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Risk factors for dyslipidemia among hypertensive patients attending the laboratory of the european Gaza hospital: case control study

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Abstract:

Dyslipidemia is a worldwide health problem that is rising steadily. The purpose of this study is to identify risk factors that may lead to dyslipidemia in hypertensive patients, which in turn may contribute to the preparation of preventive programs to decrease mortality and morbidity from hypertension and dyslipidemia. The design of the study was case-control, which is practical and economical design for studying risk factors. The study sample consisted of 237 participants, divided into three groups (case group included 79 hypertensive patients with dyslipidemia, control group included 79 hypertensive patients without dyslipidemia and 79 normal persons). Participants were selected from European Gaza Hospital (EGH) during the period from January 1st 2009 to December 31st 2010. The study instrument consisted of Socio-demographic characteristics, history of smoking, physical activity, compliance to diet and lipid profile. The lipid profiles were analyzed by spectrophotometer at EGH medical laboratory. The study results showed that risk factors for dyslipidemia included; obesity (Chi square = 18.775; P = 0.001), low level of education (Chi square = 19.50; P = 0.012), non compliance to diet (Chi square = 6.723; P = 0.035) and not working or being retired (Chi square = 13.484; P 0.001). In conclusion, the results highlighted serious issues that need special programs at primary and secondary levels to reduce and modify the risk factors of dyslipidemia. Clients with the identified risk factors need more attention and follow up to reduce the chance of developing dyslipidemia.

Key words: Risk factors, Dyslipidemia, Hypertensive Patients.

Introduction:

No one can deny that hypertension is the one of most common diseases in the developed and developing countries. Hypertension is a major health problem throughout the world because of its high incidence, prevalence and its association with increased risk of cardiovascular disease. The use of advanced technology in the diagnosis and treatment of hypertension has played a major role in recent dramatic declines in coronary heart disease and stroke mortality in all the world. However, in many of these countries, the control rates for high blood pressure have slowed in the last few years. It is estimated that by 2015, 1.2 billion people will be suffering from hypertension worldwide (WHO, 2010).

Dyslipidemia which has been closely linked to cardiovascular diseases is a key independent modifiable risk factor for cardiovascular diseases (Groundy, 1997).

The prevalence of dyslipidemia is high and increasing in most developed countries (Wietlisbach, *et al*. 1997) as well as in many developing countries as a result of the westernization of diet and other life style changes (Yamada, *et al.* 1997). The World Health Organization estimates that dyslipidemia is associated with more than half of the global cause of ischemic heart diseases (WHO, 2002). It has been shown that effective treatment of dyslipidemia reduces the rate of morbidity and mortality

(Costa, *et al.* 2006). There is no Epidemiological data base about dyslipidemia in Palestine. Many risk factors of dyslipidemia can be modifiable. We hope the result of this study will help directly or indirectly in decreasing the morbidity and mortality rates due to dyslipidemia. Because of limited studies conducted to investigate the factors affecting dyslipidemia in Gaza strip we hope that this study will be the first data base to promote evidence-based diagnosis and management guideline of dyslipidemia.

Methodology:

Study population:

The target population consists of patients from both genders who had been diagnosed as hypertensive and have dyslipidemia during their doctor clinic visit at the European Gaza Hospital in year 2009 and 2010 (case group) and hypertensive patient without history

of dyslipidemia (control group). Another group was normal adult without history of hypertension or any other diseases.

Sample size and sampling process

The number of all hypertensive patients who attended the clinics at the European Gaza Hospital in year 2009 and 2010 was 263. The number of cases that met the inclusion criteria was 208 cases. Then eligible patients were divided into two groups (cases and control). Subjects were assigned to appropriate group based upon the results of the blood test result. The sample consisted of 79 cases (hypertensive patient with dyslipidemia) and 79 cases in the control group (hypertensive without dyslipidemia) and 79 cases in the normal control group. The case and control groups were matched based upon age and gender (1 case: 2 control).

Study design

The design of this study is a case control design to enable the identification of risk factors of dyslipidemia.

Instrument of the study

After conducting a critical literature review, the researchers adopted a questionnaire to measure risk factors of dyslipidemia among hypertensive patients at the EGH. The researchers implemented the necessary modifications to suit study participants.

The questionnaire consisted of 5 parts:

- The first part included personal and demographic data.
- The second part included smoking habit.
- The third part included physical activity.
- The fourth part included compliance to diet.
- The fifth part included blood test (lipid profiles).

Selection criteria

Inclusion criteria

Cases

- Age from 30-65 years.
- Both gender (male and females were included).
- Hypertensive patients with dyslipidemia

Control one

- Age from 30-65 years.
- Both gender (male and females were included).
- Hypertensive patients without dyslipidemia.

Control two

- Age from 30-65 years.
- Both gender (male and females were included).
- Healthy person with normal blood pressure and lipid profile.

Exclusion criteria

- Age below 30 years and above 65 years.
- Patients with diabetes mellitus.
- Any hypertensive patient recorded in EGH before 2009 and after 2010.

Ethical and Administrative considerations

1. Permission from ministry of health **(MOH)**.
2. Approval from **Helsinki IRB** Committee.
3. Informed consent.
4. Approval from health sectors for field study administration.

Data Collection

The survey was completed by subjects in a face to face interview. The Questionnaire was developed by the researchers and submitted to 10 experts (7 experts in the field of public health and 3 cardiologists) to evaluate its face and content validity. Lipid profiles include cholesterol, triglyceride, HDL-c, LDL-c, all were analyzed and recorded.

Data analysis

The researchers used the statistical package for social science program (SPSS), version 13. For description of the study variables the researchers used frequency, percentage. In the measuring of central tendency the researchers used means and standard deviations. Cross tabulation to describe the relationships between two variables or more was also used. The researchers also used chi-square and t-test statistical tests.

Result:

Characteristics of the study population:

The study sample consisted of 237 participants divided equally into three groups; each group consisted of 79 participants, 34 males

and 45 females in each group. First group (cases) hypertensive with dyslipidemia. Second group (control 1) hypertensive without dyslipidemia and third group (control 2) healthy persons without history of hypertension or any other diseases. Their age ranged between 30 – 65 years, from different education levels (illiterate, preparatory, secondary and university level). Their characteristics are illustrated in the following table including age, gender, level of income, level of education, and occupation.

Table 1: Socio-demographic Characteristics of the Study Population.

Demographic variable	Frequency	Percent %
Gender		
Male	102	43%
Female	135	57%
Total	237	100%
Age		
30 – 40	27	11.4%
41 – 50	72	30.4%
51 – 65	138	58.2%
Education level		
Illustrate	32	13.5%
Primary	21	8.9%
Preparatory	56	23.6%
Secondary	60	25.3%
University	68	28.7%
Monthly income		
Less than 1000 IS	117	49.4%
1000 IS and more	120	50.6%
Job / work		
Yes	88	37.1%
No	149	62.9%

Serum analysis:

Table 2 Serum lipids of hypertensive patients and normal

Lipid profile	Hypertensive Patients (n=158) Mean ±SD	Normal Control (n=79) Mean ±SD	t	*P*-value
Cholesterol (mg/dl)	183.6± 49.9	167.7±28.9	2.63	0.000
Triglyceride (mg/dl)	168.8± 103.1	123±25.4	3.88	0.000
LDL(mg\dl)	106.1± 43.1	92.5±29.1	2.54	0.000
HDL (mg/dl)	43.4±7.8	50.1±9.6	-6.50	0.000

Serum lipid profiles including cholesterol, triglycerides, HDL-C and LDL-C of hypertensive patients and normal controls are illustrated in table 2. The average levels of cholesterol, triglycerides and LDL-C were found to be higher in hypertensive patients (183.6± 49.9, 168.8± 103.1 and 106± 43.1mg/dl, respectively) compared to normal controls (167.7± 28.9, 123± 25.4and 92.5± 29.1mg/dl, respectively). This elevation was statically significant (P=0.000). In contrast, HDL-C was significantly lower in hypertensive patients than in normal controls (43.4±7.8 vs. 50.1± 9.6 mg/dl, P=0.000).

Risk factors for dyslipidemia among the three groups
Obesity

Table 3: Obesity among Cases and Controls

Variable	Category	Hypertensive with dyslipidemia		Hypertensive without dyslipidemia		Normal persons	
		Freq.	%	Freq.	%	Freq.	%
Obesity	Normal weight	3	3.8	6	7.6	15	19
	Over weight	25	31.6	25	31.6	35	44.3
	Obese	51	64.6	48	60.8	29	36.7
	Total	79	100%	79	100%	79	100%
	Chi square = 18.775				**P value = 0.001***		

*statistically significant

Body mass index provides a reliable indicator of body fatness for most people and it is used as a screen for weight categories that may lead to health problems (CDC, 2007). According to WHO criteria, BMI less than 18.5kg/m2 means underweight, 18.5-24.9 kg/m2 means normal weight, 25-29.9 kg/m2 means overweight, and BMI more than 30kg/m2 means obesity. As shown in table 3; the numbers of normal, overweight and obese in hypertensive patients with dyslipidemia were 3 (3.8%), 25 (31.6%) and 51 (64.6%), respectively whereas in hypertensive patients without dyslipidemia were 6 (7.6%), 25 (31.6%) and 48 (60.8%), respectively whereas in normal control were 15 (19%), 35 (44.3%) and 29 (36.7%) respectively. There was a statically significant association between different groups (Chi square = 18.775, P value = 0.001*) indicating that obesity is a risk factor of dyslipidemia.

Diet Lifestyle:

Table 4: Diet Lifestyle among Cases and Controls

Variable	Category	Hypertensive with dyslipidemia		Hypertensive without dyslipidemia		Normal persons	
		Freq.	%	Freq.	%	Freq.	%
Compliance to diet (regime)	Yes	17	21.5	20	25.3	31	39.2
	No	62	78.5	59	74.7	48	60.8
	Total	79	100%	79	100%	79	100%
	Chi square = 6.723				***P* value = 0.035**		

*statistically significant

Table 4 shows that the numbers of compliance to diet; non compliance to diet in hypertensive patients with dyslipidemia were 17 (21.5%) and 62 (78.4%) respectively. Whereas in hypertensive patients without dyslipidemia the number were 20 (25.3%) and 59 (74.7%) respectively. In normal control they were 31 (39.2%) and 48 (60.8%) respectively. There was a statically significant association between different groups (Chi square = 6.723, P value = 0.035*). Although there was a significant association between dyslipidemia and diet, more than 75% of the cases did not comply to diet. Therefore, diet was found to be associated with dyslipidemia.

Income:

Table 5: Level of Income among Cases and Controls

Variable	Category	Hypertensive with dyslipidemia		Hypertensive without dyslipidemia		Normal persons	
		Freq.	%	Freq.	%	Freq.	%
Income	Less than 1000 IS	42	53.2	40	50.6	35	44.3
	1000 IS and more	37	46.8	39	49.4	44	55.7
	Total	79	100%	79	100%	79	100%
	Chi square = 1.31			P value = 0.518			

No statistically significant

The above table shows that the number of hypertensive patients with dyslipidemia with monthly household income of Less than 1000 IS was 42 (53.2%); the number of hypertensive patients with dyslipidemia with monthly household income of 1000 IS and 1000 IS and more was 37 (46.8%); whereas in hypertensive patients without dyslipidemia the numbers are 40 (50.6%) and 39 (49.4%) respectively. In normal control was 35 (44.3%) and 44 (55.7%) respectively. These findings indicate that the Palestinian people are among the worse economic situations due to the political situation. There is no statically significant association among the different groups (Chi square = 1.31, P value = 0.518). That means no statistically significant associations are observed between dyslipidemia and monthly household income of the participants in the three groups.

Level of Educational:

Table 6: Level of Education among Cases and Controls

Group	Level of education	Total	
		Freq.	%
Hypertensive with dyslipidemia	Illiterate	18	22.8
	Primary	6	7.6

	Preparatory	22	27.8
	Secondary	18	22.8
	University	15	19
	Total	79	100%
Hypertensive without dyslipidemia	Illiterate	8	10.0
	Primary	10	12.7
	Preparatory	19	24.1
	Secondary	23	29.1
	University	19	24.1
	Total	79	100%
Normal persons	Illiterate	6	7.6
	Primary	5	6.3
	Preparatory	15	19
	Secondary	19	24.1
	University	34	43
	Total	79	100%
	Chi square = 19.5	**P value = 0.012***	

*statistically significant

Table 6 shows analysis of the educational status of the hypertensive patients with dyslipidemia and hypertensive patients without dyslipidemia and normal persons showed that the educational level among the study groups was found to be associated with dyslipidemia ($\chi 2=19.5$, P=0.01). Data presented here suggest that low educational level is a risk factor for dyslipidemia.

Physical Activity:

Table 7: Physical Activity among Cases and Controls

Variable	**Category**	**Hypertensive with dyslipidemia**		**Hypertensive without dyslipidemia**		**Normal persons**	
		Freq.	%	Freq.	%	Freq.	%
physical activity	physically active	22	27.8	26	32.9	28	35.4
	Non physically active	57	72.2	53	67.1	51	64.6
	Total	79	100%	79	100%	79	100%
	Chi square = 1.085				**P value = 0.581**		

No statistically significant

As shown in table 7, non physically active subjects among cases (72.2%) were higher than among normal controls (64.6%). There was no statically significant association between different groups (Chi square = 1.085, P value = 0.581). That means that no statistically significant associations were observed between dyslipidemia and physical activity of the participants in the three groups. Age and sex affected physical activities profile negatively according to the social acceptance and severity of disease.

Smoking:

Table 8: Smoking among Cases and Controls

Variable	Category	Hypertensive with dyslipidemia		Hypertensive without dyslipidemia		Normal persons	
		Freq.	%	Freq.	%	Freq.	%
Smoking	Yes	11	14	13	16	8	10.1
	No	68	86	66	84	71	89.9
	Total	79	100%	79	100%	79	100%
	Chi square = 1.373				**P value = 0.503**		

No statistically significant

From the above table it is shown that there were no association between smoking and dyslipidemia. Among cases, 14% had positive history of smoking while 10.1% among controls. Chi square was found to be 1.373with P value (0.503) which means that there is no association between smoking and dyslipidemia, also the differences between the three groups were not statistically significant (P-value 0.503). Males reported more smoking than females. Females had social barriers to be smoking, (socially not accepted).

Work:

Table 9 : Work among Cases and Control

Variable	Category	Hypertensive with dyslipidemia		Hypertensive without dyslipidemia		Normal persons	
		Freq.	%	Freq.	%	Freq.	%
work	No	58	73.4	54	68.4	37	46.8
	Yes	21	26.6	25	31.6	42	53.2

	Total	79	100%	79	100%	79	100%
	Chi square = 13.484				**P value = 0.001**		

As shown in table 9, non working subjects among hypertensive with dyslipidemia (73.4%) and hypertensive without dyslipidemia (68.4%) were higher than among normal controls (46.8%). There was statically significant association between different groups (Chi square = 13.484, P value = 0.001). This means that statistically significant associations were observed between dyslipidemia and work of the participants in the three groups. The highest percentage of participants without income are among both hypertensive with dyslipidemia and hypertensive without dyslipidemia controls and normal control with 73.4%, 68.4%, 46.8% respectively.

Discussion:

The study showed that the average levels of cholesterol, triglycerides and LDL-C were found to be higher in hypertensive patients (183.6± 49.9, 168.8± 103.1 and 106± 43.1mg/dl) compared to normal controls (167.7± 28.9, 123± 25.4and 92.5± 29.1mg/dl, respectively). This elevation was statically significant (P=0.000).In contrast, HDL-C was significantly lower in hypertensive patients than in normal controls (43.4±7.8 vs. 50.1± 9.6 mg/dl, P=0.000). The results of this study is consists with another study done by Reaven,1991 who showed that; patients with hypertension tend to have dyslipidemia, with higher plasma TG concentrations and lower concentrations of HDL-C than normotensive subjects (Reaven, 1991). There is an increased trend in dyslipidemia among study subjects with increased BMI. This results is consists with (Wang, *et al.* 2010) who showed that presence of dyslipidemia was significantly associated with increasing body mass index (P = 0.001; OR:1.06). The relationship between dyslipidemia and non-compliance to healthy diet (regime) has been clearly shown in this study. The results of this study is consistent with the study of (Polychronopoulos, *et al.* 2005) who showed that an inverse association was observed between hypercholesterolemia, and adherence to a Mediterranean diet with (odds ratio = 0.77, p = 0.02), controlled for age, sex, and other factors. The prevalence of hypercholesterolemia has decreased. The greatest decrease was observed in the proportion of persons with elevated level

of low-density lipoprotein cholesterol (Polychronopoulos, *et al*, 2005). We observed no statically significant association between level of income and dyslipidemia. Our results are in accordance with the study of (Cetin, *et al*, 2010) who stated that no significant relation was found between the prevalence of high level TC, LDL-C, TG, and low level HDL-C and monthly household income. Dyslipidemia exhibited a strong inverse association with levels of education in our study. This result was in agreement with that reported by (Erem, *et al.* 2008) who found an inverse relationship between the level of education and the prevalence of dyslipidemia ($P < 0.0005$). In this study, no statistically significant associations were observed between dyslipidemia and physical activity of the participants in the three groups. Our study result is consistent with Cetin and his colleagues who reported in their study that no significant relation was found between the prevalence of high level TC, LDL-C, TG, and low level HDL-C and level of physical activity except for HDL-C (Cetin, *et al.* 2010). In contrast studies have shown that an inactive lifestyle is a risk factor for coronary heart disease. Regular, moderate-to-vigorous physical activity helps prevent heart and blood vessel disease. The more vigorous the activity the greater your benefits. However, even moderate-intensity activities help if done regularly and long term exercise can help control blood cholesterol, diabetes and obesity, as well as help lower blood pressure in some people (AHA, 2006). In this study, no association was found between smoking and dyslipidemia. Our study result is consistent with. Khader and his colleagues who reported in their study that no significant relation was found between Presence of dyslipidemia and smoking (Khader, *et al.* 2010).The presence of dyslipidemia was significantly higher among non-workers and house wives. Performing domestic duties without fixed hours or renumeration, constant exposure to food, and lack of physical activity may contribute to the appearance of obesity, dyslipidemia, and hypertension in such women.

Conclusion:

Based upon the current literature, risk factors of dyslipidemia can be preventable in many cases because most of these risk factors are modifiable. Our study found that high BMI, lower level of education,

noncompliance to healthy diet, and unemployment are risk factors for developing dyslipidemia among the case and control groups at significant level at 0.05 in the EGH in Gaza. On the other hand, smoking, low level of income and lack of physical activity did not show statistical differences between the case and control groups.

Recommendations:

The researchers advise for the development of many health promotion strategies and programs that are well known to help reduce the risks of dyslipidemia that are not currently being conducted in Gaza. Cholesterol screening programs among university students is advised. There is a need for further research in the Gaza community to implement prevention programs such as maintaining a healthy body weight. Also to conduct research that focuses on the control of hypertension and dyslipidemia in the community. Finally, as life expectancy in Palestine is increasing, more complications of dyslipidemia are expected in the future years. There is a definite need to develop and implement effective prevention interventions of dyslipidemia on the Palestinian national level.

References:

American Heart Association. (2006). Diet and Lifestyle Recommendations Revision A Scientific Statement From the American Heart Association Nutrition Committee. **Circulation.** Vol. 114(1): 82-96.

(CDC) Centers for Disease Control and Prevention, (2007). Body Mass Index. Page last reviewed and updated.

CETİN, İ. *et al.,* (2010). Serum lipid and lipoprotein levels, dyslipidemia prevalence, and the factors that influence these parameters in a Turkish population living in the province of Tokat. **Turkish Journal of Medical Sciences,** Vol. 40(5): 771-782.

Costa, J. *et al.,* (2006). Efficacy of lipid lowering drug treatment for diabetic and non-diabetic patients: meta-analysis of randomized controlled trials. **BMJ**, Vol. 332. 1115–1124.

Erem, C. *et al.,* (2008). Prevalence of dyslipidemia and associated risk factors among Turkish adults: Trabzon lipid study. **Endocrine**, Vol. 34:36–51.

Groundy, S. (1997). Small LDL, Atherogenic dyslipidemia, and the metabolic syndrome**. Circulation**. Vol. 95: 1–4.

Khader, Y. *et al.,* (2010). Prevalence of dyslipidemia and its associated factors among Jordanian adults. **Journal of Clinical Lipidology**. Vol. 4. 53–58.

.Yamada, M. *et al.,* (1997). Longitudinal trends in total serum cholesterol levels in a Japanese cohort, 1958–1986. **Journal of Clinical Epidemiology**, Vol. 50. 425-434.

Reaven, G.(1991). Insulin resistance, hyperinsulinemia, hypertriglyceridemia, and hypertension. Parallels between human disease and rodent models. **Diabetes Care**. Vol. 14(3): 195-202.

Wang, S. *et al.,* (2011). Prevalence and Associated Factors of Dyslipidemia in the Adult Chinese Population. PLoS ONE Volume 6, 2, e17061. http://www.plosone.org/home.action February 2011. Accessed on 27/3/2011.

Wietlisbach, V. *et al.,* (1997). Trends in cardiovascular risk factors (1984–1993) in a Swiss region: results of three population surveys. **Preventive Medicine**, Vol. 26. 523–533.

(WHO) World Health organization (2010): Hypertension. http://www.emro.who.int/ncd/ hypertension.htm, Accessed on 29/3/2011.

(WHO) World Health Organization (2002). **World Health Report** , Reducing Risks, Promoting Health Life. Geneva, Switzerland.

Yamada, M. *et al.,* (1997). Longitudinal trends in total serum cholesterol levels in a Japanese cohort, 1958–1986. **Journal of Clinical Epidemiology**, Vol. 50. 425-434.