obstructive, restrictive and mixed pulmonary function disorders with moderate levels of relationship. The direction of the negative relationship shows that the higher the level of dust in the work environment, the lower the value of FVC and FEV1 which are used as indicators to determine lung function disorders.

Table 4. Effect of Dust Content on Lung Function Disorders of the Textile Industry Spinning Section

Variabel	r	p-value
Work Environment Dust Level	-0,403	0,016
Dissorders of Lung fungction		

Source: Primary Data, 2018

Discussion

Measurement of work environment dust at 6 points at PT X obtained an average yield of 0.395 mg/m3. The measurement results for the whole point are above the NAB, which is 0.2 mg/m3 every 8 working hours per day for the type of cotton dust based on RI Permenaker No. 5 of 2018 concerning occupational safety and health in the work environment, attachment 3 NAB Chemical Factors[12]. Workers in the textile industry are at risk of lung dysfunction from exposure to cotton dust or cotton dust so as to cause the risk of disease. Of the total sample of 35 workers, the majority were in normal conditions namely 27 respondents (77.14%). The total workforce experienced pulmonary dysfunction 8 workers (22.86%). Most pulmonary function disorders are in the type of restrictive disorders with the number of 6 respondents or 17.14%. For types of obstructive and mixed abnormalities, there is 1 respondent or 2.86% respectively.

The mechanism of accumulating dust in the lungs begins with breathing, air containing dust enters the

lungs. Dust between 5-10 microns will be held by the upper respiratory tract, while 3-5 microns in size are held by the middle of the respiratory tract. Particles between 1 and 3 microns will be placed directly on the surface of the pulmonary alveoli. Particles measuring 0.1 micron are not so easily perched on the surface of the alveoli, because particles of this size are not easily deposited on the surface. Particles which have less than 0.1 micron in mass are too small, so they do not settle on the surface of the alveoli or lender membrane, because of Brown's movement, which causes such dust to move out of the alveoli[8].

Suma'murin 2014 also explained that exposure to cotton dust which continues for years causes irritation of the upper respiratory tract of the bronchi. After continued exposure chronic obstructive pulmonary disease can be interpreted the longer the working period, the more cotton dust settles in the respiratory tract, so that the more severe bisinosis disease that is suffered.

Republic of Indonesia Ministry of Health (2003), explained that dust can cause lung damage and fibrosis if it is inhaled during continuous work[13]. When the alveoli hardens, as a result it reduces elasticity in accommodating air volume so that the ability to bind oxygen decreases. To determine the effect of exposure to work environment dust and obstructive, restrictive and mixed pulmonary function disorders used the Spearman correlation test. Correlation test results show the results of the p-value of 0.016, which means that between the two variables shows a significant effect. according to research by Yulaekah where there is a relationship between dust exposure and lung function disorders, with the results of significance of 0.036, 0.020 and 0.002 which means that it has a significant relationship because the p-value <0.05. This result is also in accordance with research by Qian that there is a relationship between dust exposure and pulmonary function disorders[14,15].

In this study we found that there was a significant relationship between dust exposure and pulmonary function reduction, this result is consistent with the study conducted by Mohammadein et al and Said et al. Showed that there was a significant relationship between exposed workers dust with pulmonary function disorders where workers exposed to dust have a higher risk than those not exposed to dust[16,17].

Guyton as a person ages, pulmonary function will decrease. age is related to the aging process or increasing age where the older a person is, the more likely there is lung function capacity. Guyton and Hall explained that at the age of 20-40 years is the maximum muscle strength in a person and will be reduced by 20% after the age of 40 years. the older the age of a worker, the higher the risk of pulmonary function disorders[18,19].

The longer a person is at work, the more he has been exposed to the danger posed by the work environment, including exposure to cotton dust. RI Ministry of Health explained that chronic disorders occur due to exposure dust in a workplace that is quite high and for a long time

usually is annual and not infrequently the symptoms of lung function disorders appearafter more than 10 years of exposure.

A person's nutritional status influences a person's immune system to maintain health from being attacked by various diseases such as coughs, colds, diarrhea and also the body's ability to detoxify foreign bodies such as dust entering the body, which will automatically affect the function and performance of the lungs, which also interrupted[20]. one assessment of a person's nutritional status is by calculating the Body Mass Index .(Leone et al also explained that obesity is a very strong component of its influence and is associated with respiratory disorders[21].

Guyton and Hall, lung capacity can be influenced by a person's habit of exercising that someone who exercises regularly can increase blood flow through the lungs which will cause pulmonary capillaries to get maximum perfusion, so that oxygen can diffuse into the capillaries to the maximum[18].

Conflict of Interest: None

Source of Funding: None

Ethical Clearance: The study was approved by the ethical committee of Medicine Faculty Sebelas Maret University. All subjects were fully informed about the procedures and objectives of this study and each subject prior to the study signed an informed consent form.

Conclusion

Many factors in the textile industry that contribute to impaired lung function such as dust, years of service, age and exercise habits. one of the controls on these factors is the use of personal protective equipment in the form of masks according to the standard as a dust filter

References

1. P. Subbarao, P.J. Mandhane, M.R. Sears, Asthma: epidemiology, etiology and risk factors, CMAJ 181 (2009) E181–E190
2. S.A. Meo, A.M. AL-Dress, Lung function among nonsmoking Wheat flour mill workers, Int. J. Occup. Med. Environ. Health 18 (3) (2005) 246–251
3. American Lung Association State of Lung Disease in Diverse Communities 2010,www.lung.org/assets/documents/publications/solddc-chapters/ccupational.
4. H.R. Imbus, Clinical aspects of occupational medicine, in: Zenz Carl, O. Bruce Dickerson, P. Edward, J.R. Horvath (Eds.), Occupational Medicine, Mosby, London, 1994, p. 3.
5. M.N. Kolopp-Sarda, N. Massin, B. Gobert, et al., Humoral immune responses ofworkers occupationally exposed to wheat flour, Am. J. Ind. Med. 26 (1994)671–679
6. Altin R, Ozkurt S, Fisekci F, Cimrin A, Zencir M, Sevinc C. Prevalence of byssinosis and respiratory symptoms among cotton mill workers. Respiration. 2002;69(1):52–6
7. Hinson A, Schlünssen V, Agodokpessi G, Sigsgaards T, Fayomi B. The prevalence of byssinosis among cotton workers in the north of Benin. Int J Occup Environ Med. 2014;5(4):194–200
8. Braum, F. 1999. The New Public Health an Australian Perspective. Oxford: Oxford University Press.
9. Suma'mur, P. K. 2014. Industrial Hygiene and Occupational Health. Jakarta: CV SagungSeto.
10. ILO, 2013. Occupational Safety and Health, Means for Productivity. Jakarta: SCORE.
11. Notoatmojo, S. 2012. Health Promotion and Health Behavior. Jakarta : RinekaCipta
12. RI Decree No. 5 of 2018 concerning occupational safety and health in the work environment
13. Ministry of Health Republic of Indonesia. 2003. Guidelines for Advocating the Occupational Safety and Health Program. Jakarta: Health Promotion Center.
14. Yualekah, Siti. 2007. Exposure to Inhalation of Dust and Impaired Lung Function in Lime Stone Industry Workers (Thesis). Semarang: Diponegoro University
15. .Qian, Qing-Zeng, Xiang-Ke Cao, Qing-QiangQian, Fu-HaiShen, Qian Wang, Hai-Yan Liu, Jun-Wang Tong. Relationship of cumulative dust exposure dose and cumulative abnormal rate of pulmonary function in coal mixture workers. Kaohsiung Journal of Medical Sciences (2015)Vol xx, 1-6
16. Mohammadien, Hamdy A, Mona T. Hussein,Raafat T. El-Sokkary, Effects of exposure to flour dust on respiratory symptoms and pulmonary function of mill workers. Egyptian Journal of Chest Diseases and Tuberculosis (2013) Vol 62, 745–753
17. Said, Adel Mohammed, EmanBadawyAbdelFattah, Abd-Almonem Mohsen AlmawardiEffects on respiratory system due to exposure to wheat flour Egyptian Journal of Chest Diseases and Tuberculosis (2017) Vol 66, 537-548
18. Guyton, A., & Hall, J. 2008. Medical Physiology Textbook. Jakarta: EGC Medical Publisher
19. Sulfikar, T.L wardhani, C W H Putri, S Rahmah, F A Conterius, T Soewandi, and M Umakappa. Exposure to Inhalation of Dust and Impaired Lung Function in Lime Stone Industry. IRJES Workers (2015) Vol 4, 23-32
20. Almatsier, S. 2002. Basic Principles of Nutrition. Jakarta: PT. Gramedia Main Library
21. Leone N, Courbon D, Thomas F, et al. 2009. Lung Function Impairment and Metabolic Syndrome The Critical Role of Abdominal Obesity. (Am J Respir Crit Care Med 2009; 179:509-516)

Urine Serotonin in Sleep Deprivation Children

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Abstract

Background: Sleep deprivation can cause significant medical and behaviour morbidities. Many factors influenced sleep deprivation. One of the biological factors that influenced sleep deprivation was serotonin that was not clearly understood yet. 5-HIAA was serotonin metabolite, the increasement in urine reflect whole body serotonin increasement.

Objective: To analize correlation between urine serotonin and sleep deprivation. Method Cross sectional study was done in Airlangga I Elementary School Surabaya, Indonesia, subjects children 6- 10 years old. They were screened by The Children's Sleep Habits Questionnaire- Abbreviated (CSHQ-A) developed by Owen et al., to assess sleep deprivation. The same number children without sleep deprivation was taken as a control group. They were collecting 24 hours urine, then measured urine serotonin level (ELISA method). Data were analyzed with Chi- square test, and Spearman Correlation Test, significant p value<0.05.

Results: One hundred sixty four children were screened by CSHQ-A, 15% categorized as sleep deprivation. Fourteen children (90%) with sleep deprivation came from low socioeconomic family. There was no significant differences in urine serotonin level between children with and without sleep deprivation (p 0.933). There was weak correlation between sleep deprivation and urine serotonin level in subjects with low socioeconomic status (r 0.089).

Conclusion: No differences about urine serotonin in children with and without sleep deprivation. Children with poor socioeconomic family tend to have more sleep problems.

Keywords: *Urine serotonin, sleep deprivation, CSHQ-A, healthy children, low sosioeconomic.*

Introduction

Sleep deprivation can cause difficulties in social interaction, emosional control, irritability, behavioral problems, learning difficulties, motor vehicle crashes in teenagers, and poor academic performance, so it should be prevented.[1] Many ways to evaluate sleep problems, one of it is questionnaire. Although objective measures of children's sleep behavior produce highly reliable and valid data, the cost, time, and effort associated with these measures can also make them difficult to administer on a wide scale. Clinicians prefer to use questionnaires rather than polysomnography or actigraphy as tools for diagnosing sleep deprivation because of the effective time and cost, as well as the easy administration. One of the most commonly used sleep screening questionnaires for school-aged children is the Children's Sleep Habits Questionnaire (CSHQ), developed by Owens et al.[2] Biological factors that influenced sleep deprivation was serotonin. Serotonin (5-hydroxytryptophan, 5-HT) was the metabolyte of essential amino acid tryptophan.[3] Based on electrophysiological, neurochemical, genetic and neuropharmacological approaches, it is currently accepted that serotonin functions predominantly to

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promote wakefulness and to inhibit REM (rapid eye movement) sleep.[4,5] The main metabolyte of serotonin (5-hydroxyindolacetic acid dan 5-methoxyindoleacetic acid) was excreted in urine.[6] An increase in urinary 5-HIAA reflects an increase in serotonin metabolism throughout the body, the gut is the principal source of 5- HIAA. Both serotonin and 5- HIAA are influenced by dietary tryptophan[7] This study aimed to analize correlation between urine serotonin and sleep deprivation.

Material and Method

A cross sectional study was conducted between May 2018 until February 2019 in Airlangga I Elementary School Surabaya, East Java, Indonesia. Population of 6- 10 years old children who were registered as pupils in that school were screened. The CSHQ-A (NICHD SECCYD-Wisconsin) was used in this study, modified by Owen, to assess sleep deprivation. There were 5 points response scale (1= always, 5= never) and 22 questions. Retrospective method from parents/caregivers recalling on sleep pattern, disturbances, or behaviours (e.g., bed time, sleep behaviour, waking during the night, morning wake up) was used in this questionnaire. Items of the CSHQ-A were rated on a five point scale ranging from "always" if the sleep behaviour occured 7 time in the past week, "usually" if the behaviour occured 5-6 times in the past week, "sometimes" for 2 to 4 times that week, "rarely" for 1 time that week, and "never" for 0 time that week. A total score of more than 41 on CSHQ-A was taken as abnormal and indicative of sleep problem.[8,9] Inclusion criteria were the population that categorized as sleep deprivation due to CSHQ-A and parents fill informed consent for joining this study. The exclusion criteria were chronic disease that consumed long term medicine or hospitalized, include severe malnutrition, and uncomplete data of CSHQ-A. Drop out criteria was consuming medicine while urine collecting process. Characteristics were sex, age (6- 8 years old and 9-10 years old). Nutritional status was cathegorized as normal or moderate malnutrition based on CDC growth chart, percentage ideal body weight between 70 and 90 cathegorized as moderate malnutrition, 90 and 110 cathegorized as normal. Family income based on regional income, divided into low and high income. Family education were assessed from the latest parents education, cathegorized as low education (elementary school), medium if the parents latest education was junior high school, and high education for senior high school or academic. Children as sample were educated to collect 24 hours urine, submit about 30 cc of homogenated urine sample to laboratory, then run for quantitative urine serotonin level using ST/5-HT (Serotonin/5-Hydroxytriptamine) ELISA Kit from Elabscience.

Results

Of 164 children were screened for CSHQ-A, 25 children categorized as sleep deprivation. Excluded 9 students (1 ADHD, 1 history of asthma, 7 not signed informed consent), drop out 1 children because of fever and consumed paracetamol during 24 hours urine collecting. 15 children succeed to submit the collecting urine. 15 children from normal CSHQ-A score group as the second population, also submit the collecting urine.

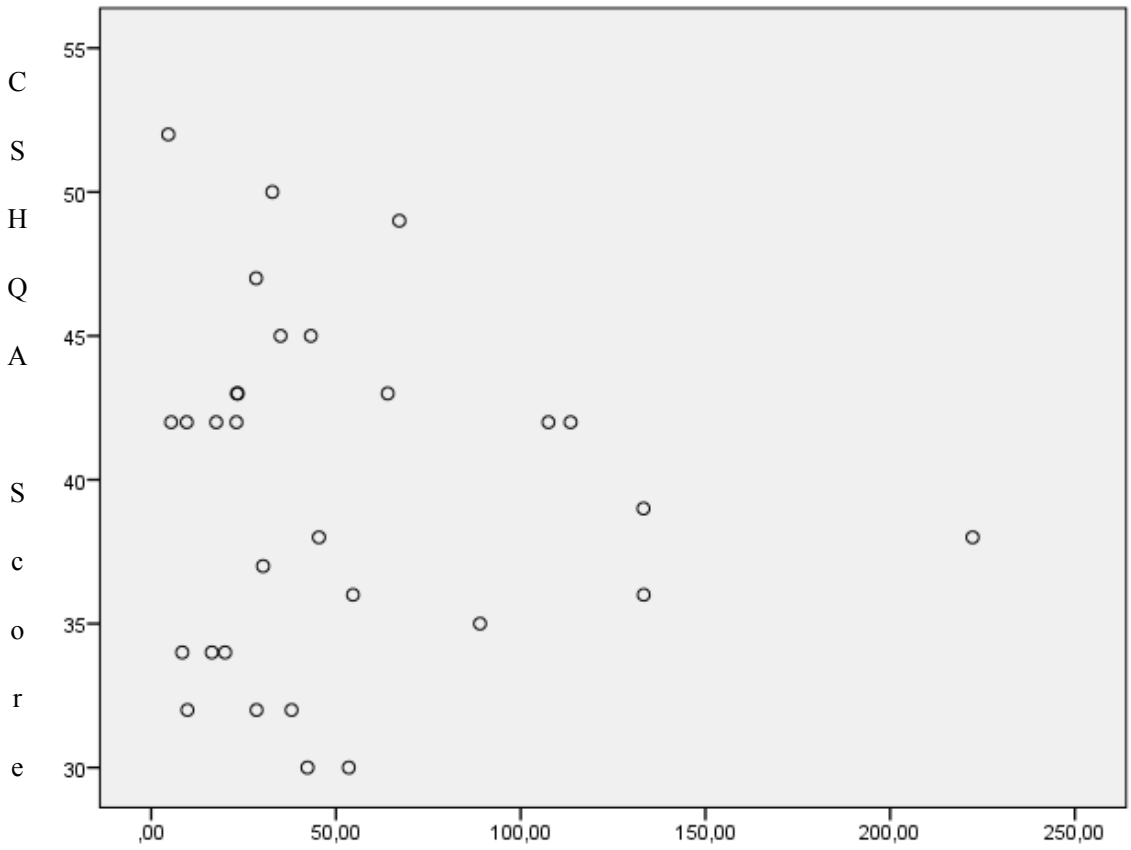
Table 1: Characteristics of subjects

Baseline Characteristics	Sleep Deprivation		%	p
	Yes	No		
Sex				
Male	7	10	56	
Female	8	5	43	0.461
Age, median (min-maks)	**9.5 (6-10) years old**			
Age (Years)				
6 - 8	3	10	43	
9 -10	12	5	56	1.448
Nutritional Status				
Normal	10	14	80	
Moderate Malnutrition	5	1	20	0.171

Baseline Characteristics	Sleep Deprivation		%	p
	Yes	No		
Socioeconomic Status				
Family Income				
High	1	11	40	
Low	14	4	60	0.273
Parents Education				
Low	2	0	6.6	
Moderate	9	5	46	
High	4	10	46	0.057

Table 2. Urine serotonin characteristics in children with and without sleep deprivation

Urine serotonin level (ng/mL)	Sleep deprivation (%)	No sleep deprivation (%)
<68	10 (33)	7 (23)
>68	5 (17)	8 (27)



Picture 1. Urine serotonin level in 6- 10 years old children with and without sleep deprivation

Table 3. Urine serotonin and CSHQ-A score characteristics in low socioeconomic subjects

CSHQ-A score	Urine serotonin level <68 (ng/mL)	Urine serotonin level >68 (ng/mL)
<41	3	1
>41	10	4

Table 4. Urine serotonin analysis in 6- 10 years old children

		Urine serotonin level (ng/mL)		P
		<68	**>68**	
Sleep Deprivation	Yes	10	5	*0,933
	No	7	8	
Total		**17**	**13**	

*Chi- Square test

Table 5. Correlation analysis for urine serotonin level to CSHQ-A score in low socioeconomic subjects

		Urine serotonin level (ng/mL)		P
		<68	**>68**	
CSHQ-A Score	<41	3	1	*0,726 (r 0,089)
	>41	10	4	
Total		**13**	**5**	

*Spearman correlation test

Discussion

Serotonin (5-HT) is a crucial neuromodulator, yet its role in behavior remains poorly understood. There was no significans differences urine serotonin level in children with and without sleep deprivation (p>0.05). Serotonin deficiency can cause sleep deprivation, but sleep deprivation itself can be caused by many reasons. Another study that developed an approach that reproducibly achieves near-complete elimination of 5-HT synthesis from the adult ascending 5-HT system, discovered that adult 5-HT deficiency led to a novel compound phenotype consisting of hyperactivity, disrupted circadian behavior patterns, and elimination of siestas, a period of increased sleep during the active phase.[10] Previous study reveal that the serotonergic raphe nuclei with their widespread cortical projections are part of the monoaminergic wake promoting system. Accordingly, cortical serotonin levels are high during wakefulness, reduced during Slow Wave Sleep (SWS), and virtually quiescent during rapid eye movement sleep. During sleep deprivation the serotonin release is even higher than during the previous wake period, as animal findings suggest. Elevated serotonin levels have been measured in the hippocampus of sleep deprived rats and even during the subsequent recovery period.[11] Serotonin does not cross the blood-brain barrier, so all central 5-HT must be synthesized locally in the neuron. Serotonin is synthesized from the neutral amino acid L-tryptophan (TRP), which is readily available from the diet. Tryptophan is highly protein-bound, leaving only 5% available for transport through the blood-brain barrier into the brain. The free TRP level depends on the balance of dietary intake and its depletion by liver for protein synthesis.[12] Previous studies have showed a correlation between central nervous system neurotransmitter activity and urinary transmitter output. The study using rats as the objects, analized the effects of oral ingestion of the serotonin precursor, 5-hydroxytryptophan (5-HTP), on specific brain regions. Serotonin levels were measured using brain tissue immunoreactivity and urinalysis. Maximum serotonin immunoreactivity in the serotonergic dorsal raphe nucleus reached within 2 hours of administration. Urinary analysis of serotonin, 5-HTP, and 5-hydroxyindolacetic acid (the major metabolite of serotonin) showed the changes observed in immunoreactivity, suggesting a positive correlation between CNS and urinary serotonin levels.[13] A study that measuring serotonin levels in platelets results in a very strong correlation with levels in CSF, so in most cases platelet measurements will be preferable since it is much less invasive to collect. Levels of serotonin in plasma and urine are significantly but less strongly correlated with levels in CSF. [14]

Sleep deprivation in this study was shown in 15% population of healthy children age 6- 10 year old. Almost half of the sleep deprivation population come from low socioeconomic family. Shown in this study there was weak correlation of urine serotonin level and sleep deprivation in children from family with low socioeconomic status (r 0.089). A related study

found that the socioeconomically disadvantaged have higher likelihood of sleep complaints. They also found differing effects of employment on sleep complaints by gender. Poor sleep quality is strongly associated with poverty and race. Socioeconomic variables are related to sleep complaints in general (greater socioeconomic status is associated with less sleep complaints) but the specifics of this relationship are complex.[15,16] From previous study indicated that adolescents living in lower socioeconomic conditions experienced significantly poorer sleep outcomes in terms of the timing, duration, and regularity across the week. Although we controlled for the number of medical and psychiatric conditions; however, it is possible that living in lower socioeconomic status conditions is associated with the development of medical conditions that affect sleep and/or sleep disorders. The chaos of poverty might lead to emotional and physical health problems that in turn negatively affect sleep.[17]

The limitation of this study was few sample so the results could not be generalized to population. Other factors that influenced serotonin level could not be controlled in this study. But aplication of urine as a sample that less invasive to collect can be a superiority for this study.

Conclusion

There was weak correlation between urine serotonin level and sleep deprivation in healthy children. Children with low socioeconomic status tend to be sleep deprivation.

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Ethical Clearance: This study was approved by medical researched ethical committee Dr. Soetomo General Hospital Surabaya No. 67/Panke. KKE/IV/2018.

References

1. Carter KA, Hathaway NE, Lettieri CF: Common sleep disorders in children. Am Fam Physician. 2014;89(5): 368-77.
2. Markovich AN, Gendron MA, Corkum PV: Validating the Children's Sleep Habits Questionnaire against polysomnography and actigraphy in school-aged children. Frontiers in Psychiatry. 2015;188: 1-10.
3. Keszthelyi D, Troost FJ, Masclee AA: Understanding the role of tryptophan and serotonin metabolism in gastrointestinal function. Neurogastroenterol Motil. 2009;21: 1239–49.
4. Monti JM: Serotonin control of sleep-wake behavior. Sleep Med Rev. 2001;15: 269–81.
5. Malow BA: Sleep disorders, epilepsy, and autisme. Ment Retard Dev Disabil Res Rev. 2004;10: 122–5.
6. Chojnacki C, Kapica W: Serum and ascitic fluid serotonin levels and 5- hydroxyindoleacetic acid urine excretion in the liver of cirrhotic patients with encephalopathy. Advances in Medical Sciences. 2013;58(2): 251–6.
7. Sparrow D, Connor G, Young JB, Rosner B, Weiss S: Relationship of urinary serotonin excretion to cigarette smoking and respiratory symptoms. The normative aging study. Chest. 1992;101: 976-80.
8. Owens JA, Spirito A, McGuinn M: The Children's Sleep Habits Questionnaire (CSHQ): psychometric properties of a survey instrument for school-aged children. Sleep. 2000;23: 1043–51.
9. Irwanto, Rehatta NM, Hartini SR, Takada S: Sleep problem of children with autistic spectrum disorder assessed by Children Sleep Habits Questionnaire-Abbreviated in Indonesia and Japan. Kobe J. Med. Sci. 2016;62: 22–6.
10. Whitney MS, Shemery MA, Yaw AM, Donovan LJ, Glass JD, Deneris ES: Adult brain serotonin deficiency causes hyperactivity, circadian disruption, and elimination of siestas. The Journal of Neuroscience. 2016;36(38): 9828-42.
11. Elmenhorst D, Kroll T, Matusch A, Bauer A: Sleep deprivation increases cerebral serotonin 2A receptor bonding in humans. Sleep. 2012;35: 1615-23.
12. Pyle AC, Argyropoulos SV, Nutt DJ: The role of serotonin in panic: evidence from tryptophan depletion studies. Acta Neuropsychiatrica. 2004;16: 79-84.
13. Ailts J, Ailts D, Bull M: Urinary neurotransmitter testing : myths and misconceptions. NeuroScience, Inc. 2007; 1-6.

14. Audhya T, Adams JB, Johansen L: Correlation of serotonin level in CSF, platelets, plasma, and urine. Biochimica et Biophysica Acta. 2012; 1820: 1496-501.
15. Grandner M, Patel NP, Gehrman PR, Xie D, Sha D, Weaver T, Gooneratne N: Who Gets the Best Sleep? Ethnic and Socioeconomic Factors Related to Sleep Complaints. Sleep Med. 2010;11(5): 470-8.
16. Patel NP, Grandner MA, Xie D, Branas CC, Gooneratne N: Sleep disparity in the population : poor sleep quality is strongly associated with poverty and ethnicity. BMC Public Health. 2010;10: 475.
17. Marco CA, Wolfson AR, Sparling M., Azuaje A: Family socioeconomic status and sleep pattern of young adolescents. Behav Sleep Med. 2011; 10(1): 70-80.

Assessing Demographic Distribution of Dengue Infections in Seremban District, Malaysia

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Abstract

This study aims to assess the trends of dengue incidence and socio-demographic characteristics of reported dengue cases in Seremban district, Malaysiaduring the last decade. Secondary dataon reported dengue cases during 2003-2011 were collected fromthe District Health Office, Seremban. Trend analysis was conducted to assess the status of dengue incidence and demographic distribution of the disease in the district. Annual incidence rates of the disease were also calculated and compared. The district experienceda total of 11,936 dengue infections during 2003-2011. It was found that majority of the reported cases were among the Malays (62%), followed by Chinese (17%) and Indians (15%). The age-specific incidence rate was highest in young adult and adult group (15-44 years), followed by middle-age group (45-59 years). The analysis also revealed that majority of the reported cases (on average, 79% per year) came from urban areas of the district which highlights the fact that dengue is still an urban public health problem in Seremban. The study findings provide the critical data and information on trends of dengue incidence andsocio-demographic characteristics of reported dengue cases which might assistthe public health authorities to achieve dengue mortality and morbidity reduction goals in the district.

Keywords: *Dengue incidence, demographic distribution, Seremban, Malaysia.*

Introduction

Dengue is a mosquito-borne viral infection which can be caused by one of the four antigenically distinct dengue viruses namely, DENV-1, DENV-2, DENV-3, and DENV-4[(1- 3)]. From the clinical perspective, a dengue infection is usually classified as dengue fever (DF), dengue hemorrhagic fever (DHF) or dengue shock syndrome (DSS) according to severity of the disease[(4)]. The dengue infection usually begins with a sudden onset of high fever, a severe frontal headache, pain behind the eyes, muscle and joint pains, nausea, vomiting, and rash [(5,6)]. The infection can manifest as DHF or DSS with plasma leakage, severe abdominal pain, respiratory distress, spontaneous bleeding, rapid breathing, fatigue, hypotension and organ impairment [(7)].Currently, there is no specific medication for DF/DHF[(8,9)]. The patients are treated with paracetamol, oral rehydration and IV fluids in order to maintain the volume of the patient's body fluid[(10)]. Moreover, the patient suffered from DHF or DSS is considered a medical emergency and requires hospitalization in intensive care unit.[(10,11)]

Dengueis found in tropical and sub-tropical regions

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around the world, mostly in urban and semi-urban areas[12,13]. In recent years, dengue has become a major international public health concern in terms of morbidity and economic impact [14]. The disease is now endemic in 124 countries of the world and all four dengue viruses are circulating in poor and developing countries in Asia, Africa and the Americas[15- 18].WHO currently estimates that there is 50-100 million dengue infections worldwide each year, 500,000 cases of DHF, and about 2.5% of whom die [19].Southeast Asia and the Western Pacific regions are particularly vulnerable to dengue due to rapid urbanization and high densities of dengue vector[20]. Recently, DHF has become a leading cause of hospitalization and death among children in most of the Asian countries [12]. Approximately, 200,000 dengue cases have been reported annually during the last decade in Asia Pacific region[21].

Currently, DF is one of the major public health problems in Malaysia[22,23]. The incidence of DF and DHF in Malaysia has increased steadily during the last decade [24]. The disease is predominant in urban areas where majority of the country's total population resides [25]. Seremban is one of the highly affected districts by dengue infections in Malaysia. However, the ongoing burden of the disease in the district is not well studied. This study aims to assess the trends of dengue incidence in Serembanduring the last decade. It also analyses the socio-demographic characteristics of the reported dengue cases in the district. To our knowledge, this study is an important academic attempt to examine the burden of dengue from socio-demographic perspectives that might be helpful in policy and decision making for sustainable public health in Malaysia.

Material and Method

Seremban is one of the seven districts of the Malaysian state of Negeri Sembilan. It is the capital of the state and one of the most affected districts by dengue infections in Malaysia. The hot and humid climate of Seremban is favourable for Aedes mosquitoes to breed and survive. Moreover, rapid urbanization, infrastructure development, very active construction sector for housing and commercial buildings in the district play important role in transmission and outbreaks of dengue.We conducted a retrospective secondary-data based study and collected annual data on reported cases of DF and DHF and patients' socio-demographic information in Seremban during 2003- 2011. Reported cases included all the clinically diagnosed and laboratory-confirmed cases notified to public health authority in the district. Data were extracted from record of the District Health Office, Seremban. Trend analysis was conducted to assess the status of dengue incidence from 2003 to 2011. Annual incidence rates were also calculated and compared for the nine-year period. Summary descriptive statistics (viz. summation, mean, frequency, ratio and percentage) were applied to analyze socio-demographic characteristics of reported dengue cases.

Results and Discussions

Annual Incidence of Dengue: Figure 1 shows the annual number of dengue (including DHF) cases in Seremban between 2003 and 2011. The findings suggest that dengue incidence has followed a cyclical pattern (i.e. down-up-down-up) during the last decade. However, a total of 11,946 dengue cases were reported in the district over a 9-year period. Incidence rate of dengue in Seremban is also shown in figure 1. The findings showed a great variation in yearly incidence rate of the disease during the last decade. The highest incidence rate (443.60 cases per 100,000 populations) was observed in the year 2003 while the lowest incidence rate was 97.07 cases per 100,000 populations in 2011.

Distribution of Cases by DF and DHF: Table 1 shows the distribution of dengue cases by DF and DHF and incidence rate per 100,000 populations in Seremban between 2003 and 2011. It was found that out of the total 11,946 reported cases, 11,288 (95%) were DF with the remaining 648 (5%) being DHF. It was also found that the number of DF cases was substantially higher than that of DHF in each year during the last decade. The findings indicate that annual incidence rate of DF in every 100,000 populations was substantially greater (the range of 91.45-421.31)than that of DHF (the range of 5.62- 22.61) between 2003 and 2011. The DF/DHF ratios also reveal that DF was the predominant type of dengue illness in the district over the last 9 years. The predominance of DF over DHF in the district was observed to be the greatest (45.5: 1) in the year 2004 and the smallest (8.9: 1) in 2009.

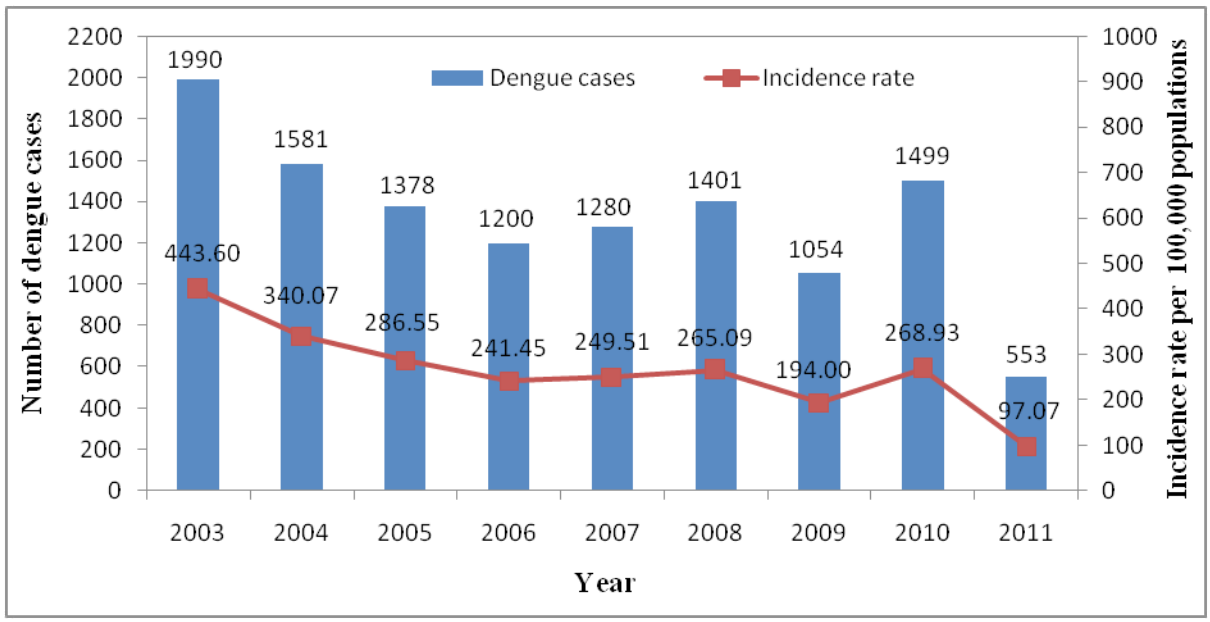

Figure 1: Number of dengue cases and incidence rate in Seremban

Table 1: Distribution of cases and incidence rate by DFand DHF in Seremban

Year	Number of dengue cases		Incidence rate per 100,000 populations		Ratio (DF/DHF)
	DF	DHF	DF	DHF	
2003	1890	100	421.31	22.29	18.9: 1
2004	1547	34	332.76	7.31	45.5: 1
2005	1335	43	277.61	8.94	31.1: 1
2006	1123	77	225.96	15.49	14.6: 1
2007	1201	79	234.11	15.40	15.2: 1
2008	1350	51	255.44	9.65	26.5: 1
2009	948	106	174.49	19.51	8.9: 1
2010	1373	126	246.32	22.61	10.9: 1
2011	521	32	91.45	5.62	16.3: 1

Distribution of Dengue Cases According to Sex: Table 2 presents the distribution of dengue cases and incidence rate per 100,000 populations based on sex in Seremban for the period of 2003-2011. Of the total cases reported in the district over the nine years period, 7305 (61%) were males and 4631 (39%) were females. It can be also seen that majority of the reported cases per year were consistently male in the district between 2003 and 2011. Moreover, the findings indicate that the annual number of male cases in every 100,000 populations was greater than that of female cases in the district during the last decade. However, there was a great variation in yearly incidence rate of dengue in both male and female population. The ratio of male cases to female cases (i.e. male: female) ranged from 1.4: 1 to 2.1: 1 (table 2). The male/female ratios also reveal that there was a consistent trend of males having a higher incidence of dengue as compared to females.

Distribution of Dengue Cases Based on Ethnicity: The distribution of dengue cases by ethnic group in Seremban between 2003 and 2011 is shown in figure 2. The findings revealed that while all ethnic groups were infected by the disease, the majority of the reported DF/DHF cases were among the Malays. It can be seen that the Malays constituted, on average, 62% of notified cases per year in the district during the last decade. The data show that the Chinese had the second highest proportion of dengue incidence in the district. This ethnic group shared, on average, 17% of the yearly

reported cases for the period of 2003-2011. The Indians constituted an average of 15% of the annual reported cases of dengue during the last decade. The other groups shared the smallest portion (on average, 6%) of annual dengue incidence in the district. Majority of the dengue cases under the other groups were foreign workers mainly from Indonesia, Bangladesh and Nepal.

Table 2: Distribution of dengue cases and incidence rateaccording to sex in Seremban

Year	Number of dengue cases		Incidence rate per 100,000 populations		Ratio (Male/ Female)
	Male	Female	Male	Female	
2003	1144	846	494.81	389.32	1.4: 1
2004	936	645	390.65	286.16	1.5: 1
2005	833	545	336.02	233.91	1.5: 1
2006	770	430	300.43	178.65	1.8: 1
2007	868	412	327.92	165.93	2.1: 1
2008	934	467	342.50	182.49	2.0: 1
2009	625	429	222.97	163.12	1.5: 1
2010	874	625	304.11	231.48	1.4: 1
2011	321	232	109.52	83.88	1.4: 1

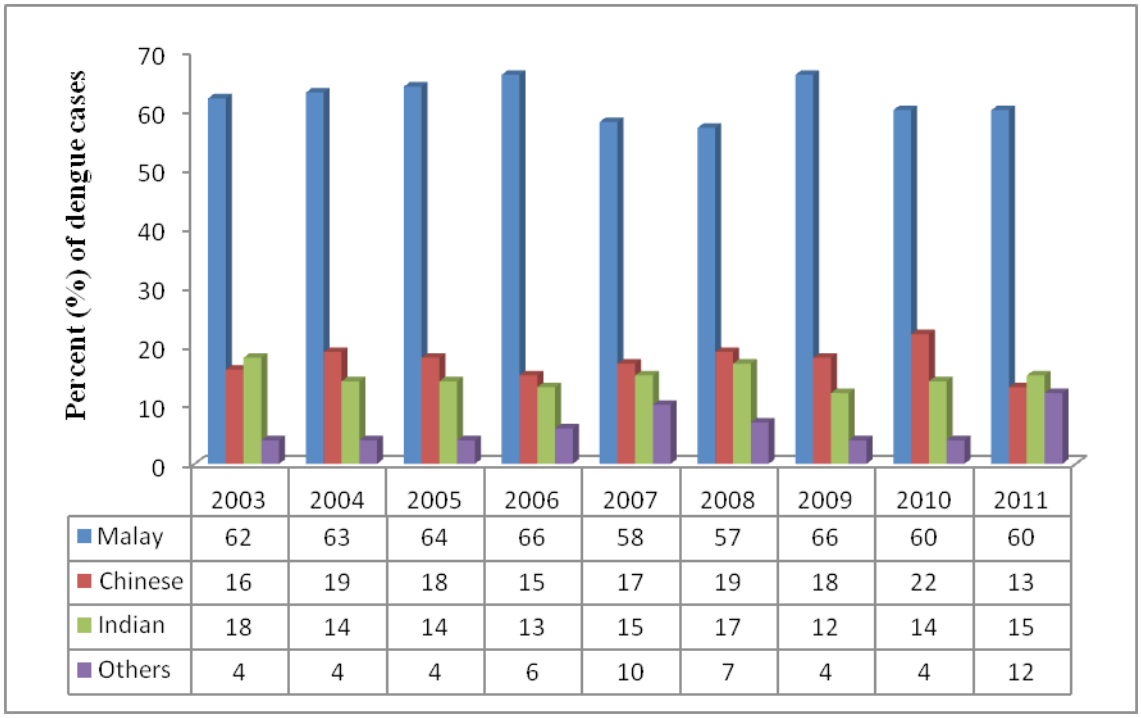

Figure 2. Distribution (%) of dengue cases based on ethnicity in Seremban

Distribution of Dengue Cases Based on Locality: The distribution of dengue cases according to locality in Seremban for the period of 2003-2011 is presented in figure 3. The findings reveal that dengue cases were more prominent in urban areas of the district during the last decade. The percentage of cases reported from the urban areas ranged from 62% to 98% highlighting the predominance of the disease in urban localities of the district. The highest predominance (98%) of urban incidence of dengue in the district was observed in the year 2011.

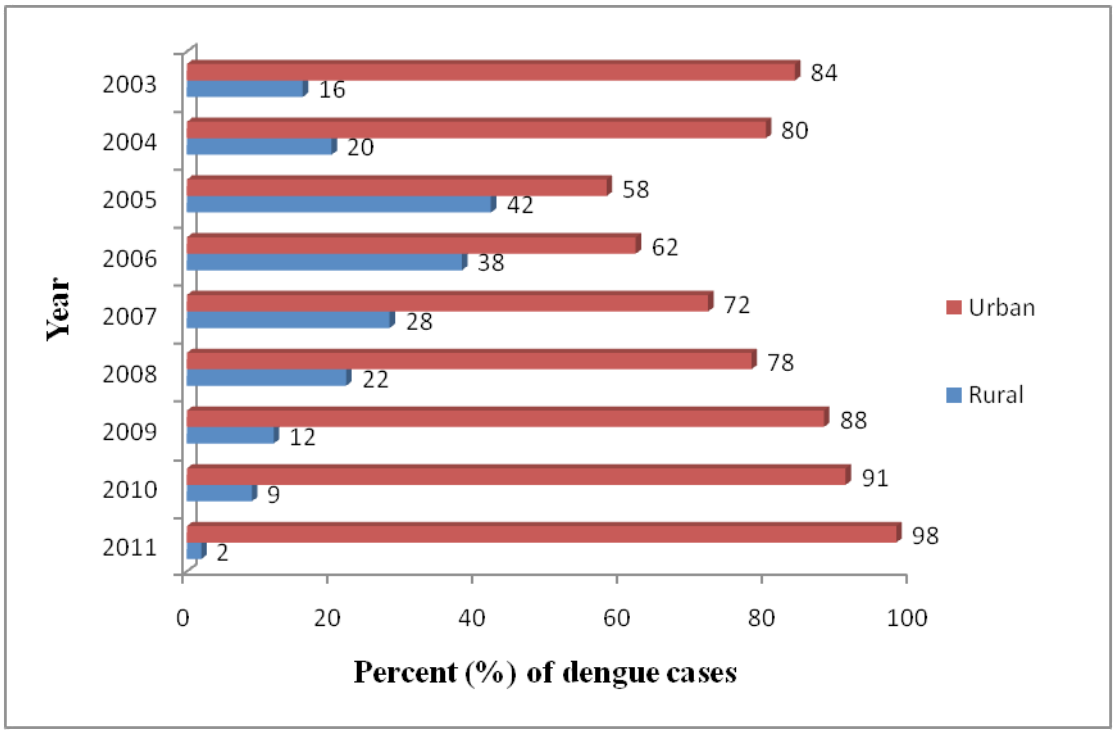

Figure 3. Distribution (%) of dengue cases based on locality in Seremban

Distribution of Dengue Cases According to Age: Table 3 depicts the distribution of dengue infections according to age of the reported cases in Seremban between 2003-2011. It can be seen that the children (0-14 years) contributed 15% (1,759 cases) of total reported cases in the district during the last decade. The analysis shows that the adult (15-44 years) had the highest portion (64%) of dengue incidence in the district. However, the middle-age group (45-59 years) constituted 16% of total reported dengue cases in the district. On the other hand, the proportion of dengue infections among older people (60 years and above) was significantly low (5% of total reported cases).

Table 3: Distribution of dengue cases based on age in Seremban

Year	Age Group								Total
	0-14 years		15-44 years		45-59 years		60 & above		
	Dengue cases	(%)	Dengue cases	(%)	Dengue cases	(%)	Dengue cases	(%)	
2003	390	20%	1,280	64%	243	12%	77	4%	1,990
2004	283	18%	1,025	65%	206	13%	67	4%	1,581
2005	215	15%	852	62%	245	18%	66	5%	1,378
2006	175	14%	754	63%	229	19%	52	4%	1,210
2007	169	13%	846	67%	201	15%	64	5%	1,280
2008	173	12%	877	63%	260	19%	91	6%	1,401
2009	114	11%	685	65%	184	17%	71	7%	1,054
2010	165	11%	984	66%	269	18%	81	5%	1,499
2011	75	14%	384	69%	71	13%	23	4%	553
Grand Total	1,759	15%	7,687	64%	1,908	16%	592	5%	11,946

Conclusion

The present study investigates the trends of dengue incidence and socio-demographic distribution of the disease in Seremban, Malaysia between 2003 and 2011. The study found that among the three major ethnic groups in the district, the Malays were the most commonly affected, followed by Chinese and Indians. While dengue affects all age group, incidence rate of dengue was highest in the young adult and the adult group (15-44 years), followed by the middle-age group (45-59 years). It was also found that dengue cases were more prominent in urban areas of the district during the last decade(on average, 79% per year).It highlights the fact that dengue is still an urban public health problem in Seremban. The findings of this study provide critical data and information on the trends of dengue incidence and socio-demographic characteristics of the reported dengue cases which might assist the public health authorities to achieve dengue mortality and morbidity reduction goals in the district. The public health authorities in the district should enhance integrated surveillance activities in this regard.

Conflicts of Interest: The authors declare that there is no conflict of interest among them.

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Ethical Clearance: The study was approved by the Medical Research Ethics Committee (MREC), Ministry of Health, Malaysia (MREC Code No. NMRR-11-730-9099).

References

1. Webster DP, Farrar J, Rowland- Jones S.Progress towards a dengue vaccine. Lancet Infect Dis. 2009; 9: 678- 687.
2. Eisen L, Beaty BJ, Morrison AC, Scott TW. Proactive vector control strategies and improved monitoring and evaluation practices for dengue prevention. J Med Entomol. 2009; 46(6): 1245-1255.
3. Guzman A, Isturiz RE. Update on the global spread of dengue. Int J Antimicrob Agents. 2010; 36S: S40-S42.
4. Kongsin S, Jiamton S, Suaya JA, Vasanawathana S, Sirisuvan P, Shepard DS. Cost of dengue in Thailand. Dengue Bull. 2010; 34: 77- 88.
5. Potts JA, Rothman AL. Clinical and laboratory features that distinguish dengue from other febrile illnesses in endemic populations. Trop Med Int Health. 2008; 13(11): 1328-1340. doi: 10.1111/j.1365-3156.2008.02151.x
6. TsengWC, Chen CC, Chang CC, Chu YH. Estimating the economic impacts of climate change on infectious diseases: a case study on dengue fever in Taiwan. Clim Change. 2009; 92: 123- 140. doi: 10.1007/s10584-008-9437-6.
7. Harving ML, Ronsholt FF. The economic impact of dengue hemorrhagic fever on family level in Southern Vietnam. Dan Med Bull. 2007; 54(2): 170-172.
8. Whitehorn J, Farrar J. Dengue. Braz Med Bull. 2010; 95: 161- 173.
9. Alexander N, Balmaseda A, Coelho ICB, Dimaano E, Hien TT, Hung NT, et al. Multicentre prospective study on dengue classification in four South-east Asian and three Latin American countries. Trop Med Int Health. 2011; 16(8): 936-948. doi: 10.1111/j.1365-3156.2011.02793.x
10. World Health Organization [WHO]. Dengue: guidelines for diagnosis, treatment, prevention and control- New edition. Geneva: WHO; 2009a.
11. Guha-Sapir D, Schimmer B. Dengue fever: new paradigms for a changing epidemiology. Emerg Themes Epidemiol. 2005; 2(1):1. Doi: 10.1186/1742-7622-2-1. Available from: http://www.ete-online.com/content/2/1/1.
12. World Health Organization [WHO]. Dengue and dengue haemorrhagic fever. Fact Sheet No. 117. Geneva: WHO; 2009b.[Cited 2011Oct]. Available from: http://www.who.int/mediacentre/facsheets/fs117/en/.
13. Halasa YA, Shepard DS, Zeng W. Economic Cost of Dengue in Puerto Rico.Am J Trop Med Hyg. 2012; 86(5): 745-752.
14. Gubler DJ. The Economic Burden of Dengue. Am J Trop Med Hyg. 2012; 86(5): 743-744.
15. Nathan MB, Dayal-Drager R. Recent epidemiological trends, the global strategy and public health advances in dengue. Working Paper 3.1, Report of the Scientific Working Group meeting on Dengue, 2006. Special programme for

Research & Training in Tropical Diseases (TDR). Geneva: WHO; 2006. Available from: http://www.who.int/tdr.

16. Beatty ME, Stone A, Fitzsimons DW, Hanna JN, Lam, SK, Vong S, et al. Best Practices in Dengue Surveillance: A Report from the Asia-Pacific and Americas Dengue Prevention Boards. PLoS Negl TropDis. 2010; 4(11): e890. Doi: 10.1371/journal.pntd.0000890.
17. Gubler DJ, Clark GG. Dengue/dengue hemorrhagic fever: the emergence of a global health problem. Emerg Infect Dis. 1995; 1: 55-57.
18. Luz PM, Vanni T, Medlock J, Paltiel AD, Galvani AP. Dengue vector control strategies in an urban setting: an economic modelling assessment. Lancet. 2011; 377: 1673-1680.
19. WHO Western Pacific Regional Office [WPRO]. Dengue. Fact Sheet. Manila: WPRO; 2012. [Cited 2012March]. Available from: http://www.wpro.who.int/mediacentre/factsheets/fs_09032012_Dengue/en/index.html.
20. Suaya JA, Shepard DS, Chang MS, Caram M, Hoyer S, Socheat D, et al. Cost-effectiveness of annual targeted larviciding campaigns in Cambodia against the dengue vector Aedes aegypti. Trop Med Int Health. 2007; 12(9): 1026-1036. doi: 10.1111/j.1365-3156.2007.01889.x
21. Arima Y, Matsui T. Epidemiologic update of dengue in the Western Pacific Region, 2010. Western Pac Surveill Response J. 2011; 2(2). doi: 10.5365/wpsar.2011.2.2.005
22. Teng AK, Singh S. Epidemiology and New Initiatives in the Prevention and Control of Dengue in Malaysia. Dengue Bull. 2001; 25: 7-14.
23. Ministry of Health [MoH], Malaysia. Health Facts 2010 Malaysia.Putra Jaya: Planning and Development Division, MoH, Malaysia; 2011. MOH/S/RAN/01.11(AR).
24. Azami NAM, Salleh SA, Neoh H-min, Zakaria SZS, Jamal R. Dengue epidemic in Malaysia: Not a predominantly urban disease anymore. BMC Res Notes. 2011; 4: 216. doi: 10.1186/1756-0500-4-216.
25. Second National Communication [NC2], Malaysia. The report submitted to the United Nations Framework Convention on Climate change (UNFCCC). Putra Jaya: Ministry of Natural Resources and Environment (NRE), Malaysia; 2011. Available from: http://www.nc2.nre.gov.my

The Contribution of Learned Helplessness to the Results of Some Evaluation Tests for the Athletes of the Talent Care Centers

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Abstract

The study aimed to identify the level of the learning Helplessness and the numerical values of the results of some evaluation tests for football talent care centers players, and to identify the extent to which the learning deficit contributed to the results of some of their evaluation tests. Talent care centers at the Ministry of Youth and Sports and the Amo Baba School for the season (2018-2019), aged (15-17) years, numbering (84) players were randomly selected by (45.405%) of their community. Evaluating tests from the two centers, and conducting the study over (9) consecutive weeks, for the period from Friday, 11/1/2019, until Friday, 8/3/2019,Scale data and evaluation tests were then collected for each gifted player from the sample application and processed quantitative data using SPSS (V25) .The researchers concluded that football talent players do not have a high level of learning disability, and that the level of gifted players Convergent in each of the four assessment tests (transitional speed, eye-to-man compatibility, scoring from stability to divided goal, accuracy of scoring towards the goal), and correlates, contributes and influences the learning deficit of all four assessment tests (transition speed, Compatibility between the eye and the man, scoring stability towards the goal divided, the accuracy of the scoring towards the target), it is possible to predict the tests evaluation of the four (transition speed, compatibility between the eye and the man, scoring stability towards the goal divided, the accuracy of scoring towards the target) in terms of the learner deficit.

Keywords: *Evaluation Tests, Care Centers, Transition speed.*

Introduction

The research problem and its importance: The National Football Talent Care Center aims to develop the talents abilities to prepare a strong base of players to provide the elite of them to the various Premier League clubs and the national team to enhance their leadership in the local and international competitions. Performing tests by the players of these centers at different levels requires physical and psychological preparation, their environment in these centers is characterized by multiple attitudes or many duties lies on the talented player and exaggeration with him to complete the best and when he fails to increase the state of attribution to the conditions that earns learned helplessness.

Cemaicilar & Others mentioned that "according to the original model of the learned helplessness theory of Seligman and Miller, Learner helplessness appear when the individual have an the inability to control experiences firstly, and learns that the experience results impede the control, then generalize this belief to new situations that generation many of difficulties. In the initial research on the learning helplessness of the human showed that he learns to avoid loud voice, and avoid the tasks of solving various problems, and intelligence tests, the learned helplessness model used to give meaning of a variety of adaptive failing behaviors as disorder (motivation, cognitive, emotional, behavioral)[13].

The formation of groups of these talented people and their atlantesand their different social environments pushes them to some self-proof behaviors among themselves, which is clear in the bullying of each other, and that the bullying behavior acquired by the talent

person for many reasons leads to some practices that harm his peers psychologically and physically during their presence in the center. This can also be reflected on the groups leadership, which calls tocaringofthese phenomena in terms of their contribution and their impact on the results of evaluation tests approved by the trainer periodically, it cannot be ignored the importance of psychological phenomena when conducting the evaluation tests, especially their application is an ongoing process, one of the most important principles that avoid random trainers and improvisation when judging the planning of their training in the center, as the evaluation process which based on measurement, and it is a complementary process through the researchers' repeated visits to the National Center for football talent care players is one of the leading projects in the Iraqi Ministry of Youth and Sports, notice that the effects of the surrounding environment of this group of talented people show many psychological phenomena that need to be described accusation and objectively to address or develop the solutions to them, including the learning helplessness, which is characterized by most players as a preliminary observation by the researcher which came after deliberation with their coaches without measuring of this phenomenon which are caused by several reasons, including exaggerating with the tasks and duties that may lead them to sense of weakness in the ability to implement some or fail to complete and which may affectionthe results of evaluation tests, Learned Helplessness is defined as a "motivation problem" because a person may fail in one or more tasks in the past, which may result a belief that he is unable to do anything to improve his performance in these tasks. This feel may accompany it at all stages of his life stages if not treated properly, and will generation a sense of weakness in his ability to control his environment, which will impedes his learning in other situations of his life, and therefore this misconception about self it leads to the conviction that no matter how he tries to change the failures situations he faced in previous stages, he will not succeed because he is unable to make any improvement and change, and that these erroneous cognitive accumulations which created by the individual about himself will lead to the formation of a cognitive emotional state, termed as an learned helplessness case[1].In order to adapt the learned state as well as indifference of the duties, and the researcher review to some of the specialized studies in different fields, and concerned with their study noted the need first to develop instruments measuring psychometric and codified take into account their specificity of direct measurement which derives data from this same sample, Which is one of the determinants of preparation or construction is that it must be appropriate to their perceptions and the extent of their response to its paragraphs, and is characterized by easy application and correction, to support the observation of this problem academically and then addressed by the adoption of scientific method later, so the study aims to:

1. Identify the level of the players of talent care of football centers with the learned helplessness.
2. Identify the numerical values of the results of some evaluation tests for the players of talent care of football centers.
3. To identify the extent of the contribution of the learned helplessness results of some evaluation tests for the players talent care football centers.

Research Methodology

The researchers adopted the correlation research method from the descriptive method, which is defined as

"The kinds of researches that can detect whether there is a relationship between two or more variables, and then know the strength and direction of this relationship." [12]

The Research population and its sample: The boundaries of the research population are represented by talented football players in the talent care centers at the Ministry of Youth and Sports and Amo Baba School for the season (2018-2019), with ages (15-17) years, of (185) players, the researcher review their study and being the problem population of the study themselves, and they achieve their purposes in sequential methodological steps, the sample selected by random method of (84) players representing (45.405%) of the research population. The procedures concerned its players to applying the two measurements for the purposes of standardization and evaluation tests.

Measurement tools and procedures: - The researchers adopted the measure of learned helplessness, which was based on (Ali Hamad Samir 2019) [2] on (91) members of the same research population as shown in Table (1):

Table (1) shows the details of the structure of the learned helplessness measurement

Fields	Paragraphs number	Alternatives of answer paragraphs	correction Key	Total Degree Limits	Hypothetical mean
Payer deficit	8			24-8	16
Cognitive deficits	8			24-8	16
Emotional deficit	8			24-8	16
Behavioral deficit	6			18-6	12
Failure to control failure	7			21-7	14
Total measure	37			111-37	74

In addition, four tests were identified by the specialists, which are among the accredited trainers in talent care centers, which were as follows:

Transitional speed test (running for a distance of (20 m) and measuring time in seconds):[1]

Leg and eye compatibility test (jump on the numbered eight circles and measure time in seconds):[2]

Test the accuracy of scoring towards the goal of running mode (calculated the scores of each ball of the six balls of (24) degrees). [3]

Test the accuracy of scoring towards the goal of the stability (the scores of each of the five balls is calculated from (25) degrees).[4]

The researchers adapt the main survey by applying it on identified application sample in this study of (84) talented players in the talent care centers in the Ministry of Youth and Sports and Amo Baba School Center, where the researchers applied the measurement before conducting the evaluation tests for each laboratory (5) Players per day for each of Friday and Saturday, i.e. (10) players per week according to the conditions and instructions these evaluations tests were applied to them taking into account the comfort between test and another that need to completely rest to restore energy sources, as the survey of individuals in this sample continued on the measurement or else Four evaluations tests of (9) consecutive weeksthe period from Friday 11/1/2019 to Friday 8/3/2019, with the assistance of the assistant team, the data of measurement and evaluation tests were collected for each talented player of the sample of the application and talented players in preparation of statistical treatment to achieve the objectives of the study, and processing Quantitative data processing by using Social Statistical Portfolio System SPSS (V25).

Results and Discussion

Table (2) shows the statistical parameters of the learned helplessness measurement compared with the hypothesis mean of the measurement

Measurement Name	Paragraphs number	measurement total score	Hypothetical mean	Arithmetic mean	Mediator	Standard deviation	Torsion coefficient	T Calculated	Degree (Sig)
Learned helplessness	37	111	74	58.5	56.5	12.131	0.351	11.783	0.000

Table (3) shows descriptive statistical features of the evaluation tests results

Evaluation tests	Measurement unit	Arithmetic mean	Mediator	standard deviation	Torsion coefficient
Transitional speed	Second	3.753	3.75	3.093	0.23
Compatibility between the eye and leg	Second	4.107	4.1	0.054	0.433
Scoring from steadiness towards the divided goal	Degree	4.107	13	2.222	1.322

Table (4) Simple correlation coefficient, linear regression.

Measurement	Evaluation tests	Simple correlation coefficient (R)	Multiple regression coefficient 2 (R) (The determination coefficient)	Contribution ratio	Standard error of estimate
	Transitional speed	0.928	0.861	0.859	0.035
Learned helplessness	Compatibility between the eye and leg	0.883	0.779	0.777	0.025
Learned helplessness	Scoring from steadiness towards the divided goal	0.627	0.393	0.386	1.742

Table (5) (F) test of the linear regression model of the results of the learned helplessness measurement of some evaluation tests results

Variables	Beta P	Standard error	Calculated (t)value	(Sig) degree	Moral
Fixed limit	4.166	0.019	222.282	0.000	Moral
Learned helplessness	-0.007	0.000	22.519	0.000	Moral
Fixed limit	3.879	0.014	283.618	0.000	Moral
Learned helplessness	0.004	0.000	17.017	0.000	Moral
Fixed limit	20.755	0.94	22.083	0.000	Moral
Learned helplessness	-0.115	0.016	7.287	0.000	Moral
Fixed limit	28.43	0.76	37.384	0.000	Moral
Learned helplessness	-0.183	0.013	14.356	0.000	Moral

* Significance Level (0.05) n = 84 (F value) function if the value of the degree (Sig) ≤ (0.05)

Table (6) shows the estimates values of the fixed limit and inclination (impact) of the results of the measure of the learned helplessness of some evaluation tests results and their standard errors and the significance level of real and moral.

Significance level (0.05) n = 84 significant value (t) if the degree (Sig) ≤ (0.05)

Prediction of the transition speed test in terms of the learned helplessness = slope constant + ((slope (impact) × x)) = 4.166 + (-0.007x58.4)

Prediction of eye-to-man compatibility test in terms of learner deficit = slope constant + ((slope (effect) x x)) = 3.879 + (0.004 × 58.4)

Prediction of scoring test from stability to divided goal in terms of learner deficit = slope constant + ((slope (effect) x x)) = 20.755 + (-0.115x58.4)

Prediction of target scoring accuracy test in terms of learner deficit = slope constant + ((slope (effect) x x)) = 28.43 + (-0.183 x 58.4)

The results of the simple correlation coefficient, linear regression, contribution ratio and the standard error for estimating the learned helplessness measure results of some evaluation tests results show that the learned helplessness, despite its low level, but it is a factor link with different contribution ratio with the results of all the four evaluation tests, as shown by the effect in that correlation, whenever higher the disability level of the talented players, the scores lowed to the two skill tests and the higher the time of the physical and motor tests, which depend on the less time, the better level of talented football player. This requires that the training staff to reduce of this phenomenon to assess their players according to their abilities when they are in a normal psychological state together, because the training burdens push them to increase the boredom and routine factor of repeated failures or improper handling in reprimand and face them to the failure positions with peers in some situations force them to attribute the failure to complete duties to external sources. This result is not limited on the correlation significance or predictability to the extent that the aggravation of this phenomenon may lead to the loss of efforts in the training process, which is judged by periodic tests, and if the tests are inaccurate in their results, it will cause a lot of confusion in the judgment at the level of talented players. This requires the need to adopt psychometric measurement before the application

of assessment tests to detect phenomena that harm the players results, including the learned helplessness which showed the study results that it is possible to infer the talented player level in each through the contribution of the learned helplessness and what it negatively effects on these evaluation tests results.

Adnan Yusuf mentioned that the individual's ability to interact is usually influenced of physical factors such as location and Stress stimuli in the natural environment, such as noise and pollution, while the degree of this effect depends on the social affiliations variation and the awareness degree of the reflect from this behavior and on how the individual perception himself as well as the adopted attribution method to resorting attribute his failure in the results of internal reasons of self-origin or attributed to external reasons of an environment beyond the scope of control.[1]

Mahmoud AL Said refer to "Some individuals who have been had shocking exceptional circumstances have been negatively which have a role in the learned helplessness, when forced to change their living way, They lived a life filled with helplessness feelings, frustration, anger and boredom, and their sense of helplessness and their belief that they followed the state of helplessness experienced to the individual from internal and external sources.[2]

Reham Al-Smadi refer to that "positive emotions and thoughts perform a therapeutic preventive function, to reduce the stressful situations effects, providing the extension services for abused children is a helpful factor in providing them with the skills necessary to deal with the situations they face in their lives, such as social skills and problem-solving skills, autonomy and sense of purpose, which help them in psychosocial adaptation.[3]

Dickhauser & Reinhard argues, "Learned helplessness is one of the most influential effects on frustrating motivation."[4]

Abstracts and Applications:

Football Players of talent care centers do not have a high level of learned helplessness.

The levels of talented players are similar in each of the four assessment tests (transition speed, compatibility between the eye and leg, scoring from stability to the goal divided, accuracy of scoring to the goal).

The learned helplessness is associated with, contributes and influences all four assessment tests (transitional speed, compatibility between the eye and leg, scoring from stability to divided goal, scoring accuracy to the goal).

It is possible to predict the four assessment tests (transitional speed, compatibility between the eye and leg, scoring from stability to divided goal, scoring accuracy towards the goal) in terms of the learned helplessness.

It is necessary to pay attention the Ministry of Youth and Sports with the specialist necessity or psychological counselor in Talent care centers of football.

It is necessary to pay attention to similar studies dealing with the players of the talent care centers of sports in other games and events.

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Conflict of Interest: None

References

1. Reham A.S. The Effect of Collective Counseling in Reducing Aggressive Behavior and Improving Psychological Resilience of Children Abused by Parents and Deposits in Care Institutions, Master Thesis, Hashemite University, Jordan, Zarqa, 2015.
2. Adnan Y.A. A and Nasser A. J. The Effect of Environmental Physical Variables of Housing on the University Students: Journal of King Saud, No. (13), Volume (2), 2001.
3. Ali H. S. A. H. The extent of the contribution of the educated and athletic inability to the results of some evaluation tests for the players of football talent care centers: unpublished doctoral thesis, Mustansiriya University, College of Education, 2019.
4. Imad K. A. A. The impact of a proposed training program in the development of scoring skill: Master Thesis, College of Physical Education and Sports Science, University of Baghdad, 1999.
5. Feryal M. A. A. The Origins of Psychological and Educational Research: Amman, Dar Al-Masirah for Printing, Publishing and Distribution, 2015.
6. Mohamed S. H. Measurement and Evaluation in Physical and Physical Education, Vol. 1: Cairo, Dar Al-Fikr Al-Arabi, 1995.

7. Mohamed S. H. & Hamdi A. M. Scientific Foundations of Volleyball and Measurement Method, 2nd Edition: Cairo, The Book Center for Publishing, 1997.
8. Mahmoud E. S. A. F. Learner lack its Contexts and Educational and Social Issues: Cairo Anglo-Egyptian Library, 2010.
9. Mufti I. H. New in Physical, Skill and Planned Preparation of the Footballer: Cairo, Dar Al-Fikr Al-Arabi, 1994
10. Cemaicilar, Z, & Canbeyli, R, & Sunar, D. Learned helplessness Therapy, and personality Traits : An Experimental study. Journal of social psychology; Feb (2003) vol.(143)Issue(1),p(65).
11. Dickhauser, O. & Reinhard, M. How Need for Cognition Affects the Formation of PerformanceExpectancies at School. Social Psychology of Education. 2009, 12(3), 385-395.
12. Shieds, K. The conflicts of Learned helplessness in motivation. [on–line]. Available: at.1997.http://ematusov.soe.udel.edu/final.paper.pud/pwfsfp/.htm

Peer Support Education Reducing Pain Perception and Improving Blood Glucose Control of Diabetes Mellitus

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Abstract

Background: Diabetes mellitus (DM) is a chronic disease that requires long-term or lifelong care of DM patients. DM disease management in the Perkeni consensus (2013) is education, nutrition therapy, physical exercise, and pharmacological therapy.

Material and Method: This research uses Quasi-Experimental Design with Non-Random Pretest-Posttest Design. The purpose of this study was to analyze changes in disease perception and blood glucose control in patients with type 2 diabetes mellitus after being given peer support education. This research method is an experimental research with Quasi - Experimental Pretest-Posttest Design. The sample consisted of 60 respondents. Sampling is done by purposive sampling.

Result: Our study showed the average age of respondents was 56.44 years, most women, basic education, received OHO therapy, with an average length of illness was 8.93 years and suffered from complications of heart disease and neuropathy, before being given peer support education, control blood glucose: the average fasting blood glucose is 152.81 mg/dl, an average weight of 59.97 kg, an average blood pressure of 158.56/84.25 mmHg and an average pain perception of 69.75. After peer support education, blood glucose control: mean fasting blood glucose is 137.75 mg/dl, average weight 59.56 kg, average blood pressure 147.19/76.25 mmHg and average pain perception in the treatment group increased the average perception to 64.44.

Conclusions: Further analysis showed that peer support education was 0.001 in reducing pain perception. This study concludes that peer education support is effective in reducing pain perception and improving blood glucose control. The recommendation of this research is to do more respondents and more time.

Keywords: *Peer Support Education, the pain perception, blood glucose control.*

Introduction

Diabetes mellitus (DM) is a metabolic disease in which the body's ability to use it, fat and protein are disrupted, related to insulin or insulin resistance [1]. DM is a chronic disease characterized by a lack of insulin or a decrease in the body's ability to use insulin. There are various types of DM, namely: type 1 DM, which arises due to damage to pancreatic beta cells that have not been recognized or due to auto immune processes, type-2 DM caused by cell resistance to insulin which causes beta cell damage, DM in pregnancy) and DM other types [2]. Type 2 DM is the largest group of all types of DM that reaches 95% of total DM cases [3]. The results of the 2013 RISKESDAS also showed East Java following the order of East Kalimantan for the prevalence of diabetes. The results of a preliminary study in one of Malang district hospitals in 2014, the average visit of DM patients was 452 patients.Based on these data, the prevalence of diabetes is very high.

From this background, the authors were interested in examining the influence of peer support education on the pain perception and blood glucose control in patients with diabetes mellitus in Hospital.

Material and Method

The sample of this study was60 people and was taken by purposive sampling. The respondent inclusion criteria were: (1) Stable condition, not experiencing acute hyperglycemia. (2) Willing to be a research respondent.

The variable in this study was the peer support education independent variable and the dependent variable was the pain perception and blood glucose control. Measurement of pain perceptions used a questionnaire by DM Pain Perception consisted of 25 questions measured by a Likert scale. Blood glucose control is measured through: fasting blood glucose, blood pressure and weight.

Analysis of this research data was to identify differences in blood glucose control before and after peer group education conducted t-test 2 paired samples and to identify differences in perceptions before and after peer group education performed Wilcoxon Signed Rank Test.

Result

Table 1. Distribution of Respondents by Age, duration of illness and blood glucose in Hospital in November 2015

Variable	Mean	SD	Min-Maks	95% CI
Age	56.44	11.105	30 - 70	50.52–62.36
Duration of illness	8.93	6.4	0.5 - 20	5.53–12.35

The average age of DM patients was 56.44 years (95% CI: 50.52 - 62.36), with standard deviation 11.105. The youngest age of the respondents was 30 years and the oldest was 70 years. The results of the analysis showed that the average duration of illness of patients with DM was 8.93 years (95% CI: 5.53 - 12.35), with a standard deviation 6.4. The respondents had the fastest DM 5 years and the longest 20 years.

Table 2. Distribution of Respondents by Gender, Education, Therapy, Other Suffered Diseases at Hospital in November 2015

Variable	Amount	Persentage (%)
Gender:		
- Female	43	71
- Male	17	29
Education:		
- Not Graduating from Elementary School	13	22
- Graduated from Elementary School	25	42
- Junior High School	14	23
- Senior High School	3	5
- University/College	5	8
Therapy:		
- Oral Pill/DM Drugs	39	65
- Insulin	21	35
Other suffered illness:		
- None	11	18
- Retinopathy	21	35
- Neuropathy	19	32
- Heart Disease	9	15

Distribution of respondents by their gender showed that most of them were female,they were 13 people (81%). Distribution of respondents based on education level showed that elementary and junior high school education was almost the same, namely 5 people (31%) for those with elementary education and 4 people (25%) for those with junior high school education. The distribution of respondents based on the obtained therapy showed that most of them received oral DM/pill therapy which was 9 people (56%). While the distribution of respondents based on other suffered diseases showed that respondents who experienced neuropathy and heart disease were the same, namely 7 people (44%).

Table 3. Changes in blood glucose control before and after Peer Support Education was given in Hospital in November 2015

Variable		Average	SD	SE	p-value
Fasting blood glucose	Before	152.81	31.94	7.98	0.006
	After	137.75	26.64	6.66	
Systolic Blood Pressure	Before	158.56	24.69	6.17	0.000
	After	147.19	28.00	7.00	
Diastolic Blood Pressure	Before	86.25	11.69	2.92	0.002
	After	76.25	13.48	3.37	
Weight	Before	59.97	11.46	2.86	0.005
	After	59.56	11.62	2.90	

* Meaning at α <0.05

Based on table 3, the statistical test results obtained a value of 0.006, it could be concluded that there were significant differences in fasting blood glucose before and after Peer Support Education. The statistical test results obtained a value of 0.000, it could be concluded that there were significant differences in systolic blood pressure before and after Peer Support Education, the statistical test results obtained a value of 0.002 so it could be concluded that there were significant differences in diastolic blood pressure before and after Peer Support Education and the statistical test results obtained a value of 0.005, it could be concluded that there were significant differences in body weight before and after Peer Support Education.

Table 4. Changes in pain perceptions before and after Peer Support Education was given in Hospital in November 2015

Variable		Average	SD	p-value
Pain Perception	Before	69.75	7.11	0.001
	After	64.44	6.47	

* Meaning at α <0.05

The average pain perception in measurements before Peer Support Education was 69.75 with standard deviation 7.11. The measurement after Peer Support Education was 64.44 with standard deviation 6.47. The results of statistical tests obtained a value of 0.001, it could be concluded that there were significant differences in the pain perception before and after Peer Support Education.

Discussion

Changes in pain perception before and after peer support education: In this study the perception of pain before Peer Support Education was carried out an average of 69.75. Pain perception is important for knowing one's perception of the disease and the meaning of the disease in life[4]. According to Coelho, Amorim, & Prata the results of measuring quality of life are evaluations of experience of illness[5]. Pain experiences include perceptions of pain regarding symptoms that are felt, experience cannot perform normal bodily functions and attempts to deal with and control disease[6].

In this study the results of the analysis showed that there were significant differences in the decrease in pain perception after respondents were given peer support education. with p = 0.001 (p value <0.05). This shows that peer support education is an effective technique in reducing the perception of DM patients. Pain perception is important for knowing one's perception of the disease and the meaning of the disease in life [7].

In this study respondents as someone who interacted with other individuals in the group during the peer support education process.

Changes in blood glucose control before and after peer support education: The results showed that the results of fasting blood glucose before peer support education carried out an average of 152.81 mg/dl with a range between 110 mg/dl to 240 mg/dl. While blood glucose after peer support education was carried out an average of 137.75 mg/dl with a range between 100 mg/dl to 210 mg/dl. Judging from the average blood glucose of respondents before and after peer support education showed a decline[8]. Similarly, the range of blood glucose levels after peer support education was carried out. The high level of blood glucose in a long time will cause some complicating diseases until complications occur[9]. The appearance of complications and complications in patients with DM can cause physical or psychological discomfort.

Changes in perception of pain before and after peer support education: In this study the results of the analysis showed that there were significant differences in the decrease in perception of pain after respondents were given peer support education, with p = 0.001 (p value <0.05). This shows that peer support education is an effective technique in reducing the perception of DM patients. Pain perception is important for knowing one's perception of the disease and the meaning of the disease in life [10]. Pain experiences include pain perceptions regarding symptoms that are felt, experience cannot perform normal bodily functions and attempts to deal with and control disease. Significant results on changes in perceptions of pain after being given peer support education because during the education process there was a strong sharing of experiences between respondents to manage their illness. In accordance with the results of research by Heisler which states peer support can reduce health behavior problems[11]. Health behavior in DM patients is that patients can accept changes that occur after suffering from DM or adapt positively. Roy's adaptation model consists of 4 important aspects, including: person, Environment, Health, and Nursing[1].

In this study, respondents as someone interacts with other individuals in the group during the peer support education process. The commencement of interaction between individuals in the group increases enthusiasm for always joint discussions regarding the management of the disease[12]. So that there were seen some respondents who at first seemed more silent, at the meeting and both began to dare to express questions and express opinions[13]. With the existence of positive experiences from other respondents it will make respondents who feel it as a problem motivated that he is not alone and he can overcome the problems experienced because of his illness with the help of friends in the group[14].

When a DM sufferer is confused, irritability and even depression, according to Roy & Andrew in his theory can arise because of the stimulus both inside and outside[15]. There were several respondents who said they were offended because their wives and children were prohibited from eating. One of them is number 13, but after the respondent told me during the discussion the respondent number 15 said that he felt happy to be reminded and that the family supported it with his wife preparing special food for her husband, the same type of food as other family members[16]. At the third meeting showed a decrease in the perception of pain in respondent number 13. The presence of external stimulus, peer support made changes in perceptions of pain that would bring behavior changes in the management of the disease by showing a positive response to adversity[17].

Conclusions

The average perception of pain before peer support education was 69.75. The average perception of pain after peer support education was 64.44. There were significant differences with p value = 0.001. There were significant differences in changes ofblood glucose control before and after peer support education: fasting blood glucose with p value = 0.028, systolic blood pressure with p value = 0.000, diastolic blood pressure with p value = 0.001 and body weight with p value = 0.005.

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References

1. Peimani M, Monjazebi F, Ghodssi-Ghassemabadi R, Nasli-Esfahani E. A peer support intervention in improving glycemic control in patients with type 2 diabetes. Patient Educ Couns [Internet]. 2018;101(3):460–6. Available from: http://dx.doi.org/10.1016/j.pec.2017.10.007

2. Riskesdas. Hasil Utama Riskesdas Penyakit Tidak Menular 2018. Has Utama Riskesdas Penyakit Tidak Menular. 2018;8.
3. Cho NH, Shaw JE, Karuranga S, Huang Y, da Rocha Fernandes JD, Ohlrogge AW, et al. IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. Diabetes Res Clin Pract [Internet]. 2018;138:271–81. Available from: https://doi.org/10.1016/j.diabres.2018.02.023
4. Wardani CK, Widyawati MN, Suryono S. The effectiveness of acupressure at LI 4 and SP 6 point on uterine contraction in the first stage of labor on primiparous women. Indian J Public Heal Res Dev. 2018;9(11):565–70.
5. Dempsey PA. Using Nursing Research 5th [Internet]. 2000 [cited 2019 Oct 23]. Available from: https://www.amazon.com/Using-Nursing-Research-Dempsey-Patricia/dp/B008CMBHUK
6. Bailes BK. Diabetes mellitus and its chronic complications. AORN J [Internet]. 2002 Aug [cited 2019 Oct 22];76(2):266–76, 278–82; quiz 283–6. Available from: http://www.ncbi.nlm.nih.gov/pubmed/12194653
7. Yusuf A, PK FR, Tristiana RD, Aditya RS. Qualitatif Research in Nursing. 1st ed. Surabaya: Mitra Wacana Media; 2017.
8. Aditya RS, S FK, Yusuf A, Suwito J. Experience of the Healthworkers in Conductin Methadone Rehabilitation Therapy at the Public Health Center. Dama Int J Res. 2017;2(2):107–13.
9. Childs B, Cypress M, Spollett G, American Diabetes Association. Complete nurse's guide to diabetes care. American Diabetes Association; 2009. 570 p.
10. McEwan PJ. Peer effects on student achievement: Evidence from Chile. Econ Educ Rev. 2003;22(2):131–41.
11. Due-Christensen M, Hommel E, Ridderstråle M. Potential positive impact of group-based diabetes dialogue meetings on diabetes distress and glucose control in people with type 1 diabetes. Patient Educ Couns [Internet]. 2016;99(12):1978–83. Available from: http://dx.doi.org/10.1016/j.pec.2016.07.023
12. Isa Ma'rufi, Eri Witcahyo HSWN. Analysis of Environmental Health Risks Resulting from Exposure to Pollution Materials. Indian J Public Heal Res Dev [Internet]. 2018;9(8):27. Available from: http://repository.unej.ac.id/bitstream/handle/123456789/65672/Ainul Latifah-101810401034.pdf?sequence=1
13. Rahman F, Marlinae L, Setyaningrum R, Putri AO, Hilmiyati. The role of midwife through antenatal class pregnancy for improvement delivery assistance with professional health workers. Indian J Public Heal Res Dev. 2018;9(1):170–4.
14. Aditya, Ronal Surya; Solikhah, Fitriana Kurniasari; Kurniawan SB. Teenager Response to the Conditions of Basic Level Emergency: A Phenomenology Study. Indian J Public Health. 2019;10(1):170.
15. Yandrizal, Machmud R, Noer M, Hardisman, Afrizal, Lipoeto NI, et al. Stakeholder collaboration model to empower integrated health education centers for non-communicable diseases: A study in Bengkulu. Indian J Public Heal Res Dev. 2018;9(1):133–8.
16. ADA (American Diabetes Association). Standards of medical care in diabetes. Diabetes Care. 2006;29(SUPPL. 1).
17. Trogdon JG, Nonnemaker J, Pais J. Peer effects in adolescent overweight. J Health Econ. 2008;27(5):1388–99.

Sexist Language: Gender-Linked Expressions in Official Communications in the Academic Workplace

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Abstract

This study investigated the occurrence of sexism in official communications in the academic workplace. Specifically, it attempted to determine whether or not words or expressions considered as gender-biased were used in memorandums written by officials of the respondent university and to identify in which examples of English usage classified as sexist do they belong. The study revealed that the most frequently used sexist words are the gender-linked masculine terms *freshmen* (used to refer to all first year students that include female students) and *chairman* (used to address even females serving as heads of departments). The examples of English usage considered as sexist which were found in the memorandums are as follows: using masculine nouns as generic, the non-parallel treatment of men and women, male being habitually placed before female, and gender-linked titles and work positions.

Keywords: *sexist language, academic discourse, gender-inclusive language.*

Introduction

Communicative competence, a linguistic term coined by Dell Hymes, can be considered as an articulation of what it takes to communicate successfully. It describes the essential components of effective communication. These are the competences into which communicative competence itself is subdivided, namely linguistic, strategic, discourse, and socio-linguistic.

Of the aforementioned competences, the ones where much of the emphasis was placed on are linguistic, strategic, and discourse. Socio-linguistic competence is often disregarded. When people have ideas to express, they are often too concerned about what words to use, how to put those words together, and what strategies to apply to deliver their message effectively. They tend to neglect one essential component of the communication process – the receiver of that message.

Socio-linguistic competence refers to the ability to use the language appropriate to the current social contexts[1]. It has been an integral part of communicative competence in that it includes learning pragmatic and sociolinguistic knowledge about how to appropriately use the language linguistically and socially [2]. It is taking into consideration the personal and cultural background of the participants in the communication process. While the linguistic, strategic, and discourse competences allow people to communicate correctly, the socio-linguistic competence makes them communicate appropriately. Sometimes, breakdowns in communication happen not for lack of clarity of the message but by what could be perceived as impropriety in the language used by the transmitter of the message.

Socio-linguistic competence enables a person to refrain from using language in any way that may be perceived as discriminatory.

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Discriminatory language includes any comments that indicate bias against other people based on factors such as race, gender, marital status, age, national origin or disability [3].

Sexist language is a form of discriminatory language, a gender-linked language that carelessly excludes female gender and presumes that male gender is the standard or the norm. It also contains words and expressions that unfairly label women on the grounds of their gender alone. There are 3 forms of sexism – blatant sexism, covert sexism and subtle sexism. Sexist language is considered an example of subtle sexism.

Notwithstanding the steady growth of feminism and awareness on human rights, sexism continues to flourish in places where men and women coexist. There are volumes of literature and studies describing how women have become victims of both conscious and unconscious sexism. Even in language, women, regardless of their actual power or social status, are seemingly treated as subordinates to men. This unequal treatment of women in language are evident in the following examples of English usage that can be considered sexist: use of masculine nouns (e.g., *man*, *mankind*) and pronouns (e.g., *he*, *himself*) as generics; non-parallel treatment of men and women (e.g., *Mrs.* indicating a woman's marital status but *Mr.* does not); habitually putting males before females in word pairs (e.g*., husband and wife, he or she*); gender-linked titles and positions (e.g., *chairman, ombudsman*); *gender markers* (e.g., *female professor*, *lady dentist*); feminine nouns with attached suffixes (e.g., *authoress*, *comedienne*); gender-based labels (e.g., *sharp-tongued*, *gossipy*); and semantically positive male-gendered forms and their negative female-counterparts (e.g., *governor-governess; wizard-witch*).

In social institutions and organizations where men and women intermingle, sexist attitudes persist. Women continue to struggle for gender parity. This struggle is at its strongest in the workplace – both in the corporate world and in the academia.

In the workplace gender stereotypes are alive, well, and busy producing gender discrimination [4]. The existence of multiple forms of gender inequalities in the workplace make it sometimes an inhospitable place for women[5].

It may not be surprising to hear women in the corporate world struggle for recognition and equal opportunities to get better salaries and occupy higher positions. But this happening in the academic workplace is a different story. Feminism and human rights are taught in universities and as such gender discrimination are presumed less likely to occur in those institutions. It is in the light of this assumption that this study was conceived. This study was conducted to investigate the occurrence of sexism in the academic workplace.

Language is considered as one of the most powerful means which sexism and gender discrimination are perpetuated and reproduced [6].Thus, it was through the use of language that occurrence of sexism in the respondent university was investigated. Specifically, the study attempted to determine whether or not gender-biased words or expressions were used in official memorandums written by university officials and to identify in which of the above-named examples of English usage classified as sexist do they belong.

Materials and Method

To determine whether or not sexist language were used in formal communications in the respondent university, 14 memorandums were analyzed. 10 of the said memorandums were written by male and 4 by female officials belonging to the administrative and management councils of the respondent university.

Each memorandum was carefully read and examined. Examples of gender-biased words or expressions used in the memorandums were identified and then evaluated against examples of English usage that are considered sexist.

The occurrence of each gender-biased words or expression in the memorandums was counted manually for frequency. Each of the examples of sexist language found was contextually analyzed to correctly identify in which examples of English usage classified as sexist do they belong. The exact places where the said words and expressions appeared in the memorandums where shown in the tables where they are presented for analysis.

Results and Discussion

The 14 memorandums analyzed for this study were written by members of the administrative and management councils of the respondent university, 10 of the said writers were males and 4 females.

The disparity in the number of male members and that of their female counterparts in the administrative and management councils represent another gender-

related problem – unequal opportunities to occupy higher positions in the academe. There are multiple studies [7, 8] that specifically focused on what factors prevent women leaders from occupying higher academic and senior management positions in the academic workplace.

Table 1 reveals that out of the 10 memorandums written by male members of the councils, 7 contain varieties of sexist language. None of the memorandums written by their female counterparts contain sexist language.

Table 1. Frequency of Sexist Language Occurrence Found inthe Memorandums in Terms of Gender

Gender	Gender-biased Terms
Female	0
Male	9

The male writers in the respondent universities are seemingly oblivious with their use of sexist language. Conversely, the absence of words that discriminate their male counterparts in the memorandums written by female writers indicates their sensitivity towards the use of gender-inclusive language.

What is difficult to determine is whether or not the male writers used sexist language on purpose or the words they used are the ones they just got accustomed to using. One semantic rule which we can see in operation in the English language is that of the male-as-norm [9]. The male officials may have used the words considered as sexist not because they intend to devalue their female counterparts but because their language training created in them the tendency to always use the masculine form by default.

Table 2. Masculine Generic Used in the Memorandums

Gender-biased Terms	Memorandums Where They Are Used
For the incoming college **freshmen,** the report is to be submitted on...	Memorandum No. 93, s.2017 Date: December 19, 2017
….. accounting of students with priorities given to the seniors down to **freshmen** to expedite application for graduation…	Memorandum No. 6, s.2013 Date: July 11, 2013
Listed below are the schedules of interview for incoming **freshmen** students…	Memorandum No. 5 s.2015 Date: March 10, 2015

Presented in Table 2 is the masculine generic used by the male writers in the memorandums they wrote.

The word with sexist connotations that was used in 3 memorandums is *freshmen*. In each of the said memorandums the word *freshmen* appeared once. The word is a generic masculine term used to refer to students of mixed genders.

The male writers may claim that discriminating their female counterparts was furthest from their minds when they used generic masculine nouns in the memorandums they wrote. But Moulton[10] argued that regardless of the author's intention the generic *man* is not interpreted neutrally. There are studies[11,12] that concluded that when the word *man* is used generically, people tend to think male, and tend not to think female.

The generic *he* has the tendency to evoke images of males relative to *he/she* and the plural *they*. Gastil [13] investigated the aforementioned phenomenon. The results have provided strong support for the hypothesis that the generic *he* evokes a disproportionate number of males images. In addition, it was revealed that while the plural *they* functions as a generic pronoun for both males and females, males may comprehend *he/she* in a manner similar to *he*.

Table 3. Non-parallel Treatment of Men and Women

Gender-biased Terms	Memorandum/s Where They Are Used
To: Mr. Florentino G. Pineda, Dept. Chair-MCPAD **Mrs.** Crisanta T. De Leon Department Chair, ELD **Gng.** Josephine C. Arceta Puno, DWF	Memorandum No. 33 s.2014 Date: Dec. 4, 2014

***** Gng. is the equivalent of Mrs. in the Filipino language

Table 3 shows that in one of the memorandums written by a male writer the female recipients of the written communication were addressed as *Mrs.* and its equivalent in the Filipino language – *Gng.*

The use of the courtesy titles *Mr.* before the full name or surname of a male and *Mrs.* for female is an example of the non-parallel treatment of men and women. It is considered gender-biased for using *Mr.* would indicate only the gender of the person being addressed while *Mrs.* indicates both gender and marital status.

The naming practices for women and men are often asymmetrical which create the impression that women merit less respect or less serious consideration than men do [14].

Gender inclusiveness would require that women be addressed with the specific professional titles they possess, (E.g., *Prof., Dr., Arch.., Engr.*). In addition, women should also be asked in which way they prefer to be addressed – *Miss, Mrs.* or *Ms.*If a woman's marital status orher preference is unknown, *Ms.* should be used.

To maintain the gender inclusiveness of correspondence, in case the reader's gender is unknown, the use of a non-sexist salutation like *Dear Professor*, *Dear Policyholder*, and the like, is strongly recommended.

Table 4. Forms That Habitually Place Male Before Female

Gender-biased Terms	Memorandum/s Where They Are Used
… to discuss the results of **his/her** evaluation and the comments made by the students. This is a way of assisting the faculty to assert **himself/herself** to achieve a better performance.	Memorandum No. 94 s.2017 Date: Dec. 19, 2017

Table 4 reveals that in one of the memorandums the form *his/her* was used twice for non-gendered antecedents. The writer may have thought that it is one way of avoiding the usage of the default masculine form.. But even the form *his/her* is considered a gender-biased expression. Habitually putting male (*he/his/himself*) before female (*she/her/herself*) is an example of English usage considered as sexist.

The lack of *epicene* (gender-neutral) equivalent of *he* and *she* is single biggest problem of the English language. The prescribed alternative to clumsy constructions like *he or she* or *his/her* is *their*. [15].

Berry[16] argues that all that is needed are four letters– *THEY* – to take a stand against the prejudice embedded in the English language. The usage of the singular *they* has now become acceptable.

Table 5. Gender-linked Titles and Work Positions

Gender-biased Terms	Memorandum/s Where They Are Used
Dr. Alodia Zapata BTTE **Chairman** Mr. Rafael Dayao BEED Chairman	Memorandum No. 38 s.2014 Date: October 31, 2014
Estrella Fajardo **Chairman**, Department of English Francelaida F. Baluyot Puno, Departamento ng Araling Pilipino	Memorandum No. 09 s. 2017 Date: October 09, 2017

As shown in Table 5, two female department heads in the respondent university are addressed as *chairman* in two separate memorandums. Whether the writers of those separate memorandums used *chairman* deliberately or it was an honest mistake is difficult to determine. But the said word is the most ubiquitous among job titles in universities. It is the most talked gender-biased expressions when it comes to academic

positions in universities. The following alternative forms are available – *chair* and *chairperson*.

Bovin [17] found out that there has been an increase of the gender-neutral forms since their introduction to English, and that they are primarily used when there is no explicit gender-referencing. Several of the previously gender-biased titles (that often end with *-man*) were said to have been supplemented by new, gender-neutral titles.

But notwithstanding the availability of the gender-neutral forms, the usage of gender-biased titles continue, most especially in the academe.

Table 6. The Gender-biased expressions used in the Memorandums

Gender-biased Expressions	Number of Occurrence
Freshmen	3
Chairman	2
Mrs./Gng	2
His/Her	1
Himself/Herself	1

Table 6 summarizes the gender-biased words and expressions used in official communications in the respondent university. A total of 5 namely *freshmen*, *chairman*, *Mrs.*, *his/her*, and *himself/herself* were found in 7 out of the 14 memorandums analyzed in this study.

The gender-linked terms *freshmen* and *chairman* appeared three times each and the title *Mrs./Gng.* 2 times. Each of the forms *his/her* and *himself/herself* was used once. These gender-biased words and expressions can be classified as examples of English usage considered as sexist, namely using masculine nouns as generic (*freshmen*), habitually putting male before female (*him/her & himself/herself*), using gender linked title/work position (*chairman*), and non-parallel treatment of men and women (*Mrs.*).

Conclusion

The study has found that official communications in the respondent university contain elements of sexism. Gender-biased words or expressions were used in 7 out of the 14 memorandums that were written by male members of the administrative and management councils.

There are 5 sexist terms that were used, namely *freshmen*, *Mrs., his/her, himself/herself,* and *chairman.*

The examples of English usage considered as sexist where the said gender-biased words and expressions belong are using masculine nouns as generic, habitually putting male before female, habitually putting male before female, and using gender-linked titles or work positions.

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References

1. Alptekin, C. Towards intercultural communicative competence in ELT. ELT Journal. 2002;56(1),57-64. Available from:doi:10.1093/elt/56.1.57.
2. Mede, Enisa & Dikilitaş, Kenan. Teaching and Lear- ning Sociolinguistic Competence: Teachers Critical Perceptions. Participatory Educational Research. 20 15;2. 14-31. Available from: doi:10.17275/per.15.29.2.3.
3. Kokemuller. Reasons to avoid discriminatory lan-language inor outside the workplace. Available from: woman.thenest.com [Accessed 7th October 2019].
4. Heilman, M. E. Description andprescription: Howgender stereotypes prevent women's ascent up the organizational ladder. Journal of Social Issues. 2001;57, 657–674. Available from: doi: 10.1111/0022-4537.00234.
5. Abrams K. Social construction, roving biologism, and reasonable women: aresponse to Professor Eps- tein. DePaul Law Rev. 1991;41 1021–1040.
6. Menegatti, M & Rubini M. Gender Bias and Sexism in Language (Gay, Lesbian, Bisexual and Trans-gender Studies), Intergroup Communication. 2017;Available from: doi:10.1093/ acrefore/9780190 2286613.013.470.
7. Shephard, S. Why are there so few female leaders in higher education: A case of structure or agency? Sage Journal. 2017;31(2), 82-87. Available from: doi:10.1177/0892020617696631.
8. Yousaf, R. & Schmiede R. Barriers to women's re-presentation in academic excellence and positions ofpower. Asian Journal of German and European Stu- dies.2017;2:2. Available from: doi:10.1186/ s4085 6-017-0013-6.

9. Spender, D. Man-made Language (2nd Ed.). London: Pandora Press; 1985.
10. Moulton, J. The myth of the neutral 'man'. In Vetterling-Braggin, M. (ed). Sexist language: A modern philosophical analysis. 1981;100-115.
11. Miller, C. & Swift, K. Words and Women. Garden City, NY:Anchor Press/Doubleday, 1976.
12. Kaufmann, C. & Bohmer, G..Masculine generics and gender-aware alternatives in Spanish. IFFOn Zeit – Online Journal of the Interdisciplinary Center for Women and Gender at the University of Bielfeld. 2014;4. 8-17. Available from: research gate. net [Accessed 10th October 2019].
13. Gastil, J. Generic pronouns and sexist language; The oxymoronic character of masculine generics. Sex Roles: A Journal of Research, 1990;23(11-12), 629-643. Available from: link.springer.com. [Accessed 10th October 2019].
14. Lei, X. Sexism in Language. Journal of Language and Linguistics, 2006 5(1) 87-94. Available from: pdfs.semanticscholar.org. [Accessed 11thOctober 2019].
15. Marsh, D. Sexist language:It's every man for him or herself. Available from: http//theguardian.com. [Accessed 11th October 2019].
16. Berry L. 'They': the singular pronoun that could solve sexism in English. Available from: http// thegu ardian.com. [Accessed 11th October 2019].
17. Bovin, M. Occupational titles and supposed gender-neutrality: A corpus-based diachronic study on study on gender-neutral occupation titles in American English (Unpublished Bachelor's thesis). Sweden;Stockholm University; 2016.

Improving Body Balance and Reducing Risk of Falling in Elderly People by Providing Family Health Related Tasks

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Abstract

Background: The loss of functional capacity and body balance in elderly people are problems that can increase the risk of falling. Family health related task can reduce the risk of falling in elderly people. The aim of this research is to find out the effect of family health task by promoting tandem walking exercise to elderly people to reduce the risk of falling.

Method: This research involved a quantitative cross sectional study. This study used a sample of 46 elderly people from Isimu Raya Village, Tibawa District, Gorontalo Regency. The sampling technique used was simple random sampling involving elderly people between the age of 60-74 years staying with their families. The data was collected using questionnaires. The researchers used univariate and bivariate analysis of Chi-Square Test with significant value α, 5% or 0.05 and multivariate analysis with multiple linear regressions.

Result: The result of the research showed that there was a significant effect of family health task on the body balance by providing tandem walking exercises to elderly people in reducing the risk of falling with p value 0.000. Thus, families can reduce the risk of falling amongst elderly family members by maximizing tandem walking exercises.

Conclusion: To improve the body balance of and reduce the risk of falling among elderly people, require an enhancement of family health task.

Keywords: *Family Health Task, Body Balance, Elderly People, Risk of Falling.*

Introduction

Elderly people are mostly subject to deteriorating physical health. The loss of functional capacity and body balance are common physical disorders in elderly people, which can increase risk and incidences of falling. In some cases, incidences of falling have led to death in elderly people and not necessarily caused by chronic diseases they may suffer. These incidences may seem uncomplicated, but they can cause death to the elderly.

The United States National Health and Nutrition Examination Survey data on balance stated that 69% of elderly people between 70-79 years old and 85% of 80 years and older has the body balance of and reduce the risk of falling[1]. The occurrence varies in term of incidences of falling among elderly people with 49.4% for people between 55 to 64 years old, 67.1% for people between 65 to 74 years old and 78.2% for people over 75 years old[2].

The main factors that influence the body balance of elderly people are age, sex, drugs, alcohol,

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psychological disorder and physical activities. A person will lose their organs' functions when they get older[3]. Women experience more body balance disorder than men do because they tend to do less physical activities. Elderly people who experienced falls tend to be afraid of walking;hence, they will reduce their physical activities. This can increase muscle deficiency, which causes body balance disorder.

The family is primarily responsible to render care currently being provided by health care professionals. Family members can provide nursing servicesand take care of other family members to prevent mental illness or physical disorder. Five family health tasks can be indicators of family autonomy. First is the ability to recognize the problems faced by family members,then the ability to determine the appropriate treatment to solve the problem, the ability to provide simple health care services, the ability to modify the environment both physiologically and psychologically.

Families play an important role in taking care of other family members, especially in preventing the elderly from falls. Families need to know the causes of falls amongst the elderly, so they can provide preventive services, such as assisting them in doing physical exercises. Previous studies have recommended various physical exercises to fix balance disorder in older adults such as Swiss Ball exercise, regular exercise, Otago home exercise and tandem walking exercise. This exercise managed to increase peoples' walking speed by 33.17% and 15.64% compared to those who did the Swiss Ball exercise.

Tandem walking is a physical exercise done by walking in a straight line for 3 – 6 meters with one foot in front of the other (heel to toe). This exercise can improve body balance and reduce the risk of falling. Tandem walking has been proven to be better than Swiss Ball exercise in reducing the risk of falling[4].

Health care providers must provide information to families and society on the risk of injuries from falls and how to prevent it from occurring. Tandem walking is an easy physical exercise to practice. Family members can assist their elderly family members in practicing tandem walking at home. Preliminary studies showed that families do not assess and assist in family health matters, such as assist their elderly family members to prevent the risk of falling. Researchers need to study the effect of tandem walking on the elderly at home,as part of family health to improve body balance and reduce the risk and injuries associated with falling.

Method

The researchers used a cross-sectional study design with a sample of 46 participants between the age of 60–75 years , staying with their families and at risk of falls. The research used a random sampling technique. The researchers used questionnaires to collect the data, as a tool to measure the variable effect of family health task by providing tandem walking exercise to improve the body balance and reduce the risk of falls in elderly people at home. The reliability and validity were tested by Pearson Product Moment Correlation with r =0,957.

Result

Table 1: Frequency Distribution of Respondents by Age, Sex, Occupation, Family Health Task, Body Balance and Incidences of Falling 2019 (n = 46)

	Variable	Frequency	Percentage (%)
Age	60 – 61 years	6	13
	62 – 63 years	4	8.7
	64 – 65 years	6	13
	66 – 67 years	11	23.9
	68 – 69 years	6	13
	70 – 71 years	4	8.7
	72 – 73 years	7	15.2
	74 - 75years	2	4.3
Sex	Male	18	39.1
	Female	28	60.9

	Variable	Frequency	Percentage (%)
Occupation	Farmer	11	23.9
	Housewives	27	58.7
	Retired	8	17.4
Able to provideTandem Walking service		40	87.0
Unable to provide Tandem Walking service		6	13.0
At risk of falling		15	32.6
Not at risk of falling		31	67.4
The incidences of falling		3	6.5
Noincidence of falling		43	93.5

Table 2: The Effect of Family Health Task in Providing Tandem Walking Exercise towards the Improvement of Body Balance in Reducing The Risk of Falls in Elderly People at Home 2019 (n = 46)

Family Health Task	Body Balance				Total		P Value	OR
	At Risk of Falling		Not at Risk of Falling					
	n	%	n	%	N	%		
Able to provide Tandem Walking	9	19.6	31	67.4	40	87	0.001	0.600
Unable to provide Tandem Walking	6	13.0	0	0	6	13.0		
	15	32.6	31	67.4	46	100.0		

*Significance level (α: 0.05)

Table 3: The Result of Multivariate Analysis of the Effect of Family Helath Task in Providing Tandem Walking towards the Improvement of Body Balance in Reducing the Risk of Fallsin Elderly People at Home 2019 (n = 46)

Variable	B	Std. Error	Beta	T	Sig	Anova Test
Constant	2.168	0.298		7.269	0.000	0.000
Sex	0.246	0.107	0.256	2.299	0.027	
Affective and Psychological Disorder	-0.911	0.098	-0.829	-9.327	0.000	
Physical Activity	0.178	0.112	0.181	1.583	0.121	

R^2 = 0.689 Rad=0.667

Discussion

The result of the research showed that 40 respondents from families with elderly people were able to provide tandem walking service and 6 respondents from families with elderly people were unable to provide the service. The families were trained by the researchers to practice tandem walking and they were able to train their elderly families members.

The researchers observed that some families were too busy to participate in the tandem walking exercises. They were either too busy with work, taking care of other family members such as children and toddlers, and doing too many domestic chores. These factors significantly affected their responsibilities towards the elderly. They could not effectively assist the elderly in the tandem walking exercises as per their responses in the questionnaires.

Family relationships can be characterized into[5] the following: (1) Well organized, a family is a reflection of an organization where each member has their own role and task to achieve the goals of a family. A well-organized family is exemplified by strong relationships among members in achieving the goals; (2) Limitation, each member of a family has their own roles and responsibilities in achieving the goals. Therefore, members of a family cannot be high-handed or unfair to others because of their limited responsibilities; (3) Dissimilarity and Specifity, each member of a family has

their own specific role, for instance, a father works to earn a living and a mother takes care of children.

Based on the observations, most of their family members showed their interdependent relationship and influence on each other. The health problems of members can affect other members and there exist an internal motivation to take care of others. Friedman, Bowden, & Jones's structural-functional perspective defined family as an open social system and other researchers believed that a family is an early form of system and a unit of care. A family has its own social structure in terms of health, religion, governance, education and economy. The main issue remains the extent to which families members carry out these roles. Family, as an open social system, are affected by the external environment. Meanwhile,family members are also preoccupied with their own roles. Illness in a family can affect a family's structure and function[6].

The researchers assumed that family members have to fulfill their responsibilities to other family members with health problems due their interdependent relationships. An independent family is able to perform simple family health task to assist sick family members.

The researchers assessed the balance using the TUGT (Time Up Go and Test) and most of the participants had normal scores, on balance lesser than < 14 second. In TUGT, if a person spent 14 second or longer, then he/she is classified as having high risk of falling[7].

There are two types of balance, dynamic and static. A static balance is the ability to stand in a firm position, while dynamic balance is the ability to control the body movement. Most respondents with high risk of falling were people had impaired dynamic balance rather than impaired static balance. When they carried out physical activities, such as walking, they tended to lose their balance.

The impairment of body balance in elderly people is commonly caused by factors, such as age, sex and physical activities. As people get older, they begin to lose their balance because of the disruption in their organs' functions. Women tend to suffer body balance impairment more than men because they usually have lesser work load. If elderly people actively carry out physical activities, they can reduce the risk of falling[8]. Writers stated that a good body balance could influence the speed and gait of walking in older adults. The researcher assumed that the faster elderly people could walk, the better their balance. This can significantly reduce the risk of falling[9].

Table 1 shows that only 3 respondents experienced falls. These were mainly caused by their age and sex. They were mostly women with limited physical activities and aged between 73-74 year sold. Guerra and Macielstated that there was a correlation between the elderly over 75 years old with impairment in body balance. They conducted a research on 310 elderly people over 60 years old [10]. Tinetti also stated that one third of adults over 65 years old have experienced falls, and half of them suffered recurrent falling[10].

It can be inferred that most of the respondents did not experience any fall after having undergone tandem walking exercises with regular supervision from family members. The families who managed to provide comprehensive tandem walking exercises helped their elderly family members in reducing the risk of falling. During the 4 weeks, the body balance of the older adults in the families improved due to family supervised tandem walking exercises at home. The elderly were able to control their movements when doing physical activities.

The researchers analyzed four factors that influenced the body balance of older adults with multivariate analysis. The factors were affective disorders, psychological conditions, physical activities and the environment. The researchers used multiple linear regression test and discovered that sex played the most influence that affected ody balance. Women were at higher risk of falling than men. The balance scores for men were mostly lesser than 14 seconds and classified as having lower risk of falling. The difference between the body balance between man and woman was caused by the difference in anthropometry[11]. Psychological factors, muscle strength and hormonal factors also affected the body balance [11]. Physical activities had less influence on women' body balance[12]

This research have several limitations. The respondents were mostly women and it was really hard to find men respondents. The respondents in this research were imbalanced. There were also some families that needed to be reminded to provide the exercise, so the researchers needed to visit these families repeatedly.

Conclusion

There was significant effect of tandem walking

exercises in reducing the risk of falling and improving the body balance of elderly people assisted by their family members. The most influential factor that affect body balance was sex. Women tend to suffer from falls more than men.

Recommendation: Family members should provide simple nursing care to elderly family members. Tandem walking exercises should be included as part of this nursing care program at home.

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Reference

1. Franklin SS, Jacobs MJ, Wong ND, L'Italien GJ, Lapuerta PJH. Predominance of isolated systolic hypertension among middle-aged and elderly US hypertensives: Analysis based on National Health and Nutrition Examination Survey (NHANES) III. 2001;37(3):869-74.
2. Kemenkes. Hasil Utama Riskesdas 2018. Jakarta: Kementerian Kesehatan RI; 2018.
3. Achmanagara AA. Hubungan Faktor Internal dan Eksternal dengan Keseimbangan Lansia di Desa Pamijen Sokaraja Banyumas: Universitas Indonesia; 2012.
4. Gaur V, Gupta S, Arora M. An Experimental Study tocompare the Effects of Balance Exercises done on Swiss-ball and Standing, On Lumbar Reposition Sense, In Asymptomatic Individuals. 2011.
5. Ferry Efendi M. Keperawatan Kesehatan Komunitas: Teori dan Praktik dalam Keperawatan: Ferry Efendi; 2009.
6. Bowden VR, Friedman MM, Jones EG. Family Nursing: Research, Theory, and Practice: Prentice Hall; 2003.
7. Salzman B. Gait and Balance Disorders in Older Adults. Am Fam Physician. 2010;82(1):61-8.
8. Miller CA. Nursing for Wellness in Older Adults: Lippincott Williams & Wilkins; 2009.
9. Umah KNS. Pengaruh Latihan Jalan Tandem Terhadap Keseimbangan untuk Mengurangi Resiko Jatuh Lansia di PSTW.
10. Gai J, Gomes L, Nóbrega OdT, Rodrigues MP. Factors related to falls of Elderly Women Residents in a community. Revista da Associação Médica Brasileira. 2010;56(3):327-32.
11. Sihvonen S. Postural Balance and Aging: Cross-Sectional Comparative Studies and a Balance Training Intervention: University of Jyväskylä; 2004.
12. Maryam S. Mengenal Usia Lanjut dan Perawatannya: Penerbit Salemba; 2008.

Effectiveness of Gail Model in Assessing the Risk of Developing Breast Cancer in Baghdad, Iraq

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Abstract

Background: The Gail Model is a statistical breast cancer risk assessment algorithm that was developed in 1989 by Dr. Mitchell Gail and colleagues with the Biostatistics Branch of the National Cancer Institute's Division of Cancer Epidemiology and Genetics. The Gail Model looked at a woman's personal medical history, familial history, and reproductive history. The Gail model has been widely used and validated with conflicting results.

Method: A Gail model were assessed for 200 convenient patients, 100 patients with history of breast cancer diagnosed during the last year (case) and other 100 patients with benign breast disease (control) and who attended the oncology hospital in medical city and Imamin Al-kadhimin medical city during 2019. The relative risk was measure for each patients and calculated 5 year risk >1.7% was regard as high risk, chi-square and student T test was used to find association between two groups.

Results: Calculated 5 year risk >1.7% found in 21% of case and in 11% of control and no association was found between two groups in the relative risk of breast cancer ($\chi^2 = 3.7$, df = 1, p = 0.054).

Conclusions: The Gail model is not useful in identifying risk of breast cancer in women and should not be used for that purpose.

Keywords: *Gail model, breast cancer, relative risk, Baghdad, Iraq.*

Introduction

Breast cancer is the most frequent cancer among women, impacting 2.1 million women each year, and also causes the greatest number of cancer-related deaths among women. In 2018, it is estimated that 627,000 women died from breast cancer – that is approximately 15% of all cancer deaths among women [(1)]. And in Iraq it regard as second cause of cancer-related deaths [(2).]

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Thus the increasing in breast cancer rate has enhanced global breast health initiatives, and attention towards breast cancer risk assessment and awareness [(3,4)]. Breast cancer causes serious concerns even in healthy women, both because of its incidence and mortality. The steps that should be taken in order to decrease this threat can be arranged as following: assessment of breast cancer risk of women, determination of risk groups, careful monitoring of such high-risk groups, informing individuals with risk factors, and extending screening and reachable treatment programs in every society[(5,6)]. Breast cancer risk factors have been defined by previous studies. Age and female sex are important risk factors for breast cancer. Other factors can be increase breast cancer risk including personal and family history of breast, ovarian, and endometrium cancer; history of lobular carcinoma in situ-matched biopsy of atypical

hyperplasia; positive BRCA 1 and BRCA 2 genes; early menarche (<12 yr), late labor (>30 yr); induced abortion; late menopause (>55 yr); hormonal replacement treatment (HRT); alcohol over-consumption; smoking; lack of physical activity; diet rich in fat; body mass index (BMI); and high socio-economic level [7-9].

Over the past two decades, a number of statistical models that predict the risk of breast cancer have been designed to select high risk women for risk reduction strategies based on some risk factors that are associated with increased risk. There are two main types of models. The first type assesses the probability of BRCA mutations such as Claus model in which all predictions are only based on family history [10] .The second type used risk factors of breast cancer includes Gail model (GM) and its modified one (GM2) which calculates 5-year and lifetime invasive breast cancer risk [11] .The GM is the most commonly used risk prediction model and has been well studied, validated and applied in various studies worldwide[12]

Objective: To evaluate the performance of model in estimating the risk of breast cancer in the clinical setting.

Material and Method

A total of 200 patients equal or above 40 years, 100 patients with history of breast cancer diagnosed during the last year (case) and other 100 patients with benign breast disease (control) and who attended the oncology hospital in medical city and Imamin Al kadhimin medical city between June and December 2019. The required information was age, age at menarche, age at first live birth, first degree relative numbers with breast cancer, previous breast biopsies with or without atypical hyperplasia, BRCA mutations and woman race. Unknown BRCA mutations and the white race/ethnicity variables were used for all the women in this study in estimating their risks[14]. The relative risk was measure for each patient which available at (http://www.cancer.gov/bcrisktool/) and calculated 5 year risk >1.7% was regard as high risk [15], chi-square and student T test was used to find association between two groups. p≤0.05 was considered significant.

Results

The mean age of breast cancer patients was 51.3±9 years which was higher than the mean age of control benign patients (49±6.5 years) and it was statistically significant (p=0.02).Distribution of participants in different categories of age at menarche, age at first lived baby and family history was almost similar in both groups and no association were observed between the two groups(P= 0.62, 0.717, 0.27 respectively). Higher frequencies of previous breast biopsy were recorded in control patients compared to breast cancer patients (P<0.001), Gail model scores, that predict 5-year risk of invasive breast cancer, in breast cancer patients and control patients were 1.25±0.7 and 1.26±0.7, respectively and no statistically difference existed between them (P = 0.9) table 1.

Table 1: Difference in Risk factor used in Gail model among studied groups.

Variable		Participants (No)		P value
		Breast cancer patients	Control patients	
Age	40-49 years	53	55	0.02*S
	50-59 years	25	36	
	≥60 years	22	9	
	mean±SD	51.3±9	49±6.5	
Age at menarche	≤11 years	10	13	0.62*
	12-13 years	73	74	
	≥14 years	17	13	
Age at first live birth	Nil parity	17	12	0.717*
	<20 years	20	17	
	20-24 years	26	25	
	25-29 years	21	26	
	≥ 30 years	16	20	

Variable			Participants (No)		P value
			Breast cancer patients	Control patients	
Family history of breast cancer	Negative		78	84	0.27*
	Positive	One	21	14	
		≥ Two	1	2	
Previous breast biopsies	Negative		94	77	0.001*[s]
	Positive		6	23	
Gail score			1.25±0.7	1.26±0.7	0.9**

*Chi-square test, ** Student T test, [S] significant ≤0.05.

Using the cut-off value of 1.7 in Gail score, patients were categorized into high and low risk groups .The model was able to correctly characterize 21 patients in the breast cancer group as having high risk of breast cancer (sensitivity = 21%) and the model was correctly characterize 89 patients in control group as having low risk of breast cancer (Specificity =89%) and no association was found between two groups in the relative risk of breast cancer (χ^2=3.7, df=1, p= 0.054).

Discussion

As the incidence of breast cancer is rising in Iraq, it is important to detect women with a high risk for early detection, timely treatment and prevention. Mitchell Gail, a biostatistician, developed a mathematical model in 1989 to assess the risk of breast cancer risk based on the results from the BCDDP–a large screening study that included 284,780 women who had been undergoing annual mammographic examination [(16).] Later, it was modified by involving atypical hyperplasia in breast biopsy, race, and ethnicity [(17)].Most Western countries use the Gail model to assess the risk of breast cancer. The drawbacks of the Gail model were that it does not consider lobular neoplasia, family history of breast cancer in second-degree relatives and family history of ovarian cancer. This led to the development of various other models considering the factors that were neglected in the GM such as history of breast cancer in second-degree relatives, which was included in the Tyrer–Cuzick model. To many countries and cities around the world validated the GM apart from the United States like Canada [(18),] Italy [(19)] and England [(20)]. Several reports focused on the performance of the Gail model in Asian population and the results of these reports were in agreement with the finding of the current study, there are no studies in Iraq to date assessed predictive breast cancer risk models. In this study, Gail model was assessed by case control study to validated in risk prediction for breast cancer and different components of the Gail model were compared between patients with confirmed breast cancer and control patient, In this study, the two groups differed significantly in terms of age, number of previous breast biopsies, sensitivity of model was 21%, specificity was 89% and it failed to differentiated between breast cancer patient and control patients, this resembled to A study of Gail model in Turkish women compared 650 breast cancer patients with 640 healthy women as control group. In this study, age and first live birth (≥30) were statistically significant between case and control groups but other risk factors used in Gail model were not different between two groups, sensitivity of model 13.3% and specificity was 92%. They concluded that Gail model is not appropriate for risk estimation in Turkish population [(21)], Iranian study on 560 women that showed a significant association of patients age , age at first baby and history of previous biopsy, no association was found between age at menarche, first degree family history and Gail model also showed very low sensitivity(13.9%) and high specificity (91.4%) of the Gail model in Iranian population and Indian study [(22)] that showed Gail model is not useful in identifying the risk of breast cancer in Indian women. Several points noted regarding the limitations of the current study. Most importantly, that a sample of patients selected from a referral center in Bagdad might not be representative of Iraqi female population. Larger studies including women from different parts of country should be conducted in order to obtain an accurate assessment of the Gail model performance in Iraqi women, the relatively small number of patients that were included in current study, may hinder detection of significant association between the variables and risk of breast cancer and limit proper interpretation of results, Case-control nature of the study and lack of patients follow-up, do not allow researchers

to assess absolute risk of cancer development among study population. Based on the results of the current study, it could be suggested that current version of Gail model should be modified to make it applicable for breast cancer risk estimation in Iraqi women.

Conclusions

The Gail model underestimate risk of breast cancer in Iraqi women and should not be used for that purpose.

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References

1. WHO. BREAST CANCER 2019.
2. MOH. Annual statistical report Iraq MOH 2017.
3. Yip CH, Smith RA, Anderson BO, Miller AB, Thomas DB, Ang ES, et al. Guideline implementation for breast healthcare in low-and middle-income countries: Early detection resource allocation. Cancer. 2008;113(S8):2244-56.
4. Kartal M, Ozcakar N, Hatipoglu S, Tan MN, Guldal AD. Breast cancer risk perceptions of Turkish women attending primary care: a cross-sectional study. BMC women's health. 2014;14(1):152.
5. Ceber E, Soyer MT, Ciceklioglu M, Cimat S. Breast cancer risk assessment and risk perception on nurses and midwives in Bornova Health District in Turkey. Cancer Nursing. 2006;29(3):244-9.
6. Açıkgöz A, Ergör G. Factors affecting breast cancer risk perception in women and comparison of risk levels to the Gail Model. J Breast Health. 2013;9(3):156-62.
7. Aslan FE, Gürkan A. The risk of breast cancer at the women. J Breast Health. 2007;3(2):63-8.
8. Chung C, Lee SJ. Estimated risks and optimistic self-perception of breast cancer risk in Korean women. Applied Nursing Research. 2013;26(4):180-5.
9. Ceber E, Mermer G, Okcin F, Sari D, Demireloz M, Eksioglu A, et al. Breast cancer risk and early diagnosis applications in Turkish women aged 50 and over. Asian Pacific Journal of Cancer Prevention. 2013;14(10):5877-82.
10. Amir E, Freedman OC, Seruga B, Evans DG. Assessing women at high risk of breast cancer: a review of risk assessment models. JNCI: Journal of the National Cancer Institute. 2010;102(10):680-91.
11. Bevers T. NCCN Clinical Practice Guidelines in Oncology®: Breast Cancer Screening and Diagnosis. V 2.2018. May 18.
12. Eadie L, Enfield L, Taylor P, Michell M, Gibson A. Breast cancer risk scores in a standard screening population. Breast Cancer Management. 2013;2(6):463-79.
13. Baytchev G, Inkov I, Kyuchukov N, Zlateva E. BREAST CANCER RISK EVALUATION-A CORRELATIONBETWEENMAMMOGRAPHIC DENSITY AND THE GAIL MODEL. Breast. 2015;6(75):0.
14. Brittingham A, de la Cruz GP. The Arab Population 2000. US Census Bureau, in. 2000.
15. mdcalc. Gail Model for Breast Cancer Risk. 2019. Available at: (https://www.mdcalc.com/gail-model-breast-cancer-risk).
16. Gail MH, Brinton LA, Byar DP, Corle DK, Green SB, Schairer C, et al. Projecting individualized probabilities of developing breast cancer for white females who are being examined annually. JNCI: Journal of the National Cancer Institute. 1989;81(24):1879-86.
17. Costantino JP, Gail MH, Pee D, Anderson S, Redmond CK, Benichou J, et al. Validation studies for models projecting the risk of invasive and total breast cancer incidence. Journal of the National Cancer Institute. 1999;91(18):1541-8.
18. Miller AB, To T, Baines CJ, Wall C. Canadian National Breast Screening Study-2: 13-year results of a randomized trial in women aged 50–59 years. Journal of the National Cancer Institute. 2000;92(18):1490-9.
19. Boyle P, Mezzetti M, La Vecchia C, Franceschi S, Decarli A, Robertson C. Contribution of three components to individual cancer risk predicting breast cancer risk in Italy. European journal of cancer prevention. 2004;13(3):183-91.
20. Amir E, Evans D, Shenton A, Lalloo F, Moran A, Boggis C, et al. Evaluation of breast cancer risk assessment packages in the family history evaluation and screening programme. Journal of medical genetics. 2003;40(11):807-14.
21. Ulusoy C, Kepenekci I, Kose K, Aydıntug S, Cam R. Applicability of the Gail model for breast cancer

risk assessment in Turkish female population and evaluation of breastfeeding as a risk factor. Breast cancer research and treatment. 2010;120(2):419-24.

22. Challa VR, Swamyvelu K, Shetty N. Assessment of the clinical utility of the Gail model in estimating the risk of breast cancer in women from the Indian population. ecancermedicalscience. 2013;7.

Cues to Action to Utilization of Cervical Cancer Screening Services among Women of Reproductive age in Kediri, East Java, Indonesia

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Abstract

Cervical cancer is currently ranked among the top among the various types of cancer that causes death in women in the world. The majority of women diagnosed with cervical cancer do not perform screening tests or do not follow up after being found abnormal results. The purpose of this study was to determine the correlation between cues to action or trigger and the implementation of early detection of cervical cancer using Visual Inspection with Acetic Acid (VIA) method in Kediri, Indonesia. This study used a case-control design. The sampling technique was a multi-stage random sampling method. The sample was 410 respondents. The data were analyzed using logistic regression. The results showed that the trigger affects the implementation of early detection of cervical cancer using the VIA method. Based on the results, the Odds Ratio (OR) cues to action or trigger values were: 1) Information from high television was obtained OR value: 2.7; 2) Recommendation from high physician was obtained OR: 2,3; 3) Recommendation from midwife was obtained OR: 2.6; 4) The recommendation from a friend was obtained OR: 2.5; 5) Having ever seen high cervical cancer patients was obtained OR: 1.6; 6) Having ever read a book or a high leaflet was obtained OR: 1.8. It showed that the higher cues to action or trigger were given to the women, the higher the probability of women to perform the early detection of cervical cancer using the VIA method. Based on the results, the appropriate cues to action or trigger need to be selected to improve the behavior of early detection of cervical cancer VIA method in women.

Keywords: *Cervical Cancer, Early Detection, Cues to Action.*

Introduction

Currently, cervical cancer ranks second among the various cancers that cause deaths in women in the world and 85% occur in women in developing countries[1,2]. Cervical cancer was a preventable and treatable disease if cervical cancer was detected early[3]. In Indonesia, an estimated 13,762 women every year were diagnosed with cervical cancer and 7,493 had died. Cervical cancer in Indonesia was also ranked second in terms of a number of cancer patients in women after breast cancer[2]. Cervical cancer was actually a preventable disease if cervical cancer was detected at the stage of precancerous lesions and treated with the correct procedure[4].

VIA method was particularly a suitable method in developing countries such as Indonesia because of the

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easy or simple technique, low cost and high sensitivity, fast and accurate enough to find abnormalities at the stage of cell abnormality or dysplasia or before precancer[5]. Implementation of early detection of cervical cancer VIA method in Kediri was still very low, less than one percent of the target Health Department of Kediri which set 10%[6].

The efforts had been made to increase women's participation in early detection of cervical cancer such as dissemination of information or counseling about early detection of cervical cancer through printed, electronic and health workers, but women visit rates associated with early detection of cervical cancers were still low[7]. Based on the theory of the Health Belief Model and Fog Behavior Model, the existence of cues to action or trigger was needed to improve the behavior of early detection of cervical cancer in women. The cues to action or trigger were effective. Thus, the trigger could increase the motivation and the ability of women to perform early detection of cervical cancer. The Fog Behavior model also asserted that a person would like to perform target behavior if she had: 1) sufficient motivation, 2) sufficient ability to perform the behavior, and 3) effective or triggered triggers for behavior[8]. In addition, research data on the effective trigger to improve the behavior of early detection of cervical cancer VIA method was very low. Thus, the purpose of this study was to determine the effect of a trigger on the implementation of early detection of cervical cancer VIA method in women in Kediri, Indonesia.

Material and Method

This study used a case-control design that tried to explain the effect of a trigger on the implementation of early detection of cervical cancer VIA method. The populations of the study were all woman who was married and not pregnant at the Health Center Working Area of Health Office of Kediri City 2017. The Sample in this study was some woman who is married and not pregnant in Kediri city year 2017. In this study, the respondents were 410 respondents who were divided into 205 cases and 205 control. The sample was selected using a multi-stage random sampling method with multilevel sampling.

The data were collected by giving questionnaires that had been tested for validity and reliability. The activity of questionnaires begins with determining the respondents who become case groups. After meeting the respondents who became the next case, then looking for the respondents who became the control. After meeting prospective respondents, the researcher explained the purpose of this study, how to fill out the questionnaire, the benefits of research for research subjects, and the confidentiality of the results of questionnaires that had been filled by respondents. Having understood the explanations given, the respondents were required to fill out the approval format to be the respondent, in which the woman was entitled to choose to be a respondent or unwilling, after determining the choice of participation, and then requesting to sign the approval format. In the case and control, respondents were given a questionnaire with the same questionnaire.

Findings:

Table 1. Cues to Action or Trigger Influence to the Implementation of Early Detection of Cervical Cancer VIA Method at Health Center Working Area of Health Office of Kediri City 2017

No	The Characteristics	Categories	VIA checking up				Total		OR value	CI 95%
			Yes		No					
			N	Percentage	N	Percentage	N	Percentage		
1	Physic	Heavy	203	49.8	205	50.2	408	100	-	-
		Very heavy	2	100	0	0.0	2	100	-	-
2	Information from televisions	High	105	64.8	57	35.2	162	100	2.7	1.8–4.1
		Low	100	40.3	148	59.7	248	100	ref	
		P value = 0.000**								
3	Recommendation from the doctor		93	62.8	55	37.2	148	100	2.3	1.5–3.4
		Low	112	42.7	150	57.3	262	100	ref	
		P value = 0.000**								

No	The Characteristics	Categories	VIA checking up				Total		OR value	CI 95%
			Yes		No					
			N	Percentage	N	Percentage	N	Percentage		
4	Recommendation from the midwife	High	92	65.2	49	34.8	141	100	2.6	1.7–3.9
		Low	113	42.0	156	58.0	269	100	ref	
		P value = 0.000**								
5	Friend suggestion	High	106	63.5	61	36.5	167	100	2.5	1.7–3.8
		Low	99	40.7	144	59.3	243	100	ref	
		P value = 0.000**								
6	Having seen to the women who have cervical cancer	High	79	57.7	58	42.3	137	100	1.6	1.1–2.4
		Low	126	46.2	147	53.8	273	100	ref	
		P value = 0.028*								
7	Having seen friends who have cervical cancer	High	66	57.4	49	42.6	115	100	1.5	0.9–2.3
		Low	139	47.1	156	52.9	295	100	ref	
		P value = 0.06								
8	Reading book or leaflet	High	74	59.7	50	40.3	124	100	1.8	1.2–2.7
		Low	131	45.8	155	54.2	286	100	ref	
		P value = 0.01*								

Table 1 describes the results of two variables analysis between various triggers in the behavior of early detection of cervical cancer with the implementation of VIA checking up. The result of bivariable analysis between information from television with VIA implementation showed that the information from television had a statistically significant relationship with VIA implementation. The analysis results were obtained OR: 2.7 (95% CI 1.8 - 4.1) on information from high television. Based on the results, women who received information from high television about early detection of cervical cancer had a 2.7 times higher possibility to perform VIA examination compared with women received information from low television.

The result of bivariable analysis between a recommendation from a physician and VIA implementation showed that recommendation from a doctor was statistically had a significant relationship with VIA implementation. The analysis results were obtained OR: 2.3 (95% CI 1.5 - 3.4) on the recommendation of a high doctor. Based on the results, women who received recommendations from high doctors had a 2.3 times higher possibility to perform VIA examination compared with women who received recommendations from low physicians.

The result of bivariable analysis between a recommendation from a midwife and VIA implementation showed that recommendation from a midwife had a statistically significant relationship with VIA implementation. The analysis results were obtained OR: 2.6 (95% CI 1.7 - 3.9) on the recommendation of a high midwife. Based on the results, women who received recommendations from midwives have a 2.6 times higher possibility to perform VIA examinations compared with women who received recommendations from low midwives.

The result of bivariable analysis between friend suggestion and VIA implementation showed that friend suggestion had a statistically significant correlation with VIA implementation. The analysis results were obtained OR: 2.5 (95% CI 1.7 - 3.8) at the advice of a friend. Based on the results, women who received advice from high friends had 2.5 times higher possibility to perform VIA examination compared with women who received low friend suggestions.

The results of bivariable analysis between having seen women with cervical cancer with the implementation of VIA showed that having seen women with cervical cancer statistically had a significant relationship with the implementation of VIA. The analysis results were obtained OR: 1.6 (95% CI 1.1 - 2.4) in ever saw women suffering from high cervical cancer. Based on the results, women who had seen women with high cervical cancer had 1.6 times higher possibilities to perform

VIA examination compared with women who had seen women with low cervical cancer.

The results of bivariable analysis between having seen a friend who had cancer with VIA implementation showed that having seen a friend who had cancer had not statistically had a significant relationship with VIA implementation (p-value 0.06 > α = 0.05).

The result of bivariable analysis between the reading book or leaflet with VIA implementation showed that reading books or leaflets statistically had a significant relationship with VIA implementation. The analysis results were obtained OR: 1.8 (95% CI 1.2 - 2.7) on high reading books or higher possibilities to VIA checking up compared with women who low read books or leaflets.

Discussion

Trigger or cues to action was a stimulus that motivates individuals to perform actions appropriate to health behavior[9]. The trigger was one of the triggering factors for deciding to accept or to reject alternate precautions. Triggers were needed to encourage individual involvement in health behaviors. These cues could be internal; the internal cues within the individual such as perceived and external symptoms derived from interpersonal interactions such as mass media, messages, advice, advice or consultation with health workers. In this study, the results showed that women who received the appropriate trigger would perform early detection of cervical cancer by using the VIA method.

Trigger or cues to action was a factor that leads to a change in one's behavior[10]. According to the results of this study, in terms of triggers, most respondents performed early detection of cervical cancer VIA method because of the advice of midwives, doctors and reading leaflets.

Based on the result of this research, the trigger variable consists of six indicators including information from television, the recommendation from a doctor, the recommendation from a midwife, suggestion of a friend, having seen cervical cancer patient, and reading book or leaflet. The physical condition indicator did not qualify as the compiler of the trigger variable, this is not in accordance with the trigger theory in[11], but in accordance with the results of the study[12] where the most dominant trigger was recommended by health personnel including the main midwife next recommendation from the doctor. The physical condition in this research did not become a trigger. The possible cause was the respondents in this study were all people who were still not affected by cervical cancer. Cervical cancer of stage one or stage of precancerous lesions did not show any complaints or signs and symptoms of any kind.

Based on the research[13] mentioned that the trigger in the form of recommendations from doctors and recommendations from the family proved to influence the use of influenza vaccine by parents in children. Triggers prove effective in reducing perceived obstacles or minimizing parental awareness about the negative effects of vaccine delivery and might increase perceived benefits about the effectiveness of influenza vaccine delivery in infants. thus increasing external motivation for using the influenza vaccine.

Research[14] suggested that cues to action or triggers were associated with adherence to taking antihypertensive drugs. Reading about disease information, knowing about services, and consulting with others about illness could trigger a person against compliance. Triggers were needed to encourage individual involvement in health behaviors. The trigger could come from internal or external. Internal triggers such as physiological cues such as pain. External triggers such as illness from family members, media reports[15]. The existence of clues, education, symptoms or information media could influence a person about the dangers of illness, thus, they felt the need to take action[16].

According to[11] one of the triggering sources was the physiological condition of humans in the form of a sense of discomfort or tension. When the tension was strong enough, it would motivate humans to act to meet their needs. Previous human experience and current physical condition would greatly affect the behavior to be taken. Research conducted by[12], mentions that medical triggers have greater or more effective power in losing weight than other triggers. Medical triggers could be advice from doctors or stories of patients who have been sick from being overweight. Medical triggers would cause health threats and increase motivation in patients to control weight.

Conclusion

There was an existence of a trigger effect on the implementation of early detection of cervical cancer VIA method. The trigger in this study consisted of information from television, recommendations from doctors, recommendations from midwives, advice from

friends, have seen cervical cancer patients, have seen cancer patients and read books. Based on the Odds Ratio (OR) the highest influence was information from televisions.

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References

1. Jia Y, Li S, Yang R, Zhou H, Xiang Q, Hu T, et al. Knowledge about Cervical Cancer and Barriers of Screening Program among Women in Wufeng County, a High-Incidence Region of Cervical Cancer in China. 2013;8(7):2–9.
2. Jaspers L, Budiningsih S, Wolterbeek R, Henderson FC, Peters AAW. Parental acceptance of human papillomavirus (HPV) vaccination in Indonesia : A cross-sectional study. Vaccine [Internet]. 2011;29(44):7785–93. Available from: http://dx.doi.org/10.1016/j.vaccine.2011.07.107
3. Donnelly TT. The Health-Care Practices of Vietnamese-Canadian Women : Cultural Influences on Breast. Vol. 38. 2006. p. 82–101.
4. Lee SH, Vigliotti JS, Vigliotti VS, Jones W. From human papillomavirus (HPV) detection to cervical cancer prevention in clinical practice. Cancers (Basel). 2014;6(4):2072–99.
5. Sidabutar S, Martini S, Umbul C. Analysis of Factors Affecting Women of Childbearing Age to Screen Using Visual Inspection with Acetic Acid. 2017;8(1):61–4.
6. Winarti E, Santoso B, Hargono R. Psychosocial Factors are Associated with Participation in Cervical Cancer Screening Programs : A Structural Equations Model. 2017;7(10):32–9.
7. Winarti E, Santoso B, Hargono R. Health Notions, Volume 2 Number 4 (April 2018) Trigger, Self Efficacy and Motivation in The Implementation of Cervical Cancer Screening 494 | Publisher : Humanistic Network for Science and Technology Health Notions, Volume 2 Number 4 (April 2018) I. 2018;2(4):494–9.
8. Fogg BJ. A Behavior Model for Persuasive Design. 2009;
9. Redding C a, Rossi JS, Rossi SR, Velicer WF, Prochaska JO. Health Behavior Models. Int Electron J Health Educ. 2000;3:180–93.
10. Edmonds E, Turner LW, Usdan SL. Osteoporosis knowledge, beliefs, and calcium intake of college students: Utilization of the health belief model. Open J Prev Med. 2012;02(01):27–34.
11. Loudon, D.L., dan Bitta A. Consumer Behavior Concepts, and Applications. United States: McGraw-Hill, INC; 1993.
12. Gorin AA, Phelan S, Hill JO, Wing RR. Medical Triggers are Associated with Better Short- and Long-term Weight Loss Outcomes. Prev Med (Baltim). 2004;39(3):612–6.
13. Malosh R, Ohmit SE, Petrie JG, Thompson MG, Aiello AE, Monto AS. Factors associated with influenza vaccine receipt in community dwelling adults and their children. Vaccine [Internet]. 2014;32(16):1841–7. Available from: http://dx.doi.org/10.1016/j.vaccine.2014.01.075
14. Zhao Y, Chen L, Qi W, Wang B. Application of the health belief model to improve the understanding of antihypertensive medication adherence among Chinese patients. Patient Educ Couns [Internet]. 2015;98(5):669–73. Available from: http://apps.webofknowledge.com.libproxy.ucl.ac.uk/full_record.do?product=UA&search_mode=GeneralSearch&qid=4&SID=S2xS9CYUVpG1r1nlLUx&page=1&doc=2
15. Sandra Graham BW. Graham-TheorPrinMotiv.pdf. 2002.
16. Brown KM. Health Belief Model. United States Public Heal [Internet]. 1999; Available from http://www.infosihat.gov.my/infosihat/artikelHP/bahanrujukan/HE_DAN_TEORI/DOC/Health Belief Model.doc%0Ahttp://www.med.usf.edu/~kmbrown/Health_Belief_Model_Overview.htm

Birth Length is a Dominant Risk Factor of Stunting among Children Aged 6-59 months in North Moyo Sub District, Sumbawa District West Nusa Tenggara, Indonesia

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Abstract

Background: Malnutrition is still a problem of public health that occurs in the area of North Moyo Subdistrict, Sumbawa District.

Objective: This analysis aims to determine the major factors of stunting among children aged 6-59 months in North Moyo Subdistrict, Sumbawa District.

Materials and Method: This was an observational study with a cross-sectional design. Chi-square statistical test was conducted to identify the incidence of stunting in children aged 6-59 months and the major factors associated with stunting in children aged 6-59 months. Statistical test results were declared significant if the p-value was less than 0.100. There were 406 children aged 6-59 months as sample.

Results: The prevalence of stunting was 34.9%.Several significant variables related to stunting are age, birth length, integrated health care visits, smoke, and mother's education ($p<0.05$). Birth length is a dominant factor of stunting after being controlled by age, visit to integrated health care, smoke and mother's education.

Conclusions: Efforts from the government are needed to improve nutrition programs that focus on efforts to prepare mothers since prior to pregnancy; improve nutrition programs related to nutrition education and promotion of balanced nutrition for the community that not only to mothers, but also to fathers; and improve the Hygienic and Healthy Behavior-related education in the community.

Keywords: *Stunting, children, birth length.*

Introduction

Stunting is a condition of growth failure in under-five as a result of chronic malnutrition from the womb until early childhood, so that the child is considered too short for their age. Globally, stunting affects about 21.9 % or 149 million children under 5 years of age in 2018. Children who suffer from stunting will probably never reach their maximum height and the brain will never develop to their maximum cognitive potential. These children start their lives at a disadvantage: they face learning difficulties in school, earn lower income as adults, and face obstacles to participate in their community.(1) Based on the 2018 National Basic Health Research data, it is known that the prevalence of stunted under-five in Indonesia is 30.6%; while, the prevalence of stunting in West Nusa Tenggara Province is 33.49%, and Sumbawa District is at 31.53%.(2)Although a decrease occurs compared to the 2013 National Basic Health Research data, the decrease is not significant and remains a public health problem because it is still above 20% according to WHO standards.

According to UNICEF, the stunting problem is a cumulative process and caused by inadequate nutrient

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intake or recurrent infectious diseases, or both. Stunting can also occur at fetal time, which is caused by poor nutritional intake during pregnancy, inadequate care and feeding practices, poor quality of food in line with the frequency of infection, so that it can inhibit growth.(3)

A meta-analysis study conducted in 37 developing countries found that 10.8 million stunting cases (out of 44.1 million) were caused by poor sanitation (7.2 million cases) and diarrhea (5.8 million cases).(4)A study by Cummin and Cairncross also stated that poor access to clean water, sanitation and hygiene has a significant detrimental effect on child growth and development.(5)

North Moyo Subdistrict in Sumbawa District is one of the areas for developing cattle farming for both meat and milk production in the Sumbawa District area and which will be sold to other regions, such as Java, Sumatra and other regions. With the localization of livestock-farming close to residential locations, it is likely to cause many health problems, especially for children under five. Nutritional Status Monitoring Results in 2017 shows that North Moyo Subdistrict is the subdistrict with the highest stunting prevalence, compared to 23 other Subdistricts in Sumbawa District, which is at 72.19%.

The high exposure of various risk factors above has a direct impact on the incidence of stunting for under-five. The aim of this study was to determine the major factors of stunting among children aged 6-59 months in North Moyo Subdistrict, Sumbawa District in 2019.

Materials and Method

This study used a cross-sectional study design. All variables observed in this study were carried out at the same time, obtained through direct interviews using questionnaires and anthropometric measurements. The study was conducted in North Moyo Subdistrict, Sumbawa District, West Nusa Tenggara Province. This study was conducted in June-August 2019.

The data collected were primary data in which the study subjects were children aged 6-59 months as many as 406 children. The data were collected related to child characteristics (age, sex, birth length, birth weight, anthropometric measurements (length/height), breast feeding record, food intake, infectious diseases, parity and number of household members), parent‘s education level, level of knowledge and attitude about health and nutrition, income level, and smoking habits, hygienic and healthy behavior, hand-washing habits, access to health care services, and food intake. Nutritional status data were obtained from length/height and age data, which was processed using WHO-ANTRO software. The analysis used was univariate and bivariate analysis.

Results

Characteristics of children and families: The total sample in this study was 406 children under five. Highest proportions of under-five are female (51.2%), age 24-59 months (62.1%), family members < 4 people (75.4%), regular visits to integrated health care (71.4%), exclusive breastfeeding (35.9%), ever experiencing infections (83.7%), not implementing Hygienic and Healthy Behavior (87.4%), and having smoker family members (77.1%). Highest proportions for under five's mothers were those attaining secondary education, and as housewives. Most of the under-five had low nutritional intakes, namely in energy, fat, and carbohydrate.

Characteristics of children with stunting: The nutritional status measurement results showed the mean z-score + SD was -1.27 ± 1.11 (min max -4.73 -3.18), with a stunting proportion of 34.5%. There is a significant relationship of the incidence of stunting in under-five with aged, birth length, mothers did not wash their hands with running water and soap, visits to integrated health care, and mother and father's education ($p < 0.100$).

In multivariate analysis, six variables were included in modelling namely age, birth length, mother's education, visit to integrated health care, and family members smoke (Table 1).The analysis result showed that standardized coefficient beta value of birth length variable was the largest, which means birth length was the dominant risk factor of stunting in children aged 6-59 months after controlling for age, mother's education, visit to integrated health care, and family members smoke.

Table 1. Multivariate analysis results in stunting among children aged 6–59 months

Variables	B	P-value	OR
Age	-1.034	0.0005	0.36
Birth length	0.974	0.003	2.65
Mother's education	0.461	0.017	1.59
Visit to integrated health	0.523	0.050	1.69
Family members smoke	0.699	0.027	2.012

Discussion

Nutritional problem is a serious problem that occurs in Sumbawa District, especially stunting, making Sumbawa District determined as one of 100 districts/ cities with locus stunting in an effort to reduce stunting in its region.[6] In this study, the magnitude of stunting in North Moyo Subdistrict was 34.5%, still above the standards set by WHO, so that North Moyo Subdistrict was still categorized as a health problem area specifically related to stunting.

In this study, the age of children under five was related to stunting, in which children over 2 years had a higher risk for stunting than children under 2 years. This could be related to changes in food intake received by children over 2 years at which most of them have begun to be weaned and there is an adaptation process related to changes in feeding which most likely majority of children over 2 years do not adapt well, added with mostly low education level of mothers, that contribute to the incidence of stunting in children over 2 years. Similar results from several studies that show significant relationship between age and stunting, in which the risk of stunting is higher in children over 2 years.[7],[8],[9]

In this study, mother's education was related to the incidence of stunting in children aged 6-59 months, in which children with low-educated mothers will be at risk of stunting by 2.06 times higher than children with high-educated mothers. In line with studies conducted in The Royal Kingdom of Bhutan 2015 showed the prevalence of stunting was significantly higher among children whose mothers without any formal education, and/or born to families where the household head did not have any formal education.[10] Maternal education that it may influence child growth and health through better feeding practices and home hygiene.[11]

Integrated health care, commonly known as *Posyandu* in Indonesia, is a form of community resource health efforts, which is managed and organized from, by, for and with the community where this activity had been carried out by community in early 1970s. Integrated health care is a means to facilitate community access to health care services, especially in monitoring the growth of children under five. In this study, children under five who were not routinely taken to the integrated health care significantly increased the risk of stunting incidence. Similar to other studies conducted in three districts in Indonesia, namely Sikka, Jayawijaya, and Klaten Districts, the prevalence of stunting was also significantly lower among children of mothers who had good access to health care services.[9]

This study also showed that children under five coming from families with smoker family members had a higher risk for stunting. This is similar to studies conducted in rural and urban areas of Indonesia where smoker fathers have been proven to shift household income from food to tobacco, putting infants and children at greater risk for chronic malnutrition.[12]

Birth length was a dominant risk factor of stunting in children aged 6-59 months after controlling for age, mother's education, visit to integrated health care, and family members smoke. A study in Melawi and Bogor Indonesia showed that newborn's length was related to the incidence of stunting in children aged 6-59 months.[8],[13] Length of birth is important indicator as the initial growth and development of the individual in the next life. Birth weight and length are positively associated with later height from infancy to adulthood. Children defined as SGA (Small for Gestational Age) show that birth length is somewhat more sensitive than birth weight in predicting shortness in adulthood. The difference, however, is overtaken by the persistence or not of shortness at 2 years of age. It can be concluded that children born SGA will show remain short, however, and in these children full catch-up never occurs.[14]

Although both genetic and individual specific environmental factors influence the association between birth size and later height, genetic factors are more importantly influenced birth length rather than birth weight.[15] Various factors that increase the risk of children with low birth length. The Lancet 2013 nutrition series has identified maternal undernutrition during pregnancy as a major determinant of poor fetal growth and child stunting.[16]

Conclusion

This study showed the prevalence of stunting among children aged 6-59 months in North Moyo Subdistrict, Sumbawa District was still high at 34.9% and included in the category of health problem.

Significant variables related to stunting are age, birth length, mother's education, integrated health care visits, and smoke. Birth length is a dominant factor of stunting in children aged 6-59 months in North Moyo

District after being controlled by age, visit to integrated health care, mother's education, and smoking.

Therefore, it is very important to ensure that women enter pregnancy in good health and with adequate nutritional status. Efforts from the government are needed to improve nutrition programs that focus on efforts to prepare mothers since prior to pregnancy; improve nutrition programs related to nutrition education and promotion of balanced nutrition for the community that not only to mothers, but also to fathers; and improve the Hygienic and Healthy Behavior-related education in the community.

Conflict of Interest Statement: The authors declare that there is no conflict of interest.

Ethical Clearance: The study was approved by the Commission of Research Expert and Research Ethics of Faculty of Public Health, Universitas Indonesia (Letter of Approval No. 308/UN2.F10/PPM.00.02/2019 dated 15 May 2019).

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References

1. WHO. Levels and trends in child malnutirtion: key findings of the 2019 Edition of the Joint Child Malnutrition Estimates. 2019;1–15. Available from: https://www.who.int/nutgrowthdb/jme-2019-key-findings.pdf?ua=1
2. Indonesian Ministry of Health. Indonesia. Basic Health Research Report 2018. 2018;
3. UNICEF. Improving child nutrition: The achievable imperative for global progress. Division of Communication, UNICEF. 2013.
4. Danaei G, Andrews KG, Sudfeld CR, Mccoy C, Peet E, Sania A, et al. Risk Factors for Childhood Stunting in 137 Developing Countries: A Comparative Risk Assessment Analysis at Global , Regional , and Country Levels. 2016;1–18.
5. Cumming O & Cairncross S. Review Article Can water, sanitation and hygiene help eliminate stunting ? Current evidence and policy implications. 2016;12:91–105.
6. National Team for the Acceleration of Poverty Reduction. 100 Districts/Cities Priority for Intervention of Stunting 2017;2.
7. Tosheno D, Mehretie Adinew Y, Thangavel T, Bitew Workie S. Risk Factors of Underweight in Children Aged 6-59 Months in Ethiopia. J Nutr Metab. 2017;2017.
8. Ntenda PAM & Chuang YC. Analysis of individual-level and community-level effects on childhood undernutrition in Malawi. Pediatr Neonatol [Internet]. 2018;59(4):380–9. Available from: https://doi.org/10.1016/j.pedneo.2017.11.019
9. Torlesse H, Cronin AA, Sebayang SK, Nandy R. Determinants of stunting in Indonesian children : evidence from a cross-sectional survey indicate a prominent role for the water , sanitation and hygiene sector in stunting reduction. BMC Public Health [Internet]. 2016;1–11. Available from: http://dx.doi.org/10.1186/s12889-016-3339-8
10. Aguayo VM, Badgaiyan N, Paintal K. Determinants of child stunting in the Royal Kingdom of Bhutan: An in-depth analysis of nationally representative data. Matern Child Nutr. 2015 Jul 1;11(3):333–45.
11. Armar-Klemesu M, Ruel MT, Maxwell DG, Levin CE, Morris SS. Poor Maternal Schooling Is the Main Constraint to Good Child Care Practices in Accra. J Nutr [Internet]. 2000 Jun 1 [cited 2019 Nov 29];130(6):1597–607. Available from: https://academic.oup.com/jn/article/130/6/1597-1607/4686118
12. Semba RD, De Pee S, Sun K, Best CM, Sari M, Bloem MW. Paternal smoking and increased risk of infant and under-5 child mortality in Indonesia. Am J Public Health. 2008;98(10):1824–6.
13. Nur Handayani U, Rika R, Anies I, Kencana S, Bunga Christitha Rosah BC, Nurillah A, et al. Short birth length, low birth weight and maternal short stature are dominant risks of stunting among children aged 0-23 months: Evidence from Bogor longitudinal study on child growth and development, Indonesia. Malays J Nutr. 2018;24(29):11–23.
14. J. Larry Jameson, David M. de Kretser, Ashley B. Grossman, John T. Potts, Jr., Leslie J De Groot, Linda C. Giudice, Shlomo Melmed GCW.

Endocrinology: Adult and Pediatric Book 7th Edition [Internet]. 7th ed. 2016 [cited 2019 Dec 3]. Available from: https://www.sciencedirect.com/book/9780323189071/endocrinology-adult-and-pediatric

15. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, de Onis M, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. Lancet (London, England). 2013 Aug;382(9890):427–51.

Extra-Levator Abdomino-Perineal Excision Versus Standard Abdomino-Perineal Excision: A Prospective Study in the Egyptian National Cancer Institute

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Abstract

Background: The standard abdomino-perineal excision (SAPE) is associated with a high incidence of Intraoperative Bowel Perforation (IOBP) and positive circumferential resection margin (CRM), both are major determinants of local recurrence. This led to the introduction of the more radical surgery; extra levator abdomino-perineal excision (ELAPE).

Method: This prospective pilot study included 40 patients with low rectal cancer. They were randomized to either ELAPE Group or SAPE Group. The study was carried out over 54 months, from January 2014 to June 2018. All patients were evaluated regarding operative factors, early postoperative complications, and oncological outcomes (CRM and local recurrence).

Results: IOBP Occurred in one *patient in* ELAPE Group (5%) vs. seven in SAPE Group (35%) (p=0.044). CRM was positive in seven patients of the SAPE group (35%) vs. one (5%) in the ELAPE group (p=0.004). Local recurrence occurred in six patients (30%) of the SAPE group vs. one (5%) in the ELAPE group (p=0.091). There was no significant difference between the two groups regarding perineal wound complications, urinary complications, Operative factors, and Length of Hospital Stay (LHS).

Conclusion: ELAPE is an oncologically superior and equally safe procedure to replace SAPE without compromising patients' QOL.

Keywords: *Abdomino-perineal; positive margin; extra-levator; local recurrence.*

Introduction

Important goals during rectal cancer treatment are to minimize the risk of local recurrence and to preserve the quality of bowel, bladder, and sexual function. For tumors lying less than 2 cm above the anorectal ring, abdomino-perineal resection (APR) is usually unavoidable[1].

It is well-established that CRM involvement and specimen perforation are documented determinants of local recurrence of low rectal cancer[2]. Therefore, the perineal dissection part of SAPE has been in focus as it is considered a vulnerable phase for specimen perforation and positive CRM [3,4][8,9].This led to the introduction of a more extensive and detailed type of perineal dissection aiming to improve the oncological outcomes; extra-levator abdomino-perineal excision (ELAPE) [5,6].

Thisstudy aims to provide a thorough description of ELAPE as a new technique introduced in the National Cancer Institute (NCI), Cairo University, and to

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compare it with SAPE regarding oncological outcomes and postoperative complications.

Patients and Method

This prospective pilot study involved 40 patients with low rectal cancer who were candidates for APR. The study compared ELAPE versus SAPE regarding oncological outcomes and early postoperative complications. All patients were followed for a minimum period of 24 months. The study protocol was approved by the institutional review board of the NCI. Informed consent was obtained from all patients after a comprehensive explanation of the techniques and outcomes.

Randomization was done using a computer-generated random table. Consecutive numbers were included in opaque sealed envelopes. Patients were randomized into two equal groups according to the type of surgery; ELAPE group and SAPE group. The patient, pathology, and radiology specialists were blinded to the nature of the procedure.

Surgical Technique (Figure 1-4): The abdomino-pelvic phase was the same for the two techniques. In the ELAPE group, the lower limit of rectal dissection stopped earlier than in the SAPE group so that the distal tapering end of the mesorectum was not dissected off the levators and was left undisturbed to be addressed only through the perineal part.

The perineal phase for ELAPE was done while the patient in the prone Jack-Knife position for better exposure. Maximizing the CRM didn't mean to include a large amount of the ischeo-anal fat unless grossly involved. We continued dissection till the inferior surface of the levators was exposed entirely bilaterally. The pelvis was entered posteriorly by disarticulating the coccyx. The levators were clasped between 2 fingers, and their lateral-most attachment was divided. In the SAPE group, the perineal dissection was done in the Lithotomy position and was carried in a plane parallel to the wall of the anal canal and continued through and not outside the levator complex. For both groups, the perineal defect was reconstructed by using a pedicled omental flap. A composite mesh was used in 5 patients only.

In the two groups, intraoperative and early postoperative complications were evaluated. Then, the oncological outcomes, including CRM and local recurrence, were recorded within 24 months.

Pathological examination of the surgical specimens was done by expert pathologists at NCI blinded about the procedure. We followed the grading system of Nagetegaal et al. [7] for grading of APR specimens. Grade 3 specimens were those with an extralevator plain. Grade 2 specimens were those with sphincter plain. Grade 1 specimens were those with intra-sphincteric plain and/or mucosal exposure and perforation.

The primary outcome measures were intraoperative bowel perforation (IOBP) CRM positivity and local recurrence. IOBP was defined as "*inadvertent"* perforation only during pelvic or perineal dissection located in relation to the radial margin of the tumor. Positive CRM was defined as any tumor located within less than 1 mm from the inked circumferential margin. Local recurrence was defined as true pelvic recurrence and/or perineal recurrence within the 24 months' follow-up period that was detected radiologically by MRI or PET-CT and/or histologically proven.

Secondary outcome measures were intraoperative blood loss, operative time, perineal wound complications, urinary retention, and length of hospital stay. Perineal wound complications included wound infection or dehiscence.Urinary retentionwas defined as delayed urinary catheter removal beyond postoperative day 6.

Statistical Method: Statistical analysis was done using IBM© SPSS© Statistics version 22 *(IBM© Corp., Armonk, NY, USA)*. Numerical data were expressed as mean and standard deviation or median and range as appropriate. Qualitative data were expressed as frequency and percentage. Chi-square test or Fisher's exact test was used to examine the relation between qualitative variables. For not normally distributed quantitative data, a comparison between the two groups was made using the Mann-Whitney test (non-parametric t-test). All tests were two-tailed. A p-value < 0.05 was considered significant.

Results

There was no significant difference between the ELAPE group and the SAPE group regarding demographic, clinical, and operative characteristics. All clinically and/or radiologically T3 and T4 patients received neoadjuvant treatment, the percentage of which was equally 85% in both groups. Blood loss and operative time were comparable between the two groups. Pathological factors, including pT, pN, grade, and margins, were comparable between the two groups (Table I).

Table II shows that IOBP occurred in one patient with a locally advanced tumor in ELAPE Group A (5%) compared to 7 patients in SAPE Group (p = 0.044). All perforations were located at the point of maximum wasting in the specimen.

Severn patients (35%) of SAPE Group had positive CRM compared to only one in the ELAPE group (p=0.044). Within the follow-up period of 24 months, six patients (30%) of the SAPE group developed local recurrence compared to only one in the ELAPE group (p=0.091). All patients with positive CRM had local recurrence except only one patient in the SAPE group. All recurrences were documented by imaging and only two were histologically proven. Secondary outcome measures, including perineal wound complications, urinary retention, and hospital stay, were all comparable between the two groups (Table II).

Table I: Disease characteristics of the two studied group

	ELAPE Group A n=20	**SAPE Group n=20**	**p-value**
Pathological T-Stage			**0.621**
pT2	6 (30%)	5 (25%)	
pT3	7 (35%)	10 (50%)	
pT4	7 (35%)	5 (25%)	
Nodal stage			0.433
pN0	11 (55%)	10 (50%)	
pN1	6 (30%)	9 (45%)	
pN2	3 (15%)	1 (5%)	
Histological Grade			0.592
G1	4 (20%)	4 (20%)	
G2	12 (60%)	9 (45%)	
G3	4 (20%)	7 (35%)	
Proximal Margin (cm)*	30 (16-90)	30 (18-40)	0.882
Distal Margin (cm)*	2 (0.1-4.0)	3.0 (1.0-4.0)	0.211

Data were expressed as number (%), or median (range)

Table II: Outcome of surgery and postoperative complications of the two studied group

	ELAPE Group n=20	**SAPE Group n=20**	**p-value**
Intraoperative bowel perforation	1 (5%)	7 (35%)	0.044
Positive CRM	1 (5%)	7 (35%)	0.044
Local Recurrence	1 (5%)	6 (30%)	0.091
Perineal Wound Infection	10 (50%)	9 (45%)	0.752
Perineal Wound Dehiscence	5 (25%)	2 (10%)	0.407
Perineal Abscess	0	2 (10%)	0.487
Urinary Retention	8 (40%)	4 (20%)	0.168
Length of hospital stay (days)	8.5 (5.0-15.0)	6.0 (4.0-20.0)	0.383

Data were expressed as number (%), or median (range), CRM: circumferential resection margin

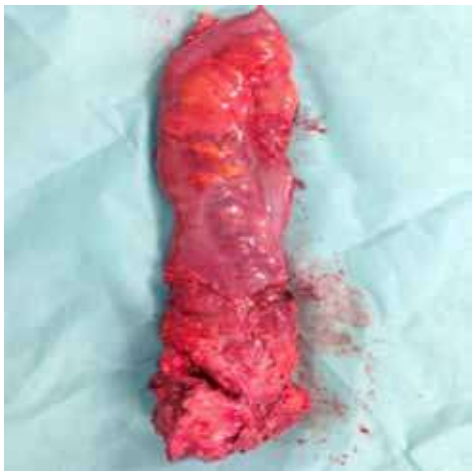

Figure 1: IOB perforation

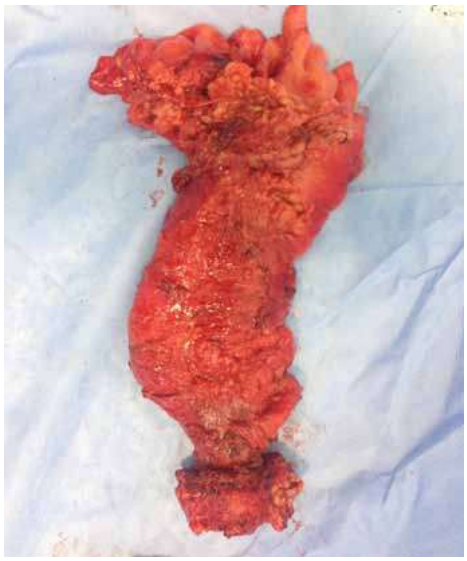

Figure 2: typical waist of the specimen in SAPE

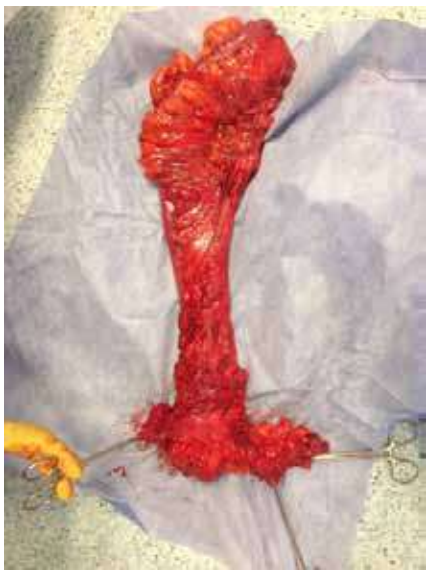

Figure 3: extra levator APR showing complete excision of the levator muscle

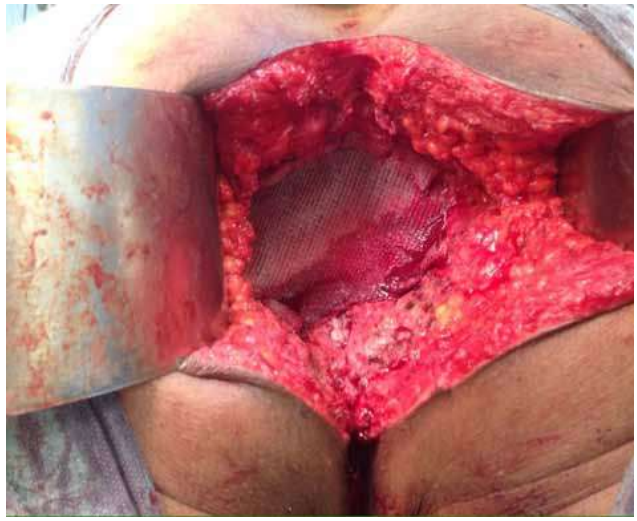

Figure 4: Reconstruction of the pelvic floor with mesh

Discussion

ELAPE, through a more radical perineal approach, has addressed the problems associated with SAPE, i.e., threatened CRM and IOBP that have been considered independent risk factors for local recurrence [5]. The principles involve avoiding dissecting the mesorectum off the levator-ani muscle and dividing the levators at their lateral-most point[8].

Several studies have compared ELAPE and SAPE regarding oncological outcomes, but most of these studies were systematic reviews and multi-center trials [3,6,9].Our study is a prospective single-institution pilot study that details the new perineal approach by ELAPE and compares ELAPE and SAPE.

In the current study, blood loss was comparable between the two groups. Operative time was not prolongedas it was assumed for a new technique requiring changing the patient's position. In agreement with the current results, pooled data from three studies reported no significant difference in operating time between ELAPE and SAPE. Pooled data from two studies reported slightly less, but comparable blood loss in ELAPE than APE [10–12].

In our study, we tried to stick to the original technique that was first published by Holm et al. [5]. By defining the lower limit of pelvic dissection and attacking the pelvic floor at their origin, we managed to achieve what we call "a site-specific CRM," i.e., maximum CRM at the point where specimen integrity is threatened the most. This led to much fewer IOBP

and wider CRM in the ELAPE group with a statistically significant difference. A systematic review pooled data from 1,097 patients who underwent ELAPE and 4,147 patients who underwent SAPE. The authors reported IOBP of 4.1% vs. 10.4%, respectively [9]. These findings confirmed the findings of another retrospective study that reported lower perforations in ELAPE compared to SAPE (3.7% vs. 22.8%, respectively) [13].

In the current study, the new technique didn't have an impact on the rate of wound complications and length of hospital stay. Though the overall incidence of perineal wound infection was relatively high (45% and 50%), the two groups were comparable. These results are comparable to that of two meta-analyses that showed no significant difference in the rate of postoperative complications between ELAPE and SAPE [6,14]. However, other studies reported a higher incidence of perineal wound complications in ELAPE patients [13,15].

The extent of tissue removal in ELAPE can result in autonomic nerve damage, especially at the postero-lateral aspect of the prostate/vagina. This might explain the relatively higher incidence of urinary retention in the ELAPE group, with no significant difference between the two groups (p=0.168). Our results regarding urinary complications were comparable to the works of Ramsay et al., West et al., and Palmer et al., who showed a relatively high incidence of urinary complications in the ELAPE group, but the results were statistically comparable[13,16,17].

In our study, CRM was positive in 7 patients of the SAPE group compared to only one in the ELAPE group (p=0.004).Though the number of local recurrences was higher in the SAPE group, it was near but not statistically significant (p=0.091). Keeping with our results, the retrospective study by West et al. showed Less CRM positivity in the ELAPE group (14.8% vs. 40.6%; p=0.013), but this study didn't investigate Local recurrence rates[18]. A previous prospective study comparing ELAPE (16 patients) and SAPE(20 patients) reported comparable results to the current study regarding CRM and local recurrence [12]. Stelzner et al.[9] reported a significant relative risk reduction of local recurrence of 44.5% in extended vs. standard APE.

A systematic review showed a 37.7% relative risk reduction of CRM involvement in extended vs. standard APE [9]. A retrospective analysis from 2000 to 2010 also showed a reduction in CRM positivity/R1 resections and the local recurrence rate after the introduction of ELAPE[19]. It has also been demonstrated that ELAPE can reduce the incidence of positive CRM in the advanced stages of low rectal cancer. These results suggest that ELAPE can be selected for specific T-stages clarifying the indication of this technique[19,20]. In the current study, all local recurrences were observed in patients who had pT3-4 and received preoperative treatment except one patient in the SAPE group who didn't receive a preoperative treatment.

In contrast to our study, a previous retrospective study did not find a significant difference between ELAPE and SAPE in the rate of positive CRM or local recurrence [3]. Similar results were observed in the meta-analysis done by Yang et al. [14].

Conclusion

ELAPE offersa more standardized perineal approach. Oncological superiority comes from maximizing the volume of tissues resected around the tumor at the lower end of the mesorectum. Our study showed that it was associated with much less IOBP and positive CRM, which predict the local recurrence. It was a more efficient oncologically and equally safe procedure to replace SAPE without compromising the postoperative course.

References

1. Chessin DB, Hartley J, Cohen AM, et al. Rectus flap reconstruction decreases perineal wound complications after pelvic chemoradiation and surgery: a cohort study. Ann Surg Oncol 2005; 12: 104–110.
2. Porter GA, O'Keefe GE, Yakimets WW. Inadvertent perforation of the rectum during abdominoperineal resection. Am J Surg 1996; 172: 324–327.
3. Perdawood SK, Lund T. Extralevator versus standard abdominoperineal excision for rectal cancer. Tech Coloproctol 2015; 19: 145–152.
4. Salerno G, Chandler I, Wotherspoon A, et al. Sites of surgical wasting in the abdominoperineal specimen. Br J Surg 2008; 95: 1147–1154.
5. Holm T, Ljung A, Häggmark T, et al. Extended abdominoperineal resection with gluteus maximus flap reconstruction of the pelvic floor for rectal cancer. Br J Surg 2007; 94: 232–238.
6. Yu H-C, Peng H, He X-S, et al. Comparison of short- and long-term outcomes after extralevator

abdominoperineal excision and standard abdominoperineal excision for rectal cancer: a systematic review and meta-analysis. Int J Colorectal Dis 2014; 29: 183–191.

7. Nagtegaal ID, van de Velde CJH, Marijnen CAM, et al. Low rectal cancer: a call for a change of approach in abdominoperineal resection. J Clin Oncol 2005; 23: 9257–9264.
8. Shihab OC, Heald RJ, Holm T, et al. A pictorial description of extralevator abdominoperineal excision for low rectal cancer. Colorectal Dis 2012; 14: e655-660.
9. Stelzner S, Koehler C, Stelzer J, et al. Extended abdominoperineal excision vs. standard abdominoperineal excision in rectal cancer--a systematic overview. Int J Colorectal Dis 2011; 26: 1227–1240.
10. Angenete E, Correa-Marinez A, Heath J, et al. Ostomy function after abdominoperineal resection-a clinical and patient evaluation. Int J Colorectal Dis 2012; 27: 1267–1274.
11. Han JG, Wang ZJ, Wei GH, et al. Randomized clinical trial of conventional versus cylindrical abdominoperineal resection for locally advanced lower rectal cancer. Am J Surg 2012; 204: 274–282.
12. Vaughan-Shaw PG, Cheung T, Knight JS, et al. A prospective case-control study of extralevator abdominoperineal excision (ELAPE) of the rectum versus conventional laparoscopic and open abdominoperineal excision: comparative analysis of short-term outcomes and quality of life. Tech Coloproctol 2012; 16: 355–362.
13. West NP, Anderin C, Smith KJE, et al. Multicentre experience with extralevator abdominoperineal excision for low rectal cancer. Br J Surg 2010; 97: 588–599.
14. Yang Y, Xu H, Shang Z, et al. Outcome of extralevator abdominoperineal excision over conventional abdominoperineal excision for low rectal tumor: a meta-analysis. Int J Clin Exp Med 2015; 8: 14855–14862.
15. Asplund D, Haglind E, Angenete E. Outcome of extralevator abdominoperineal excision compared with standard surgery: results from a single centre. Colorectal Dis 2012; 14: 1191–1196.
16. Palmer G, Anderin C, Martling A, et al. Local control and survival after extralevator abdominoperineal excision for locally advanced or low rectal cancer. Colorectal Dis 2014; 16: 527–532.
17. Ramsay G, Parnaby C, Mackay C, et al. Analysis of outcome using a levator sparing technique of abdominoperineal excision of rectum and anus. Cylindrical ELAPE is not necessary in all patients. Eur J Surg Oncol 2013; 39: 1219–1224.
18. West NP, Finan PJ, Anderin C, et al. Evidence of the oncologic superiority of cylindrical abdominoperineal excision for low rectal cancer. J Clin Oncol 2008; 26: 3517–3522.
19. Martijnse IS, Dudink RL, West NP, et al. Focus on extralevator perineal dissection in supine position for low rectal cancer has led to better quality of surgery and oncologic outcome. Ann Surg Oncol 2012; 19: 786–793.
20. Yun L. Comparison of Extralevator Abdominoperineal Excision (ELAPE) and Abdominal-Perineal Resection (APR). ij Sciences 2016; 2: 107–112.

A Comparable Study of Ovarian Response to Controlled Ovarian Stimulation between Overweight/Obese and Normal Weight Women with Polycystic Ovary Syndrome Whom Undergone Intracytoplasmic Sperm Injection

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Abstract

The prevalence of obesity is increasing world-wide. Obesity is considered to have a vital role in the pathogenesis of polycystic ovary syndrome (PCOS). An assisted reproduction technique, Intra cytoplasmic sperm injection (ICSI), has been used increasingly for the infertility management in those patients. However, data regarding the effects of obesity on the outcome of this technique in PCOS patients is limited.

Aim: This study compared the response to controlled ovarian stimulation (COS) between overweight/obese and normal weight women with PCOS whom undergone ICSI.

Materials and Method: 53 PCOS infertile females were included. They were divided according to their body mass index (BMI) into two groups: (Group I normal weight and group II overweight and obese). Both were included in COS/ICSI program. Assessment of total dose of gonadotropins, duration of stimulated cycles, total number of retrieved oocytes, their quality and development of OHSS was undertaken.

Results: The study showed that despite being insignificant, the total dose of gonadotropin used for stimulation of group II women was higher than that used for women in group I: 1729.06 iu vs 1380.00, p-value=0.1 with a longer duration cycle 10.0 days vs 9.4, p-value=0.5, the mean total number of retrieved oocytes from the group II was more than that from group I women, while the mean total number of immature oocytes retrieved from group II women was significantly less than that from group I (1.7% vs 3.7%, p-value=0.04). The rate of developing OHSS in group II was more than that in group I.

Conclusion: Overweight and obese PCOS women need higher doses of gonadotropin to be stimulated with longer duration of the treatment cycle; howerever, they produce a higher number of oocytes with a higher maturity during COS. Also, they are more likely to develop OHSS when stimulated in comparison to normal weight PCOS women.

Keywords: *PCOS, Overweight and Obesity, Oocyte quality and OHSS.*

Introduction

Polycystic ovarian syndrome (PCOS) is a common endocrine disorder affects the reproductive age women and is responsible for up to 80% of causes of anovulatory infertility making a large number of those women seeking assisted reproductive techniques[1]. Weight and body mass index are important parameters of normal reproductive functions. Approximately, thirty five percent of PCOS women are overweight and obese[2]. A close correlation between obesity and symptom severity of the syndrome is present[3]. Controlled ovarian stimulation and assisted

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reproduction outcomes are negatively affected with a higher miscarriage rate[4] which may be partially attributed to elevated LH, intra-follicular and serum androgen levels excess and follicular degeneration [5]. Although, different studies tried to discuss the effect of obesity on COS/ICSI outcomes in PCOS patients but their results were varied and inconclusive [6-8].

So, this study tries to investigate the effect of obesity in PCOS women on ovarian response by a comparison with an aged-matched (≤35 ys.) normal weight PCOS women whom subjected to the same induction protocol (GnRH antagonist + r-FSH).

Study Design: It is a prospective cohort study that was conducted at the Fertility Center, Al- Sadr Medical City, Al- Najaf AL-Ashraf, in Iraq.

Materials and Method

Our study recruited fifty three sub-fertile females with PCOS whom had been diagnosed according to Rotterdam criteria [9]. The age was less than 35 years old and participants' male partners had either normal or mild-moderate impairment in semen parameters (according to World Health Organization criteria in 1999 [10]). All females and their partners were evaluated by history, physical examination, BMI and fertility investigations (cycle day 2 hormones E2, LH, FSH, prolactin, endometrial thickness by transvaginal ultrasound (TVUS) and male seminal fluid analysis). The participants then divided in to two groups according to their BMI (weight in kilograms / square height in meters): group I included women of normal body weight (BMI from 19 to 24.9) and group II included overweight and obese women (BMI ≥ 25). Non-PCOS women (normal ovulatory) and PCOS women with a BMI less than 19 were excluded. All were subjected to COS by gonadotropin releasing hormone (GnRH) antagonist and gonadotropins. Assessment of the dose and duration of treatment cycle and monitoring of the development of OHSS by TVUS and serial E2 assay was done. Once they produce sufficient number of oocytes, a trigger by human chorionic gonadotropin (HCG) was done followed by oocyte retrieval 34-36 hours later, under TVUS and general anesthesia. An evaluation of oocyte quality was done under inverted microscope. Only those oocytes which extruded the first polar body to the perivitelline space will be considered as mature (MII) oocyte [11].

Results

Table (1) shows the means of age, cycle day 2 hormones and endometrial thickness (ET) of both groups with no significant difference except for LH level which was significantly less in overweight and obese group , p-value= 0.05.

Table (1): A comparison between both groups regarding age, hormonal profile and ET.

Parameter	G-I (N=10) Mean ±SD	G-II (n=43) Mean ±SD	P-value
Age (Years)	26.3±3.1	28.3±3.9	0.12
E2(pg/ml)	33.3±12.00	43.19±23.6	0.20
LH(iu/l)	6.6±5.6	4.2±2.6	0.05
FSH(iu/l)	5.1 ±1.8	4.8 ±1.3	0.48
Prolactin(ng/dl)	26.4±16.2	25.3±10.5	0.79
ET (mm)	3.9±0.8	3.7±1.01	0.70

Table (2) demonstrates the total dose and duration of gonadotropin stimulation and E2 & ET at the day of HCG trigger. Overweight and obese women were stimulated with higher doses and for longer duration, had a higher E2 level and a lower ET thickness than normal weight women but with no significant difference, p-value= 0.10, 0.50, 0.71 and 0.53 respectively.

Table (2): A comparison between both groups regarding total dose, duration of gonadotropins, E2 and ET at day of trigger.

Parameter	G-I Mean ±SD	G-II Mean ±SD	P-value
Total dose (iu)	1380.0 ±372.8	1729.0± 644.4	0.10
Duration(days)	9.4 ±1.2	10.0± 1.7	0.50
E2(pg/ml)	2250.0±1191.0	3729.6±11537.0	0.71
ET(mm)	10.2±2.5	9.6±2.5	0.53

Table (3) shows the response to COS. Overweight and obese women insignificantly produced more mature oocytes and the mean total number of immature oocytes was significantly less 1.7±2.0 vs 3.7±4.2, p-value=0.04.

Table (3): Controlled ovarian stimulation response between both studied groups.

Parameter	G-I Mean ±SD	G-II Mean ±SD	P-value
To. No. of oocytes	10.8 ±3.3	13.0 ±8.3	0.40
Mature (MII)	7.8±2.6	11.1±7.7	0.22
Immature(GV+MI)	3.7±4.2	1.7±2.0	0.04

Table (4) illustrates the rate of OHSS development in both groups. None of normal weight women developed OHSS, while 10 out of 43 overweight and obese women developed OHSS. The rate of OHSS development in overweight and obese was 23.2% vs 00.00% in normal weight women, p-value=0.09.

Table (4): A comparison between both groups regarding OHSS development.

Parameter	G-I (Total no.)	G-II (Total no.)	Total	P-value
OHSS	0(00.0%)	10(23.2%)	10	0.09
No-OHSS	10	33	43	
Total	10	43	53	

Discussion

The detrimental effect of obesity on ovarian stimulation response may be explained via the effects of certain mediators e.g. leptin and ghrelin[12]. The increased leptin level within follicles leads to inhibition of ovarian steriodogenesis through its antagonizing effect to stimulatory factors (IGF-1, TGF-b, insulin and LH)[12].

The study showed that, although being insignificant, higher doses of gonadotropin and longer durations of stimulation cycles were needed to stimulate overweight/ obese PCOS women than normal weight women. Some other studies agreed with us that showed significant higher doses and longer duration of gonadotropin stimulation were required in the overweight PCOS women [1,2,12].

This study showed that there was no significant variation between both the overweight/obese and normal weight women regarding the number of retrieved mature oocytes despite being higher in the overweight group. While the mean total number of immature oocytes was significantly less in the overweight/obese group. Similar results were obtained by other studies [13].

On the other hand, many studies disagreed with our findings and showed the women of both groups produced a comparable number of mature oocytes without significance difference [1,2] or overweight/obese women produced less mature oocytes [9,14].

Regarding the development of OHSS, the present study revealed that the overweight/obese women are at a higher risk of developing OHSS by a 23.2% than that of normal weight women. This could be confirmed by a higher level of serum E2 at the day of HCG trigger which was showed in the overweight/obese women. This result were inconsistent with many studies which concluded that overweight/obese women at a lower risk of developing OHSS due to low ovarian reserve [15] and

that high body weight had no significant effects on the rate of developing OHSS [1, 2,9,14].

Depending on these results, we can conclude that the exact effects of high body weight on the response to COS and the risk of OHSS in such group of women is a matter of controversy and need further researches.

Conflict of Interest: The authors declare that there was no any conflict of interest.

Source of Funding: There was for funding source for this study.

Ethical Clearance: A verbal consent was taken from all the included couples.

References

1. Banker M, Sorathiya D, Shah S. Effect of Body Mass Index on the Outcome of In-Vitro Fertilization/Intracytoplasmic Sperm Injection in Women. Journal of Human Reproductive Sciences. 2017;10(1): 37-43.
2. Cakiroglu Y, Doger E, Vural F, Kopuk SY, Vural B. Impact of insulin resistance and obesity on intracytoplasmic sperm injection outcomes in young women with polycystıc ovary syndrome. Northern Clinics of Istanbul. 2017;4(3):218-224.
3. Lim SS, Norman RJ, Davies MJ, Moran LJ. The effect of obesity on polycystic ovary syndrome: a systematic review and meta-analysis. Obesity Reveiw.2018;14:95-109.
4. Rittenberg V, Seshadri S, Sunkara SK, Sobaleva S, Oteng-Ntim E, El-Toukhy T. Effect of body mass index on IVF treatment outcome: an updated systematic review and meta-analysis. Reproductive Biomedicine Online.2011;23:421-39.
5. Kim CH, Moon JW, Kang HJ, Ahn JW, Kim SH, Chae HD, Kang BM. Effectiveness of GnRH antagonist multiple dose protocol applied during early and late follicular phase compared with GnRH agonist long protocol in non-obese and obese patients with polycystic ovary syndrome undergoing IVF/ICSI. Clinical and Experimental Reproductive Medicine.2012;39:22-7.
6. Dechaud H, Anahory T, Reyftmann L, Loup V, Hamamah S, Hedon B. Obesity does not adversely affect results in patients who are undergoing in vitro fertilization and embryo transfer. Eurpean Journal of Obstetrics, Gynecology and Reproductive Biology.2006;127:88-93.
7. Fica S, Albu A, Constantin M, Dobri GA. Insulin resistance and fertility in polycystic ovary syndrome. Journal of. Med.-life Health.2008;1:415-22.
8. Vlaisavljevic V, Kovac V, Sajko MC. Impact of insulin resistance on the developmental potential of immature oocytes retrieved from human chorionic gonadotropin-primed women with polycystic ovary syndrome undergoing in vitro maturation. Fertility and Sterility.2009;91:957-9.
9. Rotterdam ESHRE/ASRM-Sponsored PCOS Consensus Workshop Group. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome. Fertility and Sterility.2004;81(1):19-25.
10. World Health Organization. Collection and examination of human semen. In: WHO Laboratory Manual for the examination of human semen and sperm-cervical mucus interaction. 4th edition. World Health Organization, Cambridge university press, UK;1999.
11. Alikani M. Morphological expression of human egg and embryo quality. In :Textbook of clinical embryology. Coward K and Wells D. (eds.). Cambridge University Press.2013;313-326.
12. Esinler I, Bozdag G, Yarali H. Impact of isolated obesity on ICSI outcome. Reproductive BioMedicine Online.2008;17(4):583-587.
13. Huang K, Liao X, Dong X, Zhang H. Effect of overweight/obesity on IVF-ET outcomes in Chinese patients with polycystic ovary syndrome. International Journal of Clinical and Experimental Medicine.2014;7(12):5872-5876.
14. Bailey AP, Hawkins LK, Missmer SA, Correia KF, Yanushpolsky EH. Effect of body mass index on in vitro fertilization outcomes in women with polycystic ovary syndrome. American Journal of Obstetrics and Gynecology.2014;211:163.e1-6.
15. Moslehi N, Shab-Bidar S, Ramezani T, Mirmiran P, Azizi F. Is ovarian reserve associated with body mass index and obesity in reproductive aged women? A meta-analysis. Menapause. 2018; 25(9):1046-1055).

Evaluation of Locoregional Control and Survival after Total Mesorectal Excision for Middle and Lower Rectal Cancer

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Abstract

Background: The cornerstone in rectal cancer management is resection, negative margin and resection of all draining lymph nodes. Neo-adjuvant chemo-radiation may increase the ability to preserve continence by down-staging the cancer and shrinking the size of the tumor to permit the achievement of a cancer-free margin.

Objectives: To evaluate locoregional control and survival after total mesorectal excision for middle and lower rectal cancer.

Patients and Method: A retrospective study of 119 patients of middle and lower rectal cancer patients who underwent total mesorectal excision at National Cancer Institute, Cairo University in the period from 1st January, 2006 to 31th December, 2010 ,certain factors related to the primary tumor were recorded including: (age, sex, site, initial stage, histopathology, tumor size, grade of the tumor, number of Lymph nodes, lympho-vascular invasion, neo-adjuvant chemotherapy and radiotherapy and surgical procedures either sphincter preserving surgery or abdominoperineal resection).

Results: Overall survival was worsened by T stage (p value 0.036), positive lymph nodes (p value 0.071), positive margin (p value 0.031) and lack of adjuvant treatment (p value 0.001).

Conclusion: The overall survival at 3 years was 58.1% which was worsened by advanced stage, positive margin, and lack of adjuvant treatment. The 3-year disease-free survival was 55%, which was worsened by older age, lymph node positivity, positive surgical margin and lack of adjuvant therapy. The local recurrence rate after three years was 12.6%. Postoperative chemo-radiotherapy was associated with better overall survival when compared to chemotherapy alone or no adjuvant treatment.

Keywords: *Rectal cancer, Neo-adjuvant chemoradiotherapy, Total mesorectal excision, overall survival, Disease free survival.*

Introduction

Colorectal cancer is the second most common cancer in women and third-most common cancer in men. In 2012, 614,000 women (9.2% of all new cancer cases) and 746,000 men (10.0% of new cancer cases) were diagnosed with colorectal cancer worldwide. (1)

The main goals in the treatment of rectal cancer are: (1) Ensuring local control; (2) Maintaining long-term survival; (3) preservation of anal sphincter, bladder, and sexual function; and (4) maintaining patient's quality of life.(2)

Total mesorectal excision (TME) and the addition of neo-adjuvant chemo-radiotherapy (CRT) show

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significant improvements in local control and survival.[3]

TME has markedly reduced local recurrences even in lymph node-positive rectal cancers and is supposed to prevent all locally recurrent disease after optimal curative surgery.[4]

Aim of the Work: To evaluate locoregional control after TME in patients with middle and lower rectal cancer & its impact on survival at National Cancer Institute, Cairo University.

Patients and Method

This is a retrospective study of 119 patients with middle and lower rectal cancer patients who underwent TME at National Cancer Institute, Cairo University in the period from 1st January, 2006 to 31th December, 2010. Included patients had pathologically proven middle or lower rectal cancer that underwent TME at National Cancer Institute whether they received neo-adjuvant chemotherapy and radiotherapy or not. The hospital records of the patients were reviewed for clinical, pathological and management data. Clinical data included age, sex, site, initial stage and the presence of complications like bleeding or obstruction. Pathological data included histopathology, tumor size and grade, lymph node number, lympho-vascular invasion and stage. And the management data included if patients received neo-adjuvant chemotherapy and radiotherapy, the surgical procedure performed wither sphincter preserving surgery or abdominoperineal resection and if adjuvant treatment was given to the patients or not.

The overall survival was calculated from diagnosis date to the date of death or lost follow up. Disease free survival was calculated from date of (TME) till date of local recurrence, distant metastasis or death.

Results

The mean age for the studied group was 44.6±13.8 years, ranging from 17 to 73 years with male predominance. A large proportion of the patients presented with complications mainly in the form of bleeding per rectum (40.3% of the studied group). Adenocarcinoma was the main pathological type (74.8%) followed by mucinous adenocarcinoma (20.2%). About 62% of the patients had their lesions 5 cm or above from the anal verge. Grade 2 disease was more common than grade 3. T-stage at diagnosis was T3 in more than half of cases.

Lymph nodes were positive in 52% of cases and the median number of excised lymph nodes was 10 nodes (range: 1-30 nodes).The median number of positive lymph nodes was 1 node (range: 0-18 nodes). Neo-adjuvant therapy was administered to 66 patients (55.5%); mainly as a combination of chemo- and radiotherapy (CTH+RTH) in 63 patients, near 90% of the patients received post-surgery adjuvant treatment. Abdominoperineal resection (APR) was used for treating 62 patients (52.1%), while sphincter preservation was done in 57 patients (47.9%).

The median follow up time was 32.8 months (range: 1-111 months). The overall survival of the whole group was 58.1%; and was worsened by advanced stage, positive margin, and lack of adjuvant treatment **(Table 1).**

Table (1): relation between overall survival & various prognostic factors.

	n	Events	Cumulative Survival at 3 years (%)	Median Survival (months)	p value
Whole group			58.1	--	
T-stage					0.036
I, II	42	13	76.1	--	
III, IV	77	39	48.4	10.4 (14.4-55.2)	
LN positivity					0.071
Negative	57	20	69.2	--	
Positive	62	32	48.4	13.5 (8.9-61.7)	
Margin					0.031
Free	112	47	60.1	--	
Positive	7	5	28.6	6.4 (0.0-23.7)	

	n	Events	Cumulative Survival at 3 years (%)	Median Survival (months)	p value
Adjuvant therapy					0.001
No	26	18	31.0	8.8 (9.2-43.5)	
CTH	55	23	59.7	--	
CTH +RTH	38	11	74.8	--	

On multivariate analysis, the independent factors affecting survival were, age, adjuvant therapy, T-stage, and surgical margin status. Age above 50 years worsened survival with a hazard ratio (HR) of 2.41, the 95% confidence interval (CI) was 1.34-4.38. Adjuvant CTH+RTH had better survival compared to no therapy (HR: 5.3, 95%CI: 2.37-11.88) and CTH alone (HR: 2.18, 95%CI: 1.01-4.71). Advanced stage worsened survival with HR of 2.05 (95%CI: 1.07-3.96). Positive surgical margin worsened survival with HR of 4.46 (95%CI: 1.58-12.56). **(Table 2).**

Table (2): Multivariate analysis of overall survival of the whole studied group using Cox-proportional hazard model.

	B	p value	HR	95.0% CI for HR	
				Lower	Upper
Age, > 50 years	0.826	0.004	2.41	1.34	4.38
Adjuvant		< 0.001			
Adjuvant (CTH+RTH vs. No)	1.668	< 0.001	5.30	2.37	11.88
Adjuvant (CTH+RTH vs. CTH)	0.781	0.047	2.18	1.01	4.71
T-stage, III, VI	0.720	0.031	2.05	1.07	3.96
Margin, Positive	1.494	0.005	4.46	1.58	12.56

The whole group disease-free survival (DFS) was 55% **(Table 3).** And it was obviously worse in patients who did not receive adjuvant treatment (p = 0.002).

Table (3): Disease-free survival in relation to various prognostic factors.

	n	Events	Cumulative Survival at 3 years (%)	Median Survival (months)	p value
Whole group	119	67	55.0	27.1 (17.2-36.9)	
Age (years)					0.062
≤ 50	76	41	61.2	34.6 (17.6-51.5)	
> 50	43	26	42.8	11.6 (0.0-23.9)	
Sex					0.087
Female	50	32	46.7	20.9 (3.9-37.9)	
Male	69	35	60.7	42.5 (22.4-62.6)	
LN positivity					0.070
Negative	57	26	59.6	44.2 (4.9-83.5)	
Positive	62	41	51.1	24.8 (14.0-35.6)	
Margin					0.053
Free	112	61	56.8	32.1 (17.7-46.5)	
Positive	7	6	28.6	6.1 (0.0-13.2)	
Adjuvant treatment					0.002
No	26	19	31.2	8.3 (3.2-13.8)	
CTH	55	31	56.7	34.0 (8.9-59.2)	
CTH +RTH	38	17	71.0	44.0 (2.1-86.0)	

Multivariate analysis was done involving factors with near significant effect on DFS (p values up to 0.1). The independent factors affecting DFS were lymph node positivity, adjuvant therapy, age, and surgical margin status as illustrated in **(Table 4).**

Age above 50 years worsened survival with a hazard ratio (HR) of 2.54 (95%CI: 1.47-4.38). Adjuvant CTH+RTH had better survival compared to no therapy (HR: 5.20, 95%CI: 2.47-10.95) and CTH alone (HR: 1.93, 95%CI: 1.01-3.71). Positive surgical margin worsened survival with HR of 3.95 (95%CI: 1.46-10.69). Lymph node positivity worsened survival with HR of 1.72 (95%CI: 1.03-2.88).

Table (4): Multivariate analysis of disease-free survival using Cox-proportional hazard model.

	B	p value	HR	95.0% CI for HR	
				Lower	Upper
Lymph node positivity	0.545	0.037	1.72	1.03	2.88
Adjuvant		<0.001			
Adjuvant (CTH+RTH vs. No)	1.648	< 0.001	5.20	2.47	10.95
Adjuvant (CTH+RTH vs. CTH)	0.659	0.048	1.93	1.01	3.71
Margin, Positive	1.374	0.007	3.95	1.46	10.69
Age > 50	0.932	0.001	2.54	1.47	4.38

By the end of 3 years follow up, the loco regional recurrence was reported in 15 patients & therefore, the loco regional recurrence rate was 12.6%.

Discussion

The mean age of the studied group was 44.6±13.8 years, ranging from 17 to 73 years with male predominance. An important remark in the current series is that, patients 40 years or younger constituted 42% of the studied group. The increase in rectal cancer in younger patients has been previously reported. O'Connell et al. demonstrated an increase in rectal cancers in patients' aged 20 to 40 years using the SEER database data from 1973 through 1999. [5]

Although a previous study on 837 patients suggested that age, tumor size, histological grade, preoperative obstruction, pathological type, status of resection and lympho-vascular invasion are all considered positive prognostic factors; the multivariate analysis results identified the depth of invasion, histological grade and number of positive lymph nodes to be the most important prognostic factors. [6]

In the present study, there was a male to female predominance with a ratio (1.4:1); which agrees with facts that men are more risky and have higher incidence and worse prognosis for colorectal cancer than women. [7,8] Men are exposed to risk factors more than women so they develop more colorectal cancers (CRC) at all ages and also four to eight years younger than women. [9]

In this study, there was no significant survival difference between males and females. Although men have higher risk to develop CRC than women; the findings regarding differences in prognosis based only on sex have been inconsistent with several studies reported higher survival in females [10, 11, 12] , while different studies did not report the same difference. [13]

The survival advantage of women was confirmed in a multivariate analysis performed by Majek et al. on 164996 patients diagnosed with CRC from (1997 to 2006) after adjusting stage and sub-site in patients under 65 years of age, but not in older subjects. This advantage was most pronounced for localized disease and explained by the effect of sex hormones. [14]

In the current study, adenocarcinoma was the main pathological type about (74.8%) of CRC followed by mucinous adenocarcinoma (20.2%). This agrees with older study which stated that Adenocarcinomas are the most common type of colorectal cancers and among

these mucinous subtype constitute approximately 10% and signet ring adenocarcinoma constitute 1%-2.4 %. [15]

The gold standard surgical technique for rectal tumors staged T1, T2, and favorable T3 (T3N0M0) (T3 with negative nodal status) is TME, which is recommended after neo-adjuvant therapy in low-seated rectal cancers, T3c and T3d disease to reduce the risk of local recurrences. [16]

In the current series, the overall survival of the whole group was 58.1% at 3 years. Overall survival was worsened by advanced stage, positive margin, and lack of adjuvant treatment. The 3-year disease-free survival (DFS) of the whole group was 55%. Disease-free survival was worsened by older age, lymph node positivity, positive surgical margin status, and lack of adjuvant therapy. The local recurrence rate after two years was 12.6%.

The local recurrence rate ranges from less than 6% to more than 50% and survival from 45% to 80% at 5 years in surgically treated cases with markedly better outcomes with neo-adjuvant radiotherapy (with or without chemotherapy) and better surgical techniques.[16]

Neo-adjuvant therapy was used in 66 patients (55.5%) of the current series mainly in the form of chemoradiotherapy (CRT), older studies stated that Neo-adjuvant radiotherapy alone or with sensitizing chemotherapy has been increasingly used before surgical resection in the primary management of patients with rectal cancer and especially T3 and T4 rectal cancers benefit with approximately 50% reduction in local recurrence by preoperative CRT in comparison with cases receiving only postoperative CRT , but this is not translated into a significant difference in overall survival that agreed with our study.[17,18]

In the current series, postoperative chemoradiotherapy was associated with better overall survival when compared to chemotherapy alone or no adjuvant treatment. However, neo-adjuvant chemoradiotherapy did not improve overall or disease-free survival of the studied group. These results are inconsistent with previous reports.

On studying a large population-wide cohort of 869 patients it was found that overall survival was worse with age was 65 year or more, high grade of pathological differentiation, perineural nerve invasion, and multiple regional lymph node metastases.[19]

In the current study, the local recurrence rate after two years was 12.6%. This figure is relatively higher than previous studies which reported that recurrence rates by different groups vary widely from 4% to 12% at 5 years despite following TME guidelines. [20] This can be explained by the high proportion of patients with advanced stage (T-stage III and IV) in our series.

It was stated by Leong that mesorectal metastases could extend up to 5 cm below the lower margin of a rectal tumor. Their presence in pT3 and pT4 tumors indicates a poorer prognosis and his results also confirmed that TME improves outcomes in mid- and low-rectal cancers.[21]

The majority of the previously mentioned studies are in agreement with the current study that advanced stage is an independent component that worsens overall survival and disease-free survival.

Conclusion

This study reported that overall survival at 3 years was 58.1% which was worsened by advanced stage, positive margin, and lack of adjuvant therapy. The 3-year disease-free survival was 55%, which was worsened by older age, lymph node positivity, positive margin, and lack of post-operative chemoradiotherapy. Local recurrence rate after three years was 12.6%. Postoperative chemoradiotherapy results in better overall survival when compared to chemotherapy only or no adjuvant treatment. Neoadjuvantchemoradiotherapy did not enhance the overall or the disease-free survival of the studied group.

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References

1. Kuipers EJ, Grady WM, Lieberman D, Seufferlein T, Sung JJ, Boelens PG, et al. Colorectal cancer. Nat Rev Dis Primers. 2015; 1: 15065.
2. Balch G-C, De Meo A, Guillem JG. Modern management of rectal cancer: A2006 update. World J Gastroenterol. 2006; 12(20): 3186–3195.
3. Gaertner WB, Kwaan MR, Madoff RD, Melton GB. Rectal cancer: An evidence-based update for primary care providers. World J Gastroenterol

2015; 21(25): 7659-7671.

4. Cecil TD, Sexton R, Moran BJ, Heald RJ. Total mesorectal excision results in low local recurrence rates in lymph node-positive rectal cancer. Dis Colon Rectum. 2004; 47:1145–1149.
5. O'Connell JB, Maggard MA, Liu JH, Etzioni DA, Livingston EH, Ko CY. Rates of colon and rectal cancers are increasing in young adults. Am Surg. 2003; 69(10): 866–872.
6. Yuan Y, Li M-D, Hu H-G, Dong C-X, Chen J-Q, Li X-F, et al. Prognostic and survival analysis of 837 Chinese colorectal cancer patients. World J Gastroenterol 2013; 19(17): 2650-2659
7. Lawrenson R, Logie J, Marks C. Risk of colorectal cancer in general practice patients presenting with rectal bleeding, change in bowel habit or anaemia. Eur J Cancer Care (Engl). 2006; 15(3):267-271.
8. Westlake S, Cooper N. Cancer incidence and mortality: trends in the United Kingdom and constituent countries, 1993 to 2004. Health Stat Q.2008; (38): 33–46.
9. Brenner H, Hoffmeister M, Arndt V, Haug U. Gender differences in colorectal cancer: implications for age at initiation of screening. Br J Cancer. 2007; 96(5): 828–831.
10. McArdle CS, McMillan DC, Hole DJ. Male gender adversely affects survival following surgery for colorectal cancer. Br J Surg. 2003; 90:711–715.
11. Paulson EC, Wirtalla C, Armstrong K, Mahmoud NN. Gender influences treatment and survival in colorectal cancer surgery. Dis Colon Rectum 2009; 52:1982–91.
12. Wichmann M.W., Muller C., Hornung H.M., Lau-Werner U., Schildberg F.W., the Colorectal Cancer Study Group. Gender differences in long-term survival of patients with colorectal cancer. Br J Surg. 2001; 88:1092–1098.
13. Koo JH, Leong RWL. Sex differences in epidemiological, clinical and pathological characteristics of colorectal cancer. J Gastroenterol Hepatol 2010; 25:33–42.
14. Majek O, Gondos A, Jansen L, Emrich K, Holleczek B, Katalinic A, et al. Sex Differences in Colorectal Cancer Survival: Population-Based Analysis of 164,996 Colorectal Cancer Patients in Germany. PLoS ONE 2013; 8(7): e 68077.
15. Kakar S, Smyrk TC. Signet ring cell carcinoma of the colorectum: correlations between microsatellite instability, clinicopathologic features and survival. Mod Pathol. 2005; 18:244–249.
16. Quirke P, Steele R, Monson J, Grieve R, Khanna S, Couture J, et al. Effect of the plane of surgery achieved on local recurrence in patients with operable rectal cancer: a prospective study using data from the MRC CR07 and NCIC-CTG CO16 randomized clinical trial. Lancet 2009; 373: 821–828.
17. Roh MS, Colangelo LH, O'Connell MJ, Yothers G, Deutsch M, Allegra CJ et al. Preoperative multimodality therapy improves disease-free survival in patients with carcinoma of the rectum: NSABP R-03. J ClinOncol. 2009; 27(31): 5124–5130.
18. Bosset JF, Collette L, Calais G, Mineur L, Maingon P, Radosevic-Jelic L, et al Chemotherapy with preoperative radiotherapy in rectal cancer. N Engl J Med. 2006; 355(11):1114–1123.
19. Lee CH, Cheng SC, Tung HY, Chang SC, Ching CY, Wu SF. The Risk Factors Affecting Survival in Colorectal Cancer in Taiwan. Iran J Public Health 2018; 47:519–530.
20. Jeyarajah S, Sutton CD, Miller AS, Hemingway D. Factors that influence the adequacy of total mesorectal excision for rectal cancer. Colorectal Dis. 2007; 9:808–815.
21. Leong A F P K. Total mesorectal excision (TME)--twenty years on. Ann Acad Med Singapore 2003; 32(2): 159–162.

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