



World Family Medicine Journal

incorporating the Middle East Journal of Family Medicine

ISSN 1839-0188

July 2012 - Volume 10, Issue 6

Access to Person-Centered Care:
A Perspective on Status, Barriers,
Opportunities and Challenges from
the Eastern Mediterranean Region

- page 4



From the Editor

This issue of the journal is rich with papers from the region and international. A remarkable paper from the International Primary Care Research Network dealt with ACCESS TO PERSON-CENTERED CARE. The authors attempted to look at the status, barriers, opportunities and challenges from Eastern Mediterranean Region. It was found that access to Person-Centered care in the Eastern Mediterranean Region shows extreme variations. At one end there are oil and gas rich countries that offer advanced health care services to the majority of their local population while on the other end are impoverished countries that are unable to provide even minimum required services to their people. The authors concluded that a well planned and evidence based approach is the only way forward to ensure universal access to all populations in the Eastern Mediterranean Region. Access to Person-Centered care is the need of the hour in the region. Provision of health care services through a well defined health system with a prime focus on a primary care model delivered by trained family doctors is the single most appropriate step to achieve health for all. A paper from Saudi Arabia attempted to identify the causes of stigma associated with psychiatric diseases and methods of its alleviation. Sixteen focus groups were conducted in half of the primary health care (PHC) centers of Khobar. Useful opinions were given, which might help in alleviation of stigma. The authors concluded that reducing the stigmatization of mental illness continues to be an important goal for mental health professionals in our community.

A quasi-experimental study from Iran assessed the impact of a computer learning program on asthmatic patients' quality of life. Sixty patients were recruited to the study. In the intervention group, quality of life was significantly improved in physical ($P=0.003$), psychological ($P=0.033$), and general health ($P=0.000$) dimensions while comparing post-test to pre-test results; but there was no improvements in economic aspects ($P=0.202$). The authors concluded that a computer learning approach can be a useful method in promoting quality of life in patients suffering from asthma.

A paper from KSA looked at the Hemorheological properties of blood among Saudi male Smokers. A total of three hundred and twenty one male subjects were involved. The percentage of cigarette smokers is high compared to ex and never smoked persons. The authors concluded that alterations of blood rheology in turn can promote atherothrombogenesis in several ways. Smoking increases the risk of vascular diseases through its effects on blood rheology. Further prospective and public health studies would be required to deal with common reasons which influence smoking behavior as well as to deal with the blood rheological changes.

A paper from Jordan looked at Hepatitis-B Virus Seropositivity Among Adults Attending a Primary Care Clinic. A total of three hundred patients were involved. HBs Ag was positive in 10 patients (3.3%) who came from low socioeconomic class. It is concluded that the HBV seropositivity rate (3.3%) among adults attending primary care clinic is low in comparison to the average previously recorded rate (10%) in Jordan. Screening test is not necessary, but a hepatitis B vaccine program and health education should be considered.

A Prospective study from Iraq looked at impaired glucose tolerance test among B thalassemia patients in Hawler province/IRAQ. The prevalence of impaired glucose tolerance was 26% and there was no diabetes mellitus. The authors concluded that frequently transfused patients with under or poor compliance with iron chelation therapy increase the risk of development of complications including impaired glucose tolerance, early starting of desferrioxamine therapy will prevent such complications.

A paper from Iraq looked at tissue and plasma concentrations of meropenem in diabetic foot infected patients. Meropenem attained high concentrations in foot tissues in excess of the MICs of the isolated bacteria and the mean $T>MIC\%$ was 77.5 ± 19.45 . The authors concluded that the the present data shows good tissue penetration of meropenem in foot tissues that permits its recommendation for the treatment of foot infections in diabetic patients.

A cross-sectional family-based study from Egypt was conducted aiming at assessing prevalence and pattern of Complementary and Alternative Practices (CAM) in the Bedouin Community. A considerable proportion (38%) of the studied population had used CAM at some time in the past in their life. The authors concluded that there is a considerable prevalence of CAM practices among the studied population in Bir El Abd, North Sinai. The results of the present study call for including CAM in the under and post graduate curriculum in medical schools, and continuous medical education programs. Training of the primary health care team could help in modifying behavior of the population in the catchment area towards proper use of CAM practices. Family physicians have a crucial role in doing such a task with patients and families.

Chief Editor:

A. Abyad
MD, MPH, AGSF, AFCHSE
Email: aabyad@cyberia.net.lb

Ethics Editor and Publisher

Lesley Pocock
medi+WORLD International
11 Colston Avenue
Sherbrooke 3789
AUSTRALIA
Phone: +61 (3) 9005 9847
Fax: +61 (3) 9012 5857
Email:
lesleypocock@mediworld.com.au

Editorial enquiries:

aabyad@cyberia.net.lb

Advertising enquiries:

lesleypocock@mediworld.com.au

While all efforts have been made to ensure the accuracy of the information in this journal, opinions expressed are those of the authors and do not necessarily reflect the views of The Publishers, Editor or the Editorial Board. The publishers, Editor and Editorial Board cannot be held responsible for errors or any consequences arising from the use of information contained in this journal; or the views and opinions expressed.

Original Contribution / Clinical Investigation

<-- Regional / International -->

- 4 **Access to Person-Centered Care: A Perspective on Status, Barriers, Opportunities and Challenges from the Eastern Mediterranean Region**

Waris Qidwai, Tabinda Ashfaq, Tawfik A M Khoja, Salman Rawaf, Nabil Kurashi, Faisal Alnasir

<-- Saudi Arabia -->

- 14 **The Hemorheological properties of blood among Saudi male Smokers in Sakaka city, Aljouf, Saudi Arabia**

Hassan A. Almarshad, Fathelrahman M. Hassan

<-- Iraq -->

- 18 **Impaired glucose tolerance test among B thalassemia patients in Hawler Province, Iraq**

Lana Saleem, Mouroge H. AL Ani

<-- Egypt -->

- 26 **Studying Complementary and Alternative Practices in Bedouin Community: Family based study, North Sinai, Egypt**

Mosleh A. Ismail, Hoda Atwa, Amir Saleh, Mansoura F. Salem

<-- Iraq -->

- 35 **Tissue and plasma concentrations of meropenem in diabetic foot infected patients**

Mohammed Abdullah Ali, Nidhal AK Mohammed Ali

Medicine and Society

<-- Jordan -->

- 41 **Hepatitis-B Virus Seropositivity among Adults attending a Primary Care Clinic in Jordan**

Hussein H. Dmour, Amal S. AL-Tahieneh, Adnan Zayadeen

CME Quiz

- 43 **Child Health Emergencies**

Clinical Research and Methods

<-- Saudi Arabia -->

- 44 **Qualitative Research: Stigma Associated with Psychiatric Diseases**

Manal Koura, Latifa Al-Sowielem, Badria al-Dabal, Raja'a A. Shaheed, Afaf Al-Halal, Najwa Al-Mahfoodh, Abrar Hashishi

Office based family medicine

<-- Iran-->

- 48 **Effect of computer learning on quality of life of Iranian asthmatic patients**

Mitra Zolfaghari, Leila Dehghankar, Younes Mohamadi, Arezoo Mohamadkhani Ghiasvand,

Access to Person-Centered Care: A Perspective on Status, Barriers, Opportunities and Challenges from the Eastern Mediterranean Region

Waris Qidwai (1)
 Tabinda Ashfaq (2)
 Tawfik A M Khoja (3)
 Salman Rawaf (4)
 Nabil Kurashi (5)
 Faisal Alnasir (6)

(1) Department of Family Medicine, Aga Khan University Karachi, Pakistan

(2) Department of Family Medicine, Aga Khan University

(3) Director General, Executive Board, Health Ministers' Council for Cooperation Council States

(4) Professor of Public Health, Director, WHO Collaborating Centre,

Department of Primary Care and Public Health

School of Public Health, Faculty of Medicine

Imperial College London, UK

(5) Nabil Yasin Al Kurashi, Professor of Family Medicine University of Dammam, Saudi Arabia

(6) Chairman; Dept of Family & Community Medicine Arabian Gulf University, Bahrain

Advisor

Taghreed M Farahat, Egypt

Contributors

Dr. Ahmed Al-Busaidi, Oman; Dr. Ali AR. K. Abutiheen, Iraq; Dr. Anwaar Buhamra, Kuwait; Dr. Eman Alsalman, Saudi Arabia; Dr. Huda Adnan Habib, Iraq; Dr Ibrahim Kabbash, Egypt; Dr. Maleka Serour, Kuwait; Dr. Mariam Al Shetti, Bahrain; Dr Maysoon Al-Amoud, Saudi Arabia; Dr. Mohamed Al-Azri, Oman; Dr. Muntazar Bashir, Saudi Arabia; Dr. Nagwa Nashat, Egypt; Dr. Nagwa Saad, Egypt; Dr Rihab AlWotayan, Kuwait; Dr. Salma Galal, Egypt; Dr. Samina Hoosein, Pakistan; Dr. Sanaa Alkaisi, Iraq; Dr. Sehr Barakat Ahmed Shah, United Arab Emirates; Dr Wafa Halasa, Jordan, Dr Ahmed Hamed AlWahaibi, Oman; Dr. Mohamed Sayed Hussein, Saudi Arabia; Dr. Basheer M. Al-Sufyani, Saudi Arabia, Samia Almusallam, Kuwait, Dr. Mohammed Ali Al Shafae, Oman.

Editor

Lesley Pocock, Australia

Correspondence:

Dr. Waris Qidwai
 Professor and Chairman,
 Department of Family Medicine, Aga Khan University
 Stadium Road, P.O. Box: 3500, Karachi 74800, Pakistan
 Fax: (9221) 3493-4294, 3493-2095
 Telephone: (9221) 34864842 / 34930051 Ext: 4842/4838
 Email: waris.qidwai@aku.edu

Abstract

Background: “Access to Person-Centered care” is a major area of concern throughout the world including the Eastern Mediterranean Region.

Objective: This networking paper reviews current status, barriers, opportunities, challenges and future directions with regards to “Access to Person-Centered care” in the Eastern Mediterranean Region.

Methods: The lead Author from the “Working Party on Research of Eastern Mediterranean Region” invited members through its “yahoo group” to participate in this networking project. Objectives and work plan were developed by the lead Author and shared with interested contributors. Co-Authors and Advisors were invited to contribute and timelines were set for contributors to submit their report. Submissions were collected by lead authors and put into a draft that was shared with contributors for feedback. After incorporating feedback, the final draft was edited by the “Editor” before submission for publication consideration.

Results: Access to Person-Centered care in the Eastern Mediterranean Region shows extreme variations. At one end there are oil and gas rich countries that offer advanced health care services to the majority of their local population while on the other end are impoverished countries that are unable to provide even minimum required services to their people. Inequalities in health status have been growing since the mid-1990s and have resulted in an increasing gap between the most advantaged and disadvantaged social groups.

There are social, cultural, religious and economical barriers that may impede access to healthcare. It warrants a need to address these barriers on a priority basis so that “Universal access” to “Person-Centered care” may be made available to the population of the region.

Conclusion: A well planned and evidence based approach is the only way forward to ensure universal access to all populations in the Eastern Mediterranean Region. Access to Person-Centered care is the need of the hour in the region. Provision of health care services through a well defined health system with a prime focus on a primary care model delivered by trained family doctors is the single most appropriate step to achieve health for all.

Key words: Access: Primary Health Care, Eastern Mediterranean Region, Person-Centered care, Family Doctor

Introduction

Access to health and health care services is based on the need, provision and utilization of health services (1) and refers to the ability to access health care or the ease of obtaining health care(2). It involves the entry of a given individual or population group into the health care delivery system. Ensuring access is not restricted to providing appropriate health care resources but extends to include its distribution to the most deprived, with justice, irrespective of social class or standing. The concept of access is multidimensional and includes availability, accessibility, accommodation, affordability, and acceptability as the key components (1).

The Eastern Mediterranean region (EMR) is the vast area stretching from Morocco in the west to Pakistan in the east. Health indicators vary across the region but many are a cause for concern, such as life

expectancy of 50 years in Somalia compared to 81.5 years in Lebanon. Similarly, infant mortality rate is 134 per 1000 live births in Afghanistan, in comparison to 7.0 in Qatar. Disparity in access to and utilization of health and social services coupled with uneven distribution of resources are considered the main reasons for poor health status in the region (3).

A need was identified to look at the current status, barriers, opportunities, challenges and way forward with regards to “Person-Centered care” in the Eastern Mediterranean region.

Methods

The Lead author from the “Working Party on Research of Eastern Mediterranean Region” developed the idea and invited members through its “yahoo group” to participate in this networking project. Objectives and work plan were developed by the lead Author and shared with the interested contributors. Co-Authors and Advisors were invited to contribute and timelines were set for contributors to submit their report. Submissions were collected by Lead and Co-Authors and put into a draft that was shared with contributors for feedback. After incorporating feedback, the final draft was edited by the “Editor” before submission for publication consideration. Advisors, who were selected based on their experience with the subject, provided guidance. This paper is an evidence based systematic review of literature on access to health care and its utilization, issues and challenges in EMR. Contributors, Authors and Editor referred to Medline and Pub Med search engines, World Health Organization (WHO) and National Health Survey reports. Recommendations are drawn relating to the health services utilization patterns observed in EMR countries.

Health care status in EMR region

Health care has undergone major transformations with an increased emphasis on ‘Person centred health care’, defined as health care that establishes a partnership among physicians, their patients’

and families in an appropriate and holistic manner with a guarantee that the decisions made respect the wants, needs and preferences of the patients (4,5). It ensures that patients are treated as equal partners and receive appropriate and well-timed care in order to meet their needs as individuals, regardless of any health and social services boundaries(6). The shift from “Patient-Centred” to “Person-Centred” signifies a shift that looks at patients as healthy persons before they get sick and try to keep them in good health. The overall quality and equitable provision of health care services depends upon the efficiency of its primary health care delivery and is considered the most appropriate way to provide health care in a cost effective manner (7). Over the past decades, EMR countries have realised the need to incorporate primary health care in health care delivery to improve access to health care (8). “Family Practice” is recognized as a specialty and is considered to be a core component for success of any health system(9). Family Physicians are and should be considered the main force that delivers primary health care.

The public sector plays a crucial part in delivering health care through strengthening health systems and generation of human, financial and other resources. Government is the main health provider in most of the EMR countries. The allocation of budget for the health care sector in the majority of these countries is very low, not sufficient to fulfill the health needs of the country’s population (1). This is in contrast to oil and gas rich countries where the situation is slightly better and government is investing substantial finances to improve health care services for their people however it is still not sufficient to meet the health needs of countries.

Disease burden in the EMR

The EMR suffers from double disease burden comprising communicable, and non-communicable disease with increasing prevalence of mental disorders and accidents. Social and economical progress in EMR has

Country	Total Population	Total GDP	Infant Mortality Rate / 1000	Under 5 Mortality Rate /1000	Maternal Mortality Ratio/100,000
Bahrain	791	3.7	9	12	19
Jordan	6316	9.4	22	25	59
Iran	74196	5.5	26	31	30
Iraq	30747	3.3	36	44	75
Kuwait	2985	2	11	13	9
Egypt	82999	4.8	18	21	82
Qatar	1409	2	7	9	8
Oman	2845	2.1	9	12	20
Pakistan	180808	2.6	70	87	260
Yemen	23580	4.8	51	66	210
Saudi Arabia	25721	3.6	18	21	24
Morocco	31993	5.3	33	38	110
Afghanistan	28150	7.4	134	199	1400
UAE	4599	2.5	7	7	10
Libya	6420	3	5	6	64
Somalia	9133	-	109	180	1200
Sudan	42272	6.9	69	108	750
Syria	20125	3.1	14	16	46
Lebanon	24060	8.5	11	12	26

WHO health statistic Report 2011

Table 1: Health indicators in Eastern Mediterranean Region

shown some improvement in health indicators in the region mainly due to social and economic development but these changes are slow, not uniform and have deteriorated in some countries probably because of poor focus on development of health care services¹⁰. Variations between and within countries are still very high. Maternal mortality in Somalia and Afghanistan is among the highest in the world making it a challenge to achieve the target of a two-thirds reduction in the 1990 mortality levels by the year 2015⁽¹⁰⁾. (Table 1 - above)

Non-communicable diseases (NCD) are on the rise (11, 12) and deaths secondary to them are projected to increase by 15% globally between 2010 and 2020. The greatest

increase of over 20 % is predicted to be in the WHO regions of Africa, South-East Asia and the Eastern Mediterranean region (13).

Family Physicians in the EMR

There has been an increase in the number of physicians in almost all countries of EMR with the exception of Somalia (13).

(See Table 2, page 10).

This increase is not uniform and is greater in the oil rich countries of the region, with a significant number of physicians being immigrants of variable professional quality. Despite its established importance, comprehensive primary care is lacking in EMR countries. The number of trained family medicine

specialists is low in the region due to imbalance between training needs and training programs and mal-distribution of physicians, especially in rural and inner city areas.

Deficiency created by the shortage of primary care physicians is either filled up by Family Physicians recruited from various western countries or by adhoc General Practitioners working in the country, who are often neither trained nor committed to the job and therefore fail to provide "Person Centered" care (14,15, 16).

The uncooperative attitude of other specialties, poor support from the private sector with an inherent attitude for-profit orientation, along with limited awareness and acceptance among the general population regarding Family

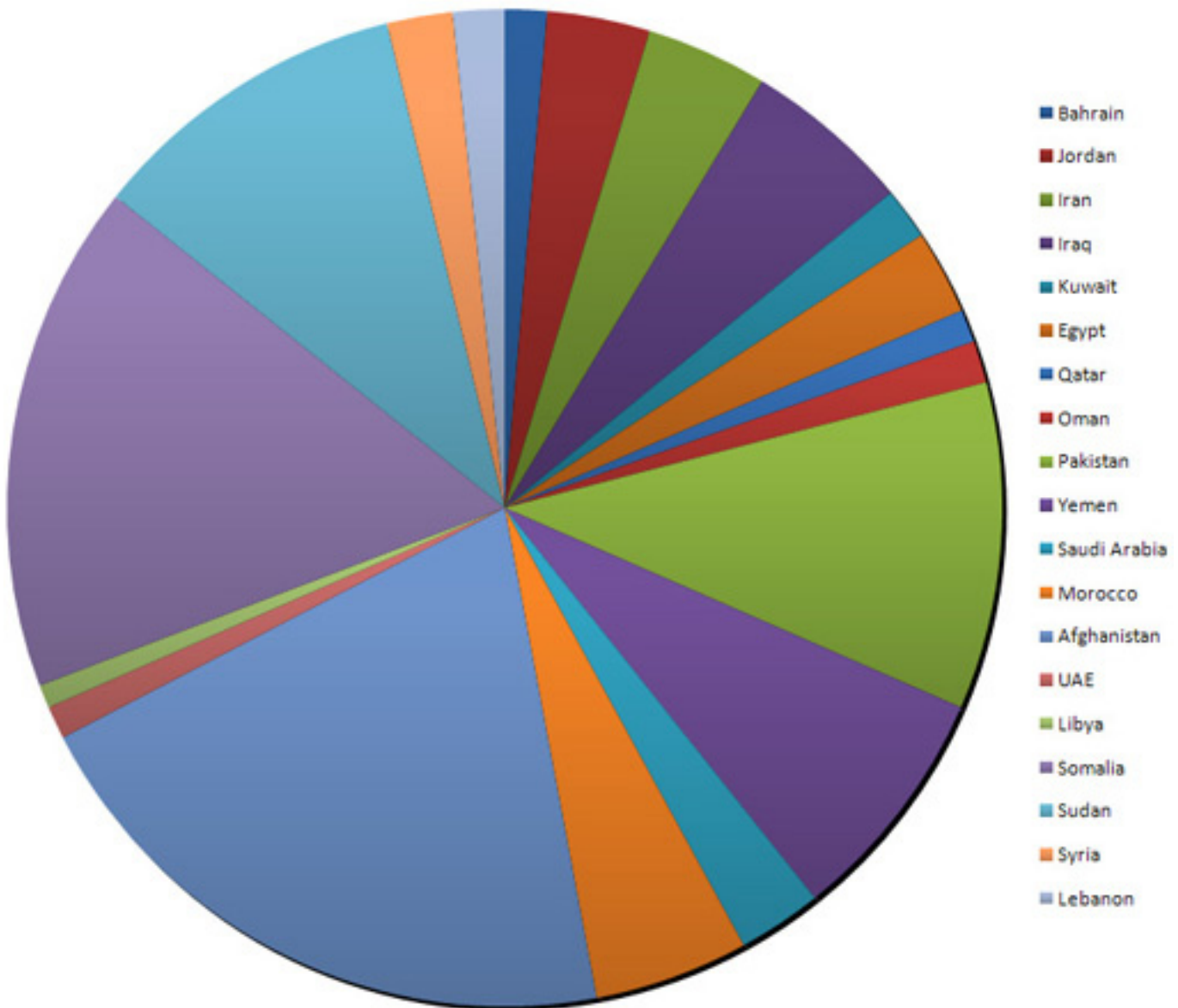


Table 1a: Infant mortality per 1000 births

Physicians, decreases access to effective delivery of health care. The number of nurses and midwives in EMR countries is static with a fall in numbers in some low income countries due to migration (10).

Provision of Primary health care

The provision of primary health care facilities in the EMR is variable and several countries from all income groups have shown a reduction in the number of primary health care facilities over the past decades (17).

Primary health care in Oman and Iran:

Oman invested consistently in its Wilayat health system; a national

health service based on principles of primary health care and is able to provide almost universal access to health care for the majority of its population with an overall improvement in health indicators¹⁸. Iran has been accredited as a pioneer in providing primary health care services to the community. The primary health care services in Iran rely on trained community health workers called behvarz, trained to meet the basic health-care needs of people living in rural areas and mainly designated to provide service to their own village. Marked improvement in health indicators was observed improving the overall health of the country with a prime focus on rural health. However, due to rapid epidemiological transition and in spite

of these achievements, still there is a need to address challenges in relation to changing health needs and preferences from the population and with an emphasis on quality care. (19, 20).

Primary health care in Pakistan:

The national programme for primary health care and family planning in Pakistan, and lady health workers programme, has trained female community health workers to provide basic health care to the rural population of the country, but while expedient may not in itself guarantee quality of service. A huge improvement in coverage for immunization, antenatal and family planning services in the rural areas of Pakistan has been seen and is being

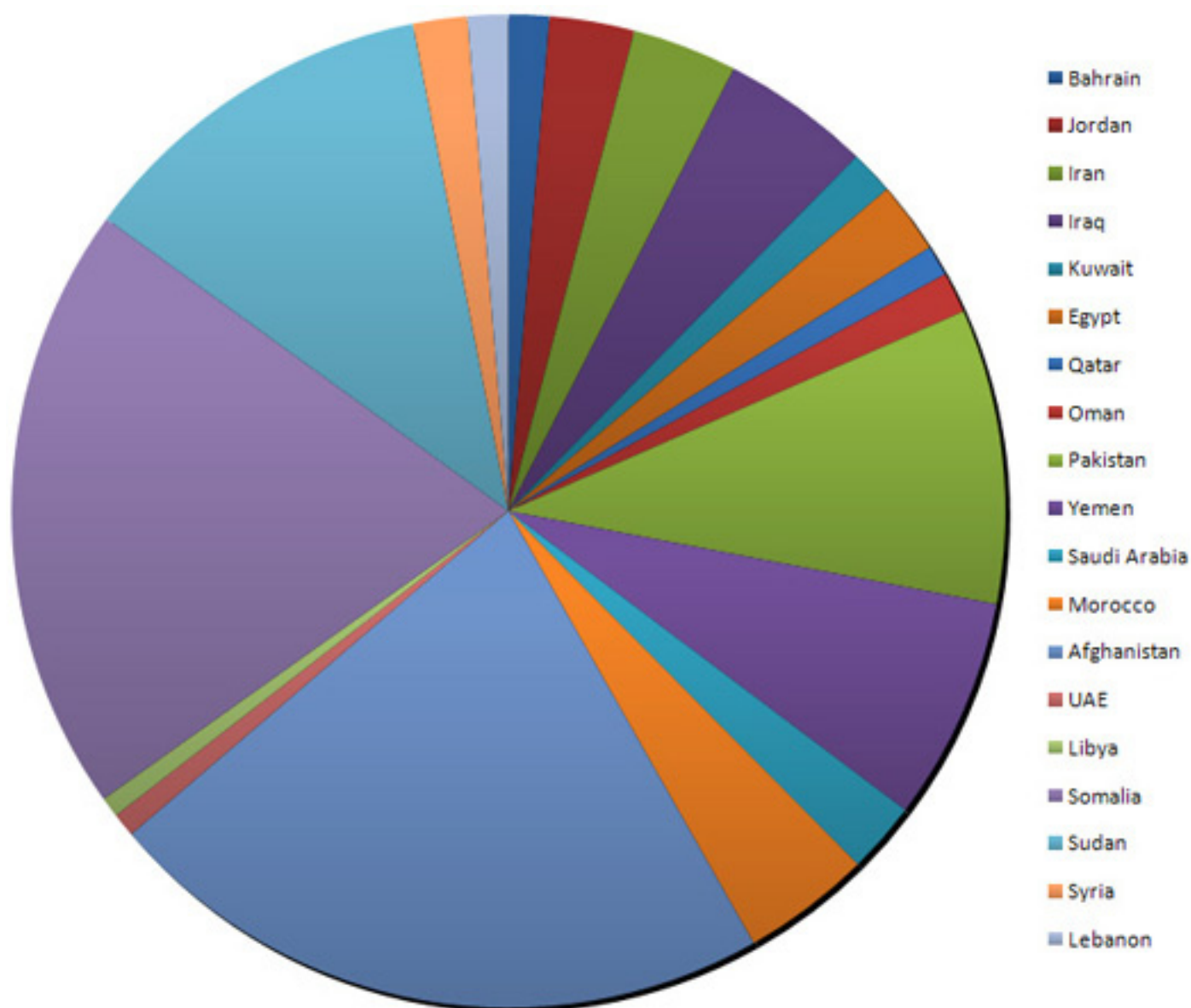


Table 1b: Under five mortality per 1000

projected as an example for other countries, but health indicators are still in need of improvement(21).

Primary health care in Egypt:

According to the UNDP (2011), the population of Egypt is 82 Million (2009); 43% live in urban areas. Over 90% of the population has access to safe water and to improved sanitation.

According to the Ministry of Health (MOH), private health sectors include private clinics and hospitals, non-governmental organization (NGO) polyclinics and hospitals, in addition to other sporadic facilities pertaining to different occupations. MOH is the major provider of preventive and curative health care (80,000 beds).

Urban areas have almost all health sectors present, while rural areas have mainly MOH health facilities, private clinics or NGO facilities. Often people bypass the primary health care unit / center to get better services in outpatient clinics of public hospitals, or they even resort to private clinics. There is no referral system.

Health Sector Reform Project (1994-2009) adopted the Family Health Model. It developed national standards for quality health care delivery. While welcome, this is still in its infancy.

- 1,103 primary clinics in two pilot Governorates - Alexandria and Menoufia - were upgraded to

family clinics services. Later on they expanded family clinics to 21 out of 27 governorates.

- Around 1,825 general (GP) and specialized physicians - 64.8% females - were trained as family physicians. Length of training however is less than 3 years. Egypt needs at least 40,000 fully trained family physicians with more than the current 6 month training period.

A basic health package provides child health, maternal health, all age groups health, emergency care and other.

According to the WHO, the ratio of physicians per 10,000 populations is 28.3 in Egypt, making a total of 226,400 physicians; 85,000 of them

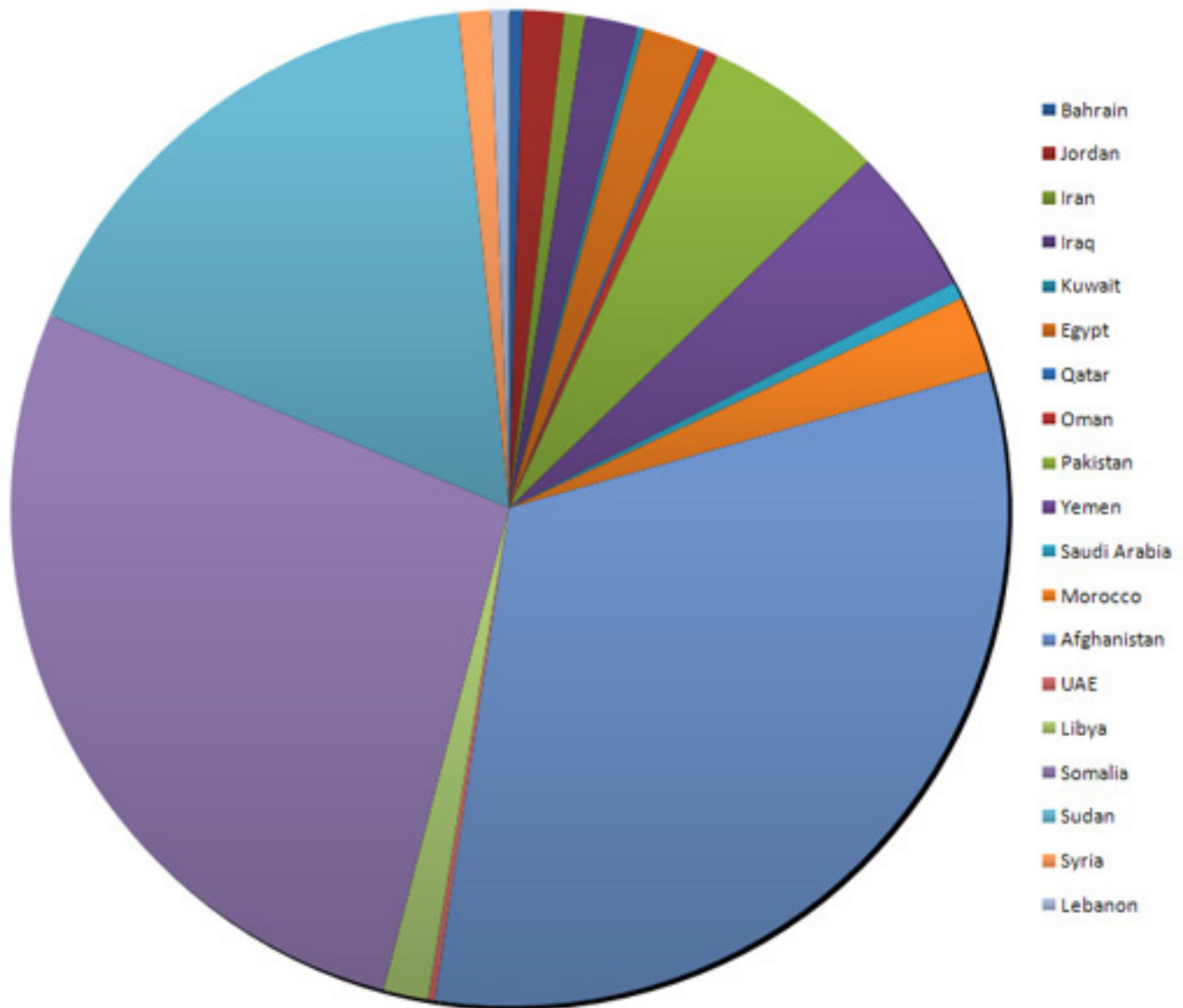


Table 1c: Maternal mortality per 100,000

are specialized and 18,000 are specialists (Physician Syndicate). Family physicians are few. Most physicians work in public and, after working hours, in private facilities as the wages are too small to cover the basic living requirements. Many of the physicians and nurses work in other Arab countries.

In Egypt, the burden of communicable and non-communicable diseases is prevailing. Hypertension and liver cirrhosis are the two most common causes of death. Over a quarter of the adult population has hypertension (WHO) and 10% has HCV (EDHS 2008). Obesity and malnutrition are increasing in children. A quarter of children are undernourished. In

adults, overweight reached 68%. Smoking prevalence among adult men is 40% while women seldom smoke.

Primary health care in Somalia and Afghanistan:

In contrast to the situation in Egypt access to basic health care services is very poor in Somalia(10) and Afghanistan(10) with poor health indicators in comparison to other countries. Diseases that have largely been controlled in most countries in the world continue to cause death and disability in Afghanistan and Somalia(10). Instability in these countries has greatly impacted on the quality and availability of health services, leaving many without access to basic care. Weakened

infrastructure, poor literacy rates, shortage of health providers and difficult access to health care services have all contributed to increased risks of mortality for mothers and newborns. Healthcare facilities in these countries are in urgent need of restoration.

Primary Health Care in Iraq

According to annual report of Iraqi MOH 2010; the following are health related statistics:

- 1- Infant Mortality rate =24/ 1000 live births (Except Kurdistan region of Iraq).
- 2- Under 5 mortality rate=28.7/ 1000 live births (Except Kurdistan region of Iraq).

Country	Physicians*		Nurses / Mid Wives*		Community Health Workers*		No. of family physicians**	Infrastructure* No. of hospitals / 10,000 population
	Total No.	Density / 10,000 people	Total No.	Density / 10,000 people	Total No.	Density / 10,000 people		
Bahrain	1103	14.4	2856	37.3	-	-	375	19
Jordan	15226	24.61	25046	40.3	-	-	472	18
Iran	61870	8.9	98020	16	25242	3.6	-	14
Iraq	21925	6.9	43850	13.8	149	0.1	70	13
Kuwait	5340	17.9	13554	45.5	-	-	80	18
Egypt	225565	28.3	280561	35.2	-	-	-	17
Qatar	2313	27.6	6185	73.7	-	-	216	14
Oman	5194	19	11233	41.1	-	-	132	19
Pakistan	139555	8.1	95538	5.6	10731	0.6	651***	6
Yemen	7127	3	13746	6.6	2542	1.2	-	7
Saudi Arabia	24802	9.4	55429	27	-	-	353	22
Morocco	20682	6.2	29689	8.9	-	-	-	11
Afghanistan	7248	2.1	17257	5	-	-	-	4
UAE	9215	19.3	19529	40.9	-	-	72	19
Libya	12009	19	42982	68	-	-	-	37
Somalia****	300	0.4	965	1.1	-	-	-	0
Sudan	10813	2.8	32439	8.4	4716	1.4	20	7
Syria	30702	15.0	38070	18.6	-	-	288	15
Lebanon*****	13214	35.4	8324	22.3	-	-	120	35

WHO health statistic Report 2011*

Osman H. Family medicine in Arab countries. Fam Med. 2011 Jan; 43(1):37-42**

College of physician and surgeon Pakistan***

Country profile .lebanon.Web site: <http://www.emro.who.int>*****

Country profile .somalia.Web site: <http://www.emro.who.int>*****

Table 2: Healthcare work force and infrastructure in the Eastern Mediterranean Region

- 3- Number of physicians = 24750, 7.5/10000.
- 4- Number of family doctors 140, 0.46/10000 (Except Erbil and Douhok governorates).
- 5- Number of nurses =46024, 14 /10000.
- 6- Number of paramedical staff = 54898, 16.7/ 10000.

Primary Health Care in Bahrain, Jordan, Yemen and Morocco

These countries are working in collaboration with WHO to implement a health care model based on the principals of a primary health care system.

Trends and changes related to health determinants including adult literacy, access to safe water and access to sanitation has shown improvement in the majority of counties however the unsteady political situation in Iraq has resulted in deterioration while Somalia also showed decreased access to drinking water.

The overall situation with respect to provision of effective person centered care is not very promising in the region. Health services still fail to reach out to those who need them most, both in the rural areas as well as in the rapidly expanding urban areas. This difference in access to health care eventually has far-reaching consequences.

Bahrain has a Primary Care system based on FM with 26 excellent clinics but without laws to make it compulsory (ie full registration). The private sector is stopping this development.

Access Barriers to Person-Centered care

Weak health care infrastructure:

Weak health care infrastructure including human and material resources is an obstacle in several countries with rural areas and urban slums adversely impacted. Under the current circumstances, it is questionable that the desire to have a family doctor for each family can be achieved in the near future. The availability of trained Family Physicians with an updated medical knowledge is an issue of concern

along with lack of a support team for primary care delivery. Quality assurance processes including proper medical record keeping are also required in certain areas(22). Additional issues are training standards, and subsequently, competencies; quality of the private sector; and willingness of governments to invest in these areas.

Dysfunctional health care system:

The health care delivery system is dysfunctional due to a limited concept of health care providers in relation to working, implementation and coordination of primary, secondary and tertiary levels of health care delivery systems. Non availability or poor functioning of primary health care facilities compel people to utilize tertiary care hospital services adding to costs and this eventually results in limited access to required health care. It is unfortunate that health care access and utilization is lowest among the poor who are the most deprived(22) leading to inequitable distribution of health services. Health delivery systems are at times dysfunctional due to lack of a central role of the Family Physician in the Primary Health Care team.

Distance to health care facilities:

Distance to health care facilities, non-availability of transport, lack of education, cultural (23) and social factors also impede access. These barriers are particularly important in countries where travel is difficult, employment inflexible, and knowledge of appropriate health care-seeking behavior is poor. Location is particularly important in relation to provision of obstetric, and especially delivery services.

Time constraint:

Time constraint can be another important factor as patients and their attendants may have to wait for long hours to receive treatment because of dysfunctional or low numbers of health care facilities available. This represents an important cost to individuals, particularly during peak periods of economic activity leading to lack of adherence to treatment and decreased satisfaction levels.

Socio-Cultural factors:

Many social and cultural factors may also impede access to health care (22). In communities where men and women do not mix freely, utilization of health services may be impeded. A woman may need to wait for a male companion to visit a health care facility. There are also inadequate numbers of female health care practitioners employed in the government sector, a fact which restricts female client's access to health care. Cultural and family opinion is particularly important in the demand for contraceptives and wider family planning advice. Lack of awareness regarding illness and preventive aspects also have an impact on access. Language barriers are also another area of concern, particularly when doctors from a foreign country see patients who speak another language.

Cultural and educational factors may obscure the recognition of illness and the potential benefits from a health care system, for instance gender of a health provider may inhibit females utilizing health services in case of male physicians or women with ailments hesitate disclosing their illness to the husband in fear of being divorced or remarriage of her husband (23).

Health seeking behavior:

Health seeking behaviors, anxiety and previous experiences all contribute towards barriers to access for health care e.g. Concerns about side effects have formed a deterrent to the uptake of childhood immunization (and influenza vaccinations for elderly people) among all social groups (24). A further barrier to the uptake of preventive services among some disadvantaged groups is the existence of a more 'fatalistic' approach to health (i.e. a belief that one has little control or ability to influence events).

Religious beliefs:

Another important area of concern is patient's religious beliefs about illness which on one hand help in improving health outcomes with increased patient satisfaction while

on the other side it can also act as a barrier to access, for instance a patient's belief about accepting disease and its complication as "Gods will" or their trust in the power of prayer in healing disease limits them from visiting health care providers, specifically in those suffering from terminal illness. There is also a huge use of alternative medicine and "religious treatments" that either delay access or compete with mainstream medical care.

Financial (socio-economic reasons) :

Financial factors such as income, employment status, and insurance status can greatly influence access and utilization of health care. People in low income countries of EMRO region are either unable to receive basic health care or they receive it with great difficulty. In this instance survival care, such as shelter and food is given more importance, overlooking health care. Financial constraints and lack of insurance facilities for health care results in people seeking emergency care for acute conditions only, ignoring the component of preventive care.

Under recognized family medicine:

There is a lack of motivation among health care providers, trainees and medical students in the field of family medicine because of limited respect among other specialties, low remuneration and most importantly limited opportunities for training. All these lead to a shortage of trained and skilled Family Physicians in the region. On one end we have issues of shortage of adequately trained human resources to tackle health care and on the other hand we have a growing disease burden consisting of communicable and non-communicable disease, mental disorders and accidents(23).

Challenges and way forward to achieve access to care

We face innumerable challenges in order to ensure access to "Person Centered" care for populations in EMR region. A rapid population growth in face of resource shortages is an enormous challenge. The rising quadruple disease burden

is difficult to control. Increase in ageing population puts additional burden and absence of government commitment resulting in increased out of pocket expense is important in absence of health insurance coverage. There is a lack of literacy and awareness about health issues among populations that puts an additional pressure on an already overburdened health delivery system, thereby further limiting access. Rapid urbanization and lack of facilities in rural areas are issues of great concern. Gender imbalance and related issues are crucial if access to health facilities is to improve. The private sector needs to be controlled so that out of pocket expenditures are kept within reach of the common man.

Government support is required for health system development and is mandatory to improve the structure and function of health delivery system with appropriate focus and attention on primary care. There is an important role for governments, to provide investment in health, engaging people in their own health, shifting from disease focus to health focus, holistic approaches, continuity of care, organization of health services, quality and patient safety (linked to practitioners competencies), laws and regulations and above all the six blocks of the health system. (27)

Health insurance should be made available for all on appropriate terms so that access is improved for persons with limited means.

Training and ongoing continuing medical education (CME) needs further strengthening. Training programs are required for Family Doctors while CME opportunities are needed for family doctors and practicing general practitioners(25). The important issue of retention of trained human resources is essential if access to person centered care is to be ensured. Ongoing quality assurance processes should be in place to ensure evidence based practice of clinical medicine that takes the patient's point of view into account and values patient

satisfaction as important pillars of health care delivery.

Research into development and testing of primary care models is necessary to bring about changes in health care delivery that improves person centered access to health care. Research that explores cost effective interventions and positive health outcomes are required. Issues such as improvement in appointment systems, scheduling of patients, strategies to reduce patient waiting time in clinics and record keeping that requires minimum time requires ongoing research.

Physicians in the EMR region are not well aware of the philosophy, components, and advantages of the person centered model of patient-physician consultation. It is important to make it part of the curriculum of all training programs. Implementation of a person centered care model will not only ensure patient ownership in addressing health issues, it will improve adherence to treatment, satisfaction with the consultation process and it will improve access to health care.

Information and communication technology has advanced to the extent that its application can be used to improve access to person centered care. It can be used for communication between health facility and patient; messages can be exchanged between health care provider and patient and this technology can be used for health education and promotion.

The concepts of religious beliefs are vital in Person Centered Care. We should not dismiss patient value systems and beliefs, as the main drivers for Person Centered Care are common ground, joint understanding and joint decisions. We should not dismiss alternative medicine / therapies, as they are part of the person's belief system. Indeed, empirical evidence has shown that some alternative / complementary medicines are of benefit to some patients/conditions. (26) Furthermore, the Chinese have incorporated successfully popular/

alternative/complementary medicine into 'Western' medicine training and all Chinese medicine practitioners are graduates of medical schools.

Conclusion

EMR is undergoing tremendous change for the better in all sectors of human development. Health care delivery is most important to ensure progress in the region. Access to "Person Centered" care for all populations is extremely important. Well trained Family Physicians playing a major role in the Primary Health Care team can ensure access to "Person Centered" care to the EMR population that can result in better health outcomes for populations of the region.

References

1. P Braveman ,S Gruskin. Defining equity in health.J Epidemiol Community Health 2003; 57:254-258 doi:10.1136/jech.57.4.254
2. Gulliford M, Figueroa-Munoz J, Morgan M, Hughes D, Gibson B, Beech R, et al. What does 'access to health care' mean? J Health Serv Res Policy. 2002; 7(3):186-8
3. World Health Organization. The Work of WHO in the Eastern Mediterranean Region, Annual Report of the Regional Director. 1 January - 31 December 2010. Regional Office for the Eastern Mediterranean region. [Cited 2012 April 11] Available from: http://www.emro.who.int/rd/annualreports/2010/pdf/Health_status_indicators.pdf
4. Hargie O, Dickson D, Boohan M, Hughes K. A survey of communication skills training in UK schools of medicine: present practices and prospective proposals. Med Educ. 1998; 32(1):25-34
5. Jennings BM, Heiner SL, Loan LA, Hemman EA, Swanson KM. What really matters to healthcare consumers. J Nurs Adm. 2005; 35(4):173-80
6. McCance T, McCormack B, Dewing J. An exploration of person-centeredness in practice. Online J Issues Nurs. 2011; 16(2):1
7. Macinko J, Starfield B, Shi L. The contribution of primary care systems to health outcomes within Organization for Economic Cooperation and Development (OECD) countries, 1970-1998. Health Serv Res. 2003; 38(3):831-65.
8. Primary Health Care: Now More than Ever - World Health organization.[online] 2008[cited 2012 March 22]. Available from http://www.who.int/whr/2008/whr08_en.pdf
9. Abyad A, Al-Baho AK, Unluoglu I, Tarawneh M, Al Hilfy TK. Development of family medicine in the Middle East. Fam Med. 2007; 39(10):736-41.
10. World Health Organization. World health statistics [online] 2011 [cited 2011 March 10] Available from: http://www.who.int/gho/publications/world_health_statistics/2011/en/index.html
11. Khuwaja AK, Khawaja S, Motwani K, Khoja AA, Azam IS, Fatmi Z, Ali BS, et al. Preventable lifestyle risk factors for non-communicable diseases in the Pakistan Adolescents Schools Study 1 (PASS-1). J Prev Med Public Health. 2011; 44(5):210-7
12. Al-Daghri NM, Al-Attas OS, Alokail MS, Alkharfy KM, Yousef M, Sabico SL, et al. Diabetes mellitus type 2 and other chronic non-communicable diseases in the central region, Saudi Arabia (Riyadh cohort 2): a decade of an epidemic. BMC Med. 2011; 9:76.
13. Global status report on noncommunicable diseases.[online] 2010[cited 2012 April 2] Available from: http://www.who.int/nmh/publications/ncd_report_full_en.pdf
14. Family Medicine Status and Historical background in Pakistan [online] 2011 [cited 2012 March 5] Available from http://www.medpk.com/family_medicine_pakistan.php
15. A new Strategic Issue Primary Health Care in Saudi Arabia [online] 2011[cited 2012 April 2] available from: http://www.vincentfromentin.fr/en/research/primary-health-care-in-saudi-arabia/#identifier_2_761
16. Osman H, Romani M, Hlais S. Family medicine in Arab countries. Fam Med. 2011 Jan; 43(1):37-42
17. Health systems based on primary health care in the Eastern Mediterranean Region: How different will they be in the 21st century? World Health Report [online] 2008 [cited 2012 March 15] Available from: <http://www.emro.who.int/RC55/media/pdf/EMRC55INF06aEn.pdf>
18. World Health Organization. The World Health Report 2008: Primary health care: Now more than ever. 2008; Geneva: World Health Organization. Available from: www.who.int/whr/2008/en/index.html. Accessed: 2009 Nov 4
19. Moghadam MN, Sadeghi V, Parva S. Weaknesses and Challenges of Primary Healthcare System in Iran: A Review. Int J Health Plann Manage. 2011. doi: 10.1002/hpm.1105
20. Iranian health houses open the door to primary care. Bull World Health Organ. [Online] 2008 [cited 2012 April 1]. Available from <http://www.who.int/bulletin/volumes/86/8/08-010208/en/index.html> Homepage: <http://www.who.int/bulletin/en/>
21. Lady Health Worker Programme: external evaluation of the national programme for family planning and primary health care. Final report. Oxford, Oxford Policy Management, March 2002
22. Almalki M, Fitzgerald G, Clark M. Health care system in Saudi Arabia: an overview. East Mediterr Health J. 2011; 17(10):784-93
23. Yosef AR. Health beliefs practice, and priorities for health care of Arab Muslims in the United States. J Transcult Nurs. 2008; 19(3):284-91
24. Turnbull AE. Fear, numbers, and measles. Health Commun. 2011; 26(8):775-6.
25. Qidwai W, Beasley JW, Francisco JGC et al. The present status and future role of Family Doctors: a perspective from International Federation of Primary Care Research Networks. Primary Health Care Research and Development 2008; 9: 172-182.
26. Ali-Shtayeh MS, Jamous RM, Jamous RM. Complementary and alternative medicine use amongst Palestinian diabetic patients. Complement Ther Clin Pract. 2012 Feb;18(1):16-21. Epub 2011 Oct 2.
27. World Health Organisation. Monitoring the building blocks of health systems: a handbook of indicators and their measurement strategies. Publication date: October 2010. <http://www.who.int/healthinfo/systems/monitoring/en/index.html>

The Hemorheological properties of blood among Saudi male Smokers in Sakaka city, Aljouf, Saudi Arabia

Hassan A. Almarshad (1)
Fathelrahman M. Hassan (2)

(1) College of Health Science, Al-Jouf University,
Saudi Arabia

(2) College of Applied Medical Science, Al-Jouf University,
Saudi Arabia

Correspondence:

Hassan A. Almarshad

College of Health Science, Al-Jouf University, Saudi Arabia

Email: almarshad@ju.edu.sa

Introduction

Hemorheology is the study of flow properties of blood and its elements (plasma and formed elements) [1]. Blood viscosity is the measure of how thin or thick the blood fluid is. The viscosity of blood thus depends on the viscosity of the plasma, in combination with the hematocrit (Ht). Blood viscosity is correlated with cerebral blood flow and cardiac output, and increased viscosity may increase the risk of thrombosis or thromboembolic events [2].

The study of hemorheology has been of great interest in the fields of biomedical engineering and medical research for many years. Hemorheology plays an important role in atherosclerosis [3]. There is increasing evidence indicating that flow properties of blood are among the main determinants of proper tissue perfusion and alterations in these properties play significant roles in disease processes [1]. A strong correlation has been found between cigarette smoking and atherosclerosis and cardiovascular disease. Various epidemiological studies have investigated the possible associations between blood rheology (i.e. haematological characteristics that could influence blood flow) and coronary heart disease rates[4,5]. This experimental study was to analyze and identify social, behavioral, and hemorheological factors related to smoking and determine the hemorheological properties of blood changes associated to cigarette smoking among young males in the community in Al-Jouf, Saudi Arabia.

Materials and Methods

Three hundred and twenty one male subjects (smokers (195), ex smokers(105) and never smokers (21)) with different age groups, were enrolled into the study as a randomized sample. Social information was collected from all study groups. The study groups

Abstract

Background: Hemorheology is the study of flow properties of blood and its elements (plasma and formed elements). Blood viscosity is correlated with cerebral blood flow and cardiac output, and increased viscosity may increase the risk of thrombosis or thromboembolic events.

Objective: To analyze and identify social, behavioral, and hemorheological factors related to smoking among young males in the community in Al-Jouf, Saudi Arabia.

Methods: Three hundred and twenty one male subjects (smokers (195), ex smokers (105) and never smokers (21)) with different age groups were enrolled into the study as a randomized sample. Social information was collected from all study groups. Hematocrit (HCT), Whole Blood Viscosity (WBV) and Plasma Viscosity (PV) were measured at room temperature. The relationships of variables with whole blood or plasma viscosity were analyzed by SPSS 17.0 and Origin 6.0 statistical software.

Results: Percentage of cigarette smokers is high compared to ex and never smoked persons. The common reason for smoking was the influence of the family which can be parent imitation, family careless, family breakdown or other reasons. The smoking leads to a rise in hematocrit and alters the rheological properties by increasing whole blood viscosity and plasma viscosity levels. Together these changes cumulate in a significant deterioration of the flow properties of blood.

Conclusions: Alterations of blood rheology in turn can promote atherothrombogenesis in several ways. Smoking increases the risk of vascular diseases through its effects on blood rheology. Further prospective and public health studies would be required to deal with common reasons which influence smoking behavior as well as to deal with the blood rheological changes.

Key words: smokers, Whole blood viscosity, Haematocrit, Plasma viscosity

Parameter	Mean ± SD		
	HCT (%)	WBV (mPa.s)	PV (mPa.s)
Non- Smokers	49.7±6.72	3.5±2.71	1.4±0.19
Ex- Smokers	51.3±6.8	3.4±0.2	1.4±0.2
Smoker I	51.6±4.75	3.7±0.38	1.4±0.20
Smoker II	51.9±6.03	3.7±0.404	1.5±0.98
Smoker III	52.9±7.43	3.8±0.425	1.7±1.71

Smoker I: Smoking < 20 cigarettes per day.

Smoker II: Smoking 21- 40 cigarettes per day

Smoking III: Smoking > 40 cigarettes per day

Table 1: Mean level of HCT, WBV and PV in smokers (type I, II and III), ex smokers and non smokers

Parameters	n	Mean ± SD		
		HCT (%)	WBV (mPa.s)	PV (mPa.s)
Non smokers	105	49.7±6.72	3.5±2.71	1.4±0.19
Smoker I <i>P. value</i>	142	51.6±4.75 (<i>p</i> <0.05)	3.7±0.38 (<i>p</i> <0.05)	1.4±0.20 (<i>p</i> >0.05)
Smoker II <i>P. value</i>	46	51.9±6.03 (<i>p</i> <0.05)	3.7±0.404 (<i>p</i> <0.05)	1.5±0.98 (<i>p</i> <0.05)
Smoker III <i>P. value</i>	07	52.9±7.43 (<i>p</i> <0.05)	3.8±0.425 (<i>p</i> <0.05)	1.7±1.71 (<i>p</i> <0.05)

A two-tailed *p*. value <0.05 was considered statistically significant

Table 2: Correlation between HCT, WBV and PV in smokers (type I, II and III) and non smokers

were divided into three age groups; ranging from 17 - 25 years, 26 - 36 years and above 36 years old. Cigarette consumption was classified into mild, < 20 cigarettes/day; moderate, 21 - 40 cigarettes/day; heavy consumption, > 40 cigarettes/day. Informed consent was obtained from the subjects. On arrival at the clinical laboratory in Abdelrahman Elsidarri hospital Aljouf, Saudi Arabia. three tubes of venous blood were collected from the subjects; one tube (2 ml) for Packed cell volume assessment and the other two tubes (2 ml and 4 ml) for whole blood viscosity and plasma viscosity assessment. K2-EDTA (3.6mg for 2 ml tubes and 7.2mg for 4ml tube) Becton Dickinson vacuum collection tubes were used for blood collection. The packed cell volume was measured by SYSMEX SE-9500 in the hematology laboratory of Abdelrahman Elsidarri hospital. The whole blood viscosity and plasma viscosity were measured by Ostwald viscometer PISCO BRAND PRECISION SCIENTIFIC GLASS APPARATUS, INDIA (capillary U tube) at room temperature in the

hematology laboratory of the College of Medical Applied Sciences (Aljouf University).

Statistical Analysis

Data The relationships of variables with whole blood or plasma viscosity were analyzed by SPSS 17.0 and Origin 6.0 statistical software. A two-tailed *p* value <0.05 was considered statistically significant.

Results

Analysis of hemorheological findings between smokers, ex smokers and never smokers was statistically significant (*p* > 0.05) increased in the mean whole blood viscosity, plasma viscosity and Packed cell volume levels among smokers compared to never smokers, Tables 1 and 2 (above).

The social variables among smokers and ex smokers such as cigarettes consumption/day, and smoking period/years, our results found that most of the smokers were smoking < 20 cigarettes per day (72.8%) and increased the smoking period during the recent 1 to 5 years period of

smoking(47.0%) compared to the ex smokers groups, Table 3 (page 16). This study indicated that the common factors affecting the onset of smoking was the influence of the family which can be parent imitation, family careless, family breakdown or other reasons, Figure 1 (page 16).

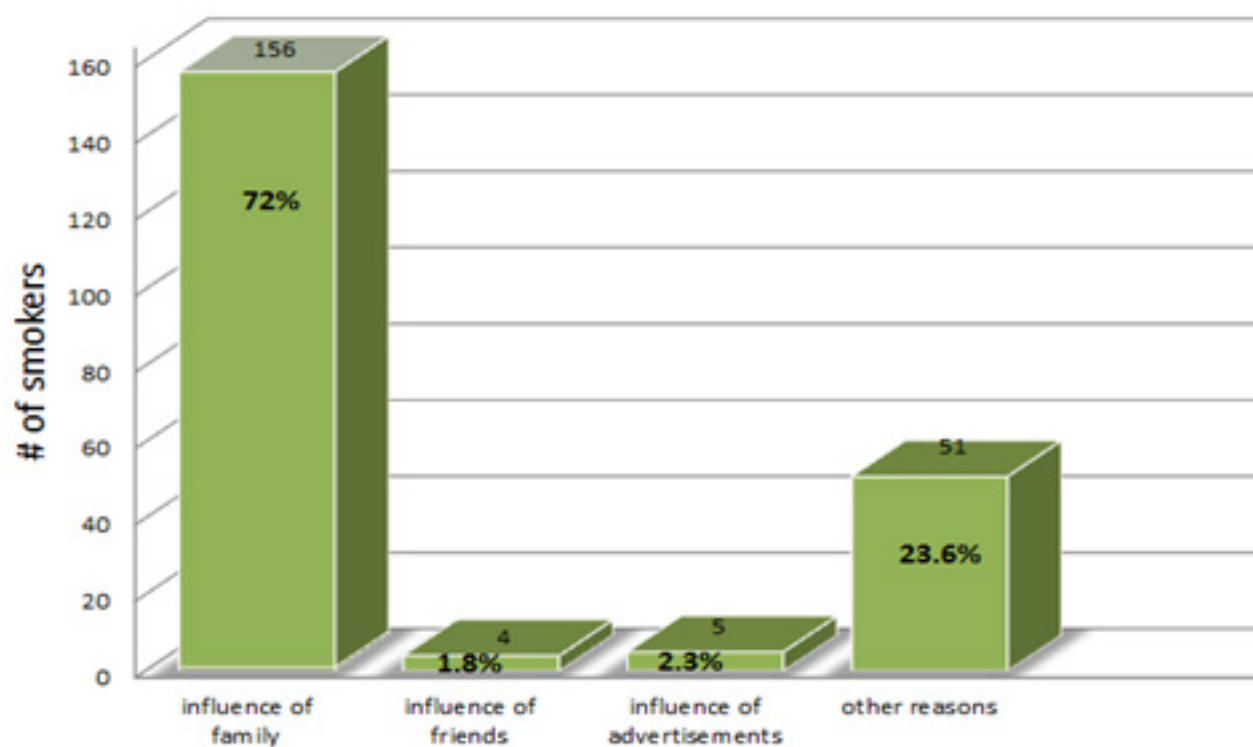
Discussion

The study of physical properties, such as viscosity, may play a critical role in predicting possible diseases as well. Physical properties of blood directly affect blood flow, and sufficient blood flow is essential for the health of all organs. Since blood supplies oxygen and nutrients needed for living cells and removes the cells' waste products, blood problems arise, ranging from heart attacks and strokes to kidney disease and blindness. The results of the present study clearly indicate Cigarette smoking adversely affects blood fluidity by increasing blood and plasma viscosity. Our comparative findings in smokers and never smokers are generally in agreement with those previously reported by Dintenfass, studying 125 policemen,

Cigarettes consumption per day		
	Smokers, %	Ex-Smokers, %
Smoker I	72.8	33.3
Smoker II	23.6	52.4
Smoker III	3.6	14.3
Smoking Period per year		
< 1	0.0	0.0
1 - 5	47.0	33.0
6 - 10	41.0	62.0
>10	12.0	5.0

Table 3: Incidence of cigarettes consumption and smoking period among both smokers (n,195) and Ex-smokers (n, 21)

Reason given for the smoking behavior vs # of smokers year 2011



common reason given for the smoking behavior

Figure 1: Factors influencing the onset of Smoking among both smokers (n,195) and Ex-smokers (n, 21)

and who found that smokers had an increase in packed cell volume, plasma fibrinogen concentration, and both plasma and whole blood viscosities[6].

Alterations in blood rheology might influence blood flow and play a role in the development of atherosclerosis [7]. It was shown that rheologic properties of blood improves with the cessation of smoking [8]. In this study hemorheological findings

were significantly higher in current smokers than never smokers. Hemorheological properties of blood include whole blood viscosity, plasma viscosity, hematocrit, RBC deformability and aggregation, and fibrinogen concentration in plasma. In this study, whole blood viscosity, plasma viscosity and packed cell volume were extensively studied. The viscosity of blood is a "dynamic" property. This means that in viscometer, the suspension

must flow for this property to be measured, so the rate of flow that occurs as a result of a pressure difference depends on the sample's viscosity. It is important to point out that, in contrast to plasma, whole blood is a non-Newtonian suspension and thus its viscosity is dependent on the shear rate (i.e., flow rate) at which it is measured. Therefore, we cannot speak about a single viscosity of blood, but rather should always associate this parameter with

the corresponding shear rate that has been used in its measurement [1]. Factors that increase WBV include haematocrit, total plasma protein, erythrocyte aggregation and erythrocyte deformability [9, 10]. The present study showed that packed cell volume and plasma viscosity were increased and then subsequently whole blood viscosity increased. Hematocrit is the most important determinant of blood viscosity under bulk flow conditions (e.g., large diameter vessels or large geometry viscometers)[11]. The physiological meaning of hematocrit value should be carefully considered. On one hand, the hematocrit value reflects the oxygen carrying capacity of blood since higher hematocrit usually correlates with higher hemoglobin concentration and higher oxygen binding capacity. On the other hand, the hematocrit value is logarithmically related to blood viscosity, hence a determinant of flow resistance. Oxygen transfer to a given tissue is a function of both blood flow to that tissue and oxygen content of blood flowing to that tissue. Above this critical value of hematocrit, increased blood viscosity and flow resistance would dominate and the main physiological function of blood flow (i.e., supplying oxygen to tissues) would be impaired[12]. Being related to the physiological importance of an optimal hematocrit value, RBC production is a well-controlled process [13]. The main control factor of RBC production is the hormone erythropoietin, and its secretion is, in turn, controlled by the degree of tissue oxygenation [13]. Among the 4,000 or more toxic substances absorbed during smoking, carbon monoxide (CO) and glycoproteins play a particularly important role in the development of smoking related arteriosclerotic changes, and the severity of the changes produced is influenced by the cigarette dose and smoking duration [14]. Plasma Viscosity unlike suspensions of red cells in plasma or whole blood, plasma and serum are Newtonian fluids with their viscosity independent of shear rate. This means that their viscosity is an intrinsic property of the liquid itself and there is no need to measure plasma or serum viscosity at defined shear rates [11]. Changes

in the concentration of one or more plasma protein fractions will result in a change in plasma viscosity. Plasma viscosity (PV) depends primarily on plasma protein concentration, indicating that PV can vary in disease [15]. As a result, the fluidity of the blood is lowered and the viscosity of whole blood and plasma is increased [16, 17]. Plasma protein levels show a dose dependent increase in smokers; following smoking cessation, levels decrease towards similar values in those who have never smoked.

Conclusion

The percentage of cigarette smokers is high compared to ex and never smoked persons in Sakaka city, Saudi Arabia. The common reason for smoking was the influence of the family which can be parent imitation, family careless, family breakdown or other reasons. The smoking leads to a rise in hematocrit and alters the rheological properties by increasing whole blood viscosity and plasma viscosity levels. Further prospective and public health studies would be required to deal with common reasons which influence smoking behavior as well as to deal with the blood rheological changes. The hematological and hemorheological changes associated with long standing cigarette smoking and to assess whether any such changes were reversible after smoking was stopped, should be established.

References

- [1] Baskurt, OK; Hardeman M, Rampling MW, Meiselman HJ (2007). Handbook of Hemorheology and Hemodynamics. Amsterdam, Netherlands: IOS Press. ISBN 978-1-58603-771-1.
- [2] Kwaan HC, Bongu A. The hyperviscosity syndromes. *SeminThromb Hemostas* 1999; 25:199-208.
- [3] Craveri et al., 1987; Resch et al., 1991; Lee et al., 1998; Kensey and Cho, 2001
- [4] Ross R: The pathogenesis of atherosclerosis: a perspective for the 1990s. *Nature* 1993; 362:801-809.
- [5] Doll R, Peto R, Boreham J, Sutherland I: Mortality in relation to smoking: 50 years' observations on male British doctors. *Br Med J* 2004; 328: 1519-1529.

- [6] Lowe GDO, Donnan T, McColl P et al. Blood viscosity, fibrinogen and activation of coagulation and leukocytes in peripheral arterial disease: The Edinburgh Artery Study. *Br JHaematol* 1991;77 (Suppl 1):27.
- [7] Rogers RL, Meyers JS, Judd B et al. Abstention from cigarette smoking improves cerebral perfusion among elderly chronic smokers.
- [8] Lowe GD, Lee AJ, Rumley A, Price JF, Fowkes FG. Blood viscosity and risk of cardiovascular events: the Edinburgh Artery Study. *Br J Haematol* 1997; 96:168-173.
- [9] Higgins C. Recurrence of venous thromboembolism. *The Biomedical Scientist [Magazine]*, London 2006; 50:865-867.
- [10] Tamariz LJ, Young JH, Pankow JS et al. Blood viscosity and hematocrit as risk factors for type 2 diabetes mellitus: the atherosclerosis risk in communities (ARIC) study. *Am J Epidemiol.* 2008; 168:1153-1160.
- [11] Baskurt O.K., Yalcin O., Gungor F. and Meiselman H.J., Hemorheological parameters as determinants of myocardial tissue hematocrit values, *Clin. Hemorheol.Microcirc.* (2006), 45-50.
- [12] Bogar L., Juricskay I., Kesmarky G., Kenyeres P. and Toth K., Erythrocyte transport efficacy of human blood: a rheological point of view, *Eur. J. Clin. Invest.* (2005), 687-690.
- [13] Wintrobe M.M., Lee G.R., Boggs D.R., Bithell T.C., Foerster J., Athens J.W. and Lukens J.N. Erythropoiesis. In: *Clinical Hematology*, Lea-Febiger, Philadelphia, 1981, pp. 108-135.
- [14] McBride PE. The health consequences of smoking. *Cardiovascular diseases. Med ClinNorth Am.* 1992; 76(2):333-353.
- [15] Rampling M.W.. Red cell aggregation and yield stress. In: *Clinical blood rheology*, G.D.O. Lowe, Ed., CRC Press, Inc., Florida , 1988;. 45-64.
- [16] Gudmundsson M, Bjelle A (1993) Plasma, serum and whole-blood viscosity variations with age, sex, and smoking habits. *Angiology* 44(5):384-391.
- [17] Feher MD, Rampling MW, Brown J, Robinson R, Richmond W, Cholerton S ,et al. Acute changes in atherogenic and thrombogenic factors with cessation of smoking. *J R SocMed.* 1990; 83(3):146-148

Impaired glucose tolerance test among β thalassemia patients in Hawler Province, Iraq

Lana Saleem (1)
Mouroe H. AL Ani (2)

(1) Pediatric Consultant (Assistant Professor Hematology Oncology, Hawler Medical College, Iraq
(2) Md General Pediatriton (MOH)

Correspondence:

Dr Mouroe H .Al Ani,
Pediatric Consultant, Assistant Professor Hematology
Oncology, Hawler Medical College, Iraq
Phone: +9647507411232
Email: Dr_Mouroe@Yahoo.Com

Introduction

Thalassemia is a genetic disorder in the globin chain production. The homozygous state, thalassemia major, results in a severe anemia and often death before puberty. The heterozygous state, thalassemia minor is less severe and may be asymptomatic with little or no anemia (1,2). Iraq is one of the countries in which 6-10% of the population have hemoglobinopathy of which thalassemia is a major part(1,3). Depending on the mutation and the degree of fetal hemoglobin production, transfusions in patients with thalassemia major are necessary in the 2nd months of life or the 2nd years of life, but rarely later (4). A decision to initiate regular transfusions in patients with b- thalassemia may be difficult and should be based on the presence and severity of the symptoms and signs of anemia, including failure of growth and development. But, transfusion results in a second disease due to iron overload(5,6). The most clinical manifestations of iron loading do not appear until the second decade of life in patients with inadequate chelation. Endocrine abnormalities are among the common complications of thalassaemia (5,7,8).

Hypogonadotropic hypogonadism, diabetes mellitus, and hypothyroidism represent the most common endocrinopathies in thalassaemic patients (8-9). Impaired glucose tolerance (IGT) is suggested as a replacement for terms such as asymptomatic diabetes, chemical diabetes, subclinical diabetes, borderline diabetes, and latent diabetes (1). IGT may precede type 2 diabetes mellitus by many years (10).

The pathogenetic mechanisms leading from siderosis to the development of diabetes are still poorly understood (11).

Abstract

Background: Thalassemia is one of the commonest hemolytic anemias. Serious complications due to iron over load still occur in the thalassemia patients and endocrinal complications are among the complications of hemosiderosis especially the development of diabetes. The aim of the study was to focus on the prevalence and risk factors for impaired glucose tolerance in transfusion dependent thalassemia patients.

Material and Methods: A prospective study of a total of 50 transfusion dependant b thalassemia patients aged 10-15 years); comprising 31 males and 19 females. Full history and examination were done along with full laboratory investigations, serum ferritin, hepatitis B and C markers. Oral glucose tolerance test was recorded from the 1st of January to the 31st of April 2010.

Result: The prevalence of impaired glucose tolerance was 26% and there was no diabetes mellitus. The risk factors for abnormal glucose tolerance were:

total units of blood transfusion/year ($p=0,046$).

Conclusion: Frequently transfused patients with under or poor compliance with iron chelation therapy increased the risk of development of complications including impaired glucose tolerance. Early starting of desferrioxamine therapy will prevent such complications.

Key words: thalassemia, impaired glucose tolerance, diabetes mellitus

Impaired glucose tolerance and diabetes mellitus may be the consequence of pancreatic β -cell destruction secondary to iron overload, chronic liver disease, viral infection and/or genetic factors.(7,11)

Three mechanisms are involved :

- 1) insulin deficiency,
- 2) insulin resistance, and
- 3) hepatic dysfunction (12,13).

Risk factors for diabetes in patients with β -thalassemia major have been suggested to include age, increased amount of blood transfusion, serum ferritin level, compliance with iron-chelation therapy, family history of diabetes, hepatitis viruses, and pubertal status (14-16).

Aim of the Study

To study impaired glucose tolerance among patients with β -thalassemia major and risk factors for impaired glucose tolerance among patients with β -thalassemia major, and to evaluate the compliance of the patients to the chelation therapy.

Patients and Methods

A prospective study was conducted at January 2010 to the end of April 2010 on 50 thalassaemic patients in the thalassaemia center in Hawler governorate. The diagnosis of

thalassemia was based on clinical features and hematological criteria (peripheral blood evaluation and hemoglobin electrophoresis of the patients). Those eligible for study were between 10-15 years and were receiving frequent transfusions (10-15 ml packed erythrocytes per kg body weight or whole blood 20 ml/kg given every 2-4 weeks). Cases with family history of diabetes were excluded from the study. Information regarding name, age, sex, height, body weight, age at the first blood transfusion, frequency of blood transfusion per year, age at the start of iron-chelation therapy, compliance with iron-chelation therapy, history of splenectomy) was taken. The compliance with desferrioxamine chelation therapy was assessed as good (>5 desferrioxamine infusions per week) and poor (<4 infusions per week) (14).

Physical examination was done: the height, weight, liver span and spleen size in non splenectomized patients were recorded. Serum ferritin was done by Automated Architect Machine (Abbott Company) in the Medical Center.

Tests for HBs Ag and HCV-Ab were detected by using ELISA technique. Plasma glucose level was assessed

by performing oral glucose tolerance test with estimation of fasting and post prandial glucose (2 hr) plasma glucose (by Trinder's glucose oxidase told to be fasting or called by telephone).

Oral glucose tolerance test was estimated using World Health Organization's definition of impaired glucose tolerance and diabetes. An oral glucose tolerance test (OGTT) was performed in the morning after an overnight fast. A (base line) blood sample was drawn. Glucose was ingested in a dose of 1.75 g/kg up to a maximum of 75 g, and plasma glucose was estimated 2 hours later. Impaired fasting glucose (IFG) was diagnosed if fasting plasma glucose >110 mg/dL and less than 126 mg/dL (6.1-7.0 mmol/L). Impaired glucose tolerance test was diagnosed if the 2 hour post glucose plasma glucose was >140 mg/dL and less than 200 mg/dL (7.8- 11.1 mmol/L) and fasting plasma glucose was <126 mg/dl (7.0 mmol/L). Diabetes was diagnosed if the fasting plasma glucose was > 126 mg/dL (7.0 mmol/L) and 2 hour post glucose plasma glucose >200 mg/dL (11.1 mmol/L). (17)

Data Analysis:

Data were entered into Statistical Package for Social Science (SPSS)

Patient characteristics	Mean	Range
Age (years)	12.3±1.5	(10-15)
Height (cm)	131.8±8.12	(110-150)
Weight (kg)	30±5.4	(17-42)
Age at first blood transfusion (months)	10.5±5	(3-22)
Age at starting Desferrioxamine (years)	5.7±2.1	(3-11)
Units of blood transfusion/year	14.2±1.9	(12-20)
S. Ferritin (ng/ml)	6127±2.4	(992-10679)
Splenic size (cm) below costal margin In 24 cases	4.7±2.8	(1-12)
Liver span (cm)	11.3±2.6	(7-20)
Fasting plasma glucose	99±12.3	(75-124)
2 hours post prandial plasma glucose	122±27	(71-184)

Table 1: Demographic characteristics of 50 thalassaemic patients with mean and range of each characters

program for Windows version 16 to generate the general characteristics of the study. Quantitative variables were summarized by finding mean \pm SD. Statistical analysis Differences between patients with and without abnormal glucose tolerance were tested with the independent t-test, x2 test and C-test to identify the potential risk factors. A two-tailed P-value of 0.05 was considered to be statistically significant.

Results

(See also Table 1 - previous page)

Patient characteristics	No.	%
Gender		
Male	31	62%
Female	19	38%
Hepatitis C infection	34	68%
Hepatitis B infection	0	0%
Splenectomy	26	52%

Table 2: Demographic characteristics of 50 thalassemic patients in NO. and % of each characters

Patient characteristics	Normal GT	Impaired GT	P-value
No. of patients	37 (74%)	13 (26%)	
Age(years)	12 \pm 1.5	13 \pm 1.5	0.055
Gender			
Male	22 (59.5%)	9 (69%)	0.532
Female	15 (40.5%)	4 (31%)	
Weight(kg)	29.32 \pm 5.3	31.85 \pm 5	0.148
Height(cm)	131.7 \pm 8.2	132.38 \pm 8.1	0.798
Mean age at first blood transfusion(months)	10.5 \pm 4.8	10.3 \pm 5.8	0.876
Mean age at starting Desferrioxamine (years)	5.3 \pm 1.8	6.7 \pm 2.6	0.046*
Units of blood transfusion/year	13.7 \pm 1.7	15.5 \pm 2.1	0.004**
S. Ferritin(ng/ml)	5810 \pm 2.3	7030 \pm 2.6	0.117
Hepatitis C infection	24 (64.9%)	10 (77%)	0.423
Splenectomy	17 (45.9%)	9 (69%)	0.148

P-Value (significant), ** P-Value (highly significant) This Table shows Correlation of patients characteristics with Impaired glucose tolerance and Normal glucose tolerance and p-value of each characters.

Table 3: Patients' characteristics and plasma glucose

Age group	Normal GT	Impaired GT	Total
10-11.9	18 (85.7%)	3 (14.3%)	21 (100%)
12-13.9	14 (73.3%)	5 (26.3%)	19 (100%)
14-15	5 (50%)	5 (50%)	10 (100%)
Total	37 (74%)	13 (26%)	50 (100%)

P-Value= 0.106 which is not significant

Table 4: Relation of age group with GT

Table 4 shows the Distribution of Impaired glucose tolerance and Normal glucose tolerance in thalassemic patients with age group.

Age at starting desferrioxamine	Normal GT	Impaired GT	Total
Below 5 years	14 (87.5%)	2 (12.5%)	16 (100%)
5-10 years	23 (72%)	9 (28%)	32 (100%)
over 10 years	0 (0%)	2 (100%)	2 (100%)
Total	37 (74%)	13 (26%)	50 (100%)

P. value < 0.026 which is significant difference

Table 5: Relation of the age at starting desferrioxamine therapy with Impaired GT and Normal GT in thalassemia patients

The age at starting desferrioxamine therapy with plasma glucose where it is shows that 87.5% of normal glucose tolerance patients start desferrioxamine therapy below 5 yr. but it was 12.5% among impaired glucose tolerance patients.

Serum Ferritin	Normal GT	Impaired GT	Total
<5000	15 (78.9%)	4 (21.1%)	19 (100%)
5000-10000	22 (75.9%)	7 (24.1%)	29 (100%)
>10000	0 (0%)	2 (100%)	2 (100%)
Total	37 (74%)	13 (26%)	50 (100%)

P-Value= 0.05 which is not significant.

Table 6: Relation of Serum Ferritin With Impaired GT and normal GT for patients with thalassemia

This table shows that 21.1% of patients had IGT at S. Ferritin < 5000 while 100% of them had IGT at S. Ferritin above 1000, this mean the risk of development IGT increase with increasing S. Ferritin, but serum ferritin was not risk factor, p-value not significant.

Units of blood transfusion/year	Normal GT	Impaired GT	Total
≤12	14 (93.3%)	1 (6.7%)	15 (100%)
13-15	19 (76%)	6 (24%)	25 (100%)
16-18	4 (44.4%)	5 (55.6%)	9 (100%)
≥19	0 (0%)	1 (100%)	1 (100%)
Total	37 (74%)	13 (26%)	100 (100%)

P-Value= 0.019 which is not significant.

Table 7: Relation of Units of blood transfusion/year with Impaired GT and Normal GT for patients with thalassemia

Table 7 show 6.7% of patients with IGT received ≤12 units of blood/year, 55.6% of them received 16-18 units of blood/year, while 100% of them received ≥ 9 units of blood/year, but it was not risk factor.

Age group	<3 rd Centile NO. %	>3 rd -<50 Centile NO. %	>50-<97 Centile NO. %	Total NO. %
10-11.9	9 (43%)	11 (52%)	1 (5%)	21 (100%)
12-13.9	10 (53%)	9 (47%)	0 (%)	19 (100%)
14-15	7 (70%)	3 (30%)	0 (%)	10 (100%)
Total	26 (52%)	23 (46%)	1 (2%)	50 (100%)

P-Value = 0.019 which is significant

Table 8

Patient's height centile shows: 38 patients (76%) below 3rd centile.

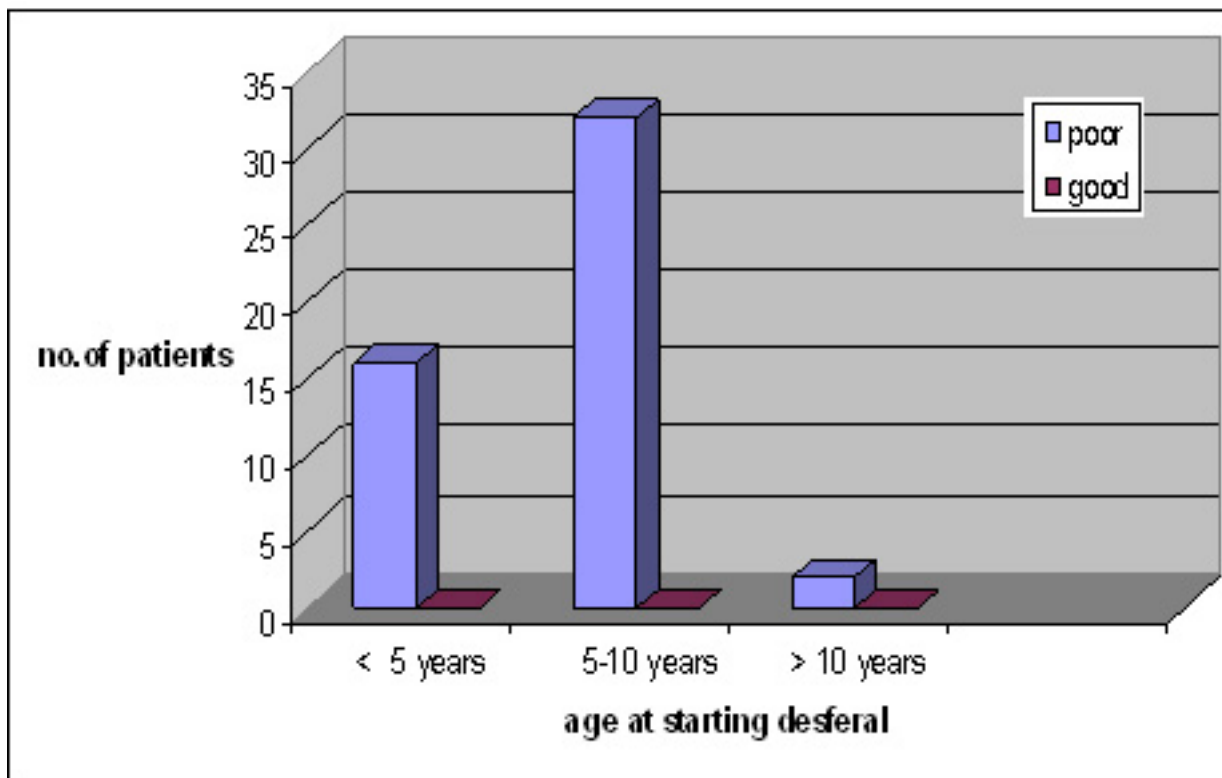


Figure 1: Compliance of patients with desferrioxamine therapy

Discussion

In this study prevalence of IGT was 26% which is nearly similar to the study done by Hafez et al, in which prevalence was 24.1%, (18) while mean age of patients who had IGT was 13 years and with increasing age the possibility of development of impaired glucose tolerance increase (Table 4), but in our study age was not a risk factor for IGT which disagrees with the results of Najafipour (8) in which the mean age of those who had IGT was 18.5 years and age was a risk factor. This is may be due to our range of age being limited to <15 year old; males

(62%) were more than females (38%), similar to the result obtained by Torres et al (19), Najafipour (8) and the study done by Suvarna et al (20) in which the male percentages were 60%, 64% and 60% and females were 40%, 36% and 40% respectively.

The mean age of first blood transfusion of patients with thalassemia was 10.5 months, which was much lower than the mean age in a study done by Jimmy et al (14) 12 (15.1 months) and Shamshirsaz et al (21) 17 in which the mean age was (15.4 months). It appears that earlier

presentation of the disease may reflect the severity of the disease in our country.

Patients mean requirement for blood transfusions was (14.2 transfusions/year). This is similar to the result obtained by Hamdoon (22). Those who required frequent blood transfusions (mean of 15.5 transfusion/year) were impaired in glucose tolerance in comparison to those who required less frequent blood transfusions (mean of 13.7 transfusions/year) in whom the glucose tolerance was normal. This agrees with the result obtained by

Najafipour in which the number of blood transfusions was a risk factor (Table 7) (8).

Splenectomy was done in 52% (26 cases) of the patients and this is higher than the result obtained by Jimmy et al (14) 12 in which only 20.2% of cases were splenectomized. This may be due to irregular blood transfusions and increased extramedullary activity. In those who had impaired glucose tolerance (69.2% of cases), splenectomy was done and this is higher than the result obtained by Leetanaporn et al (23) in which of those with IGT 50% of cases had splenectomy done and this may be due to the older age group and bad follow up of our patients. In this study mean age of starting Desferal was 5.7 years and this agrees with the study done by Shamshirsaz et al (21) in which the mean age was 5.1.

Patients who started desferrioxamine therapy earlier at a mean age of 5.3 years had better glucose tolerance than those who started later at a mean age of 6.7 years, and of those who started desferrioxamine at > 10 years of age 100% had IGT (Table 5) and this mean iron over load is a risk factor for IGT and DM. This is similar to a study done by Jimmy et al (14). Hepatitis C virus was positive in 68%, which is similar to the result done by Maria et al (24) in which 57% of their cases were sero positive for hepatitis C, and in our study all cases were sero negative for hepatitis B which may be due to the national vaccination program.

But there is no clear association between IGT and Hepatitis C in our study which is similar to the study done by Perifanis et al (25) 21 and Mowla et al (26).

In our study the mean of liver span was 11.3cm and splenic size was 4.7cm below costal margin (24 cases) which agrees with Suvarna et al (16) done in India in which mean liver span was 12 cm but it disagrees with him in splenic size in which splenic size was 7cm below the costal margin. This is probably

because most of our cases were splenectomized. The weight of 52% of patients in this study was below the 3rd centile. This result is higher than that found in a study done by Gomber and Dewan (27) in which only 31% of their cases were below the 3rd centile.

Height of 76% of them were below the 3rd centile and this disagrees with study done by Yesilipek et al (28) in which (32.4%) were below the third centile for height. This difference may be due to irregular visits and unavailability of blood, chelation therapy, infusion pump, supportive therapy of complications of thalassemia such as calcium, thyroxin, growth hormone, estrogen and testosterone and poor compliance to treatment.

Patient's compliance regarding acceptance of desferrioxamine therapy was found to be poor in 100% of our cases while only 51% had poor compliance in a study done by De Santics et al (29). This is may be due to poor education of the families and the patients about the importance of iron chelation therapy and unavailability of a center with good facilities and equipment.

Serum Ferritin level in our study was high (mean value=6127ng/ml) which is similar to the result of a study done by Suvarna et al (19) 23 (mean value = 7627ng/ml) and mean value of serum ferritin in cases with IGT was 7030 ng/ml, and this is similar to a study done by Leetanaporn (23) in which mean value of serum ferritin in cases with IGT was 8679 ng/ml. But in our study serum ferritin was not a risk factor which is similar to a study done by Najafipour in which serum ferritin was not a risk factor also (Table 6).

In our study the mean values of plasma glucose were 99 mg/dl for fasting plasma glucose and 122mg/dl for 2 hours post prandial plasma glucose which is similar to the results of Suvarna et al (19) 23 in which the values of plasma glucose were 91 mg/dl for fasting and 127mg/dl for 2 hours post prandial plasma glucose.

References

1. Rasheed NE, Ahmed SA. Effect of β -Thalassemia on some Biochemical Parameters. MEJFM. 2009 February; 7(2) 1-6.
2. Mangalani M, Lokeshwar M.R, Banerjee R. Bone Histomorphometry in Children and Adolescents with β -Thalassemia Disease: Iron-Associated Focal Osteomalacia, The J Clin Endocrinol Metab.2003; 88(8) 3966-3972.
3. David P. Steensma, James D. Hoyer, Virgil F. Fairbanks: Hereditary red blood cell disorders in Middle Eastern patients. Mayo Clin Proc.2001; 76:285-293.
4. DeBaun MR, Vichinsky E. Hemoglobinopathies. In: Behrman RE, Kliegman RM, Jenson HB, Stanton BF, editors. Nelson Textbook of Pediatrics. 18th ed. Philadelphia: Saunders; 2007. P. 2025-38.
5. Nasef A, Helmy F, Kamal I, El Awady S. C-Peptide in Thalassemic Patients. Sci. Med. J. ESCME.2004 April 2;16(2).
6. Fosburg M and Nathan DG. Treatment of Cooley's anemia. Blood. 1990; 76: 435 -444.
7. Desanctis V. Endocrine Complications in Thalassemia Major in: Cappellini MD, Cohen A, Eleftheriou A, Piga A, Porter J, Taher A, editors. Guidelines for the clinical management of thalassemia.2nd ed. Nicosia: Thalassemia International Federation; 2007.P. 68-69.
8. Najafipour F. Evaluation of Endocrine Disorders in Patients With Thalassemia Major. Int . 200 Int J of Endocrinol Metab.8; 2: 104-113.
9. Borgna-Pignatti C, Rugolotto S, De Stefano P, Zhao H, Cappellini MD, Del Vecchio GC, et al. Survival and complications in patients with thalassemia major treated with transfusion and deferoxamine. Haematologica. 2004; 89: 1187-93.
10. Barr EL, Zimmet PZ, Welborn TA, et al. "Risk of cardiovascular and all-cause mortality in individuals with diabetes mellitus, impaired fasting glucose, and impaired glucose tolerance: the Australian Diabetes, Obesity, and Lifestyle Study (AusDiab)". Circulation. 2007; 116 (2): 151-7.
11. Cario H, Holl RW, Debatin KM, Kohne E. Insulin sensitivity and beta-cell secretion in thalassemia

- major with secondary hemochromatosis: assessment by oral glucose tolerance test. *Eur J Pediatr*. 2003; July; 162: 139-146.
12. Swaminathan S, Alam MG, Fonseca VA, Shah SV. The Role of Iron in Diabetes and its Complications. *Diabetes Care*. 2007 July; 30(7):1926-1933.24.
13. Cooksey RC, Jouihan HA, Ajioka RS, Hazel MW, Jones DL, Kushner JP et al. Oxidative stress, beta-cell apoptosis, and decreased insulin secretory capacity in mouse models of hemochromatosis. *Endocrinology*. 2004; 145:5305-5312.
14. Chern JP, Lin KH, Lu MY, Lin DT, Lin KS, Chen JD, et al. Abnormal Glucose Tolerance in Transfusion-Dependent β -Thalassaemic Patients. *Diabetes Care*. 2001 May; 24(5):850-4.
15. Al-Elq AH, Al-Saeed HH, Endocrinopathies in patients with thalassemi. *Saudi Med J*. 2004; 25(10):1347-51.
16. Ho J, Pacaud D. Secondary Diabetes in Children. *Can. J. Diab*. 2004; 28(4):400-405. 31.
17. World Health Organization: Definition, Diagnosis and Classification of Diabetes Mellitus and its Complications: Report of a WHO Consultation. Part 1: Diagnosis and Classification of Diabetes Mellitus. Geneva, World Health Org., 1999.
18. Hafez M, Youssry I, El-Hamed FA, Ibrahim A. Abnormal glucose tolerance in beta-thalassaemia: assessment of risk factors. *Hemoglobin*. 2009; 33(2):101-8.
19. Suvarna J, Ingle H, Deshmukh C.T. Insulin Resistance and Beta Cell Function in Chronically Transfused Patients of Thalassaemia Major. *Ind. Pediatr*. 2006; 43:3
20. Torres FA, Bonduel M, Sciuccati G, del Pozo A, Roldán A, Ciaccio M, et al. [Beta thalassaemia major in Argentina]. *Medicina*. 2002; 62(2):124-34. 93-400.
21. Shamshirsaz AA, Bekheirnia MR, Kamgar M, Pourzahedgilani N, Bouzari N, Habibzadeh M, et al. Metabolic and endocrinologic complications in beta-thalassaemia major. a multicenter study in Tehran. *BMC Endocrine Disorders* 2003; 3:4.
22. Hamdoon GW. CARDIOMYOPATHY IN - THALASSEMIA MAJOR PATIENTS, (Thesis), University of Mousel, Iraq. 2006.
23. Jaruratanasirikul S, Chareonmuang R, Wongchamchailert M, Laosombat V, Sangsupavanich P, Leetanaporn K. Prevalence of impaired glucose metabolism in β -thalassaemic children receiving hypertransfusions with a suboptimal dosage of iron-chelating therapy. *Eur J Pediatr* (2008); 167:873-876.
24. Maria S, Cryssoula LK, Panagiota P, Helen F, Theodoros A. Chronic hepatitis C virus infection without cirrhosis induces insulin resistance in patients with [beta]-thalassaemia major. *Eur. J. Gastroen Hepat*: 2001 October; 13(10):1195-1199.38.
25. Christoforidis A, Perifanis V, Tsatra I, Vlachaki E, Athanassiou-Metaxa M. Glucose metabolism in conventionally treated patients with β -thalassaemia major assessed with oral glucose tolerance test. *Arch Med Sci* 2008; 4, 2: 191-196.
26. Mowla A, Karimi M, Afrasiabi A, De Sanctis V. Prevalence of diabetes mellitus and impaired glucose tolerance in beta-thalassaemia patients with and without hepatitis C virus infection. *Pediatr Endocrinol Rev*. 2004 Dec; 2(Suppl 2):282-4.
27. Gomber S, Dewan P. Physical Growth Patterns and Dental Caries in Thalassaemia. *Ind. Pediatr*. 2006; 43:1064-1069.
28. Yesilipek MA, Bircan I, Oygur N, Ertug H, Yegin O, Guven AG: Growth and Sexual Maturation in Children with Thalassaemia Major. *Hematologica*, 1993; Jan-Feb; 78(1): 30 - 3.
29. De Sanctis V, Eleftheriou A, Malaventura C; Thalassaemia International Federation Study Group on Growth and Endocrine Complications in Thalassaemia. Prevalence of endocrine complications and short stature in patients with thalassaemia major: a multicenter study by the Thalassaemia International Federation (TIF) *Pediatr Endocrinol Rev*. 2004 Dec; 2 Suppl 2:249-55.

Studying Complementary and Alternative Practices in Bedouin Community: Family based study, North Sinai, Egypt

Mosleh A. Ismail (1)
Hoda Atwa (2)
Amir Saleh (3)
Mansoura F. Salem (4)

(1) Family Medicine Department, Faculty of Medicine, Suez Canal University
(2) Pediatric Department, Faculty of Medicine, Suez Canal University
(3) Faculty of Physiotherapy, Cairo University
(4) Lecturer Family Medicine Department, Faculty of Medicine, Suez Canal University

Correspondence:

Mosleh A. Ismail
Family Medicine Department, Faculty of Medicine,
Suez Canal University
Email: MISMAIL@hmc.org.qa

Abstract

Background: The terms “complementary” and “alternative” (non-conventional) are used to refer to a broad set of health care practices that are not integrated into its dominant health care system. Practicing CAM is not free of contradictory views and reactions ranging from enthusiasm to skepticism. Use of CAM remains widespread in developing countries and is increasing rapidly in developed countries. Understanding the extent and patterns of CAM usage in an economically developing country like Egypt is important on planning for health at different levels. The family physician is an integral part within the health system and can play a fundamental role in rational prescribing of CAM. He/she can modify the inappropriate behavior of customers towards a sound one regarding CAM use.

Objectives: This study was conducted aiming at assessing prevalence and pattern of CAM use, as well as to identify factors that might affect CAM use among family members in Bir El Abd district-North Sinai.

Subjects and Methods: This is a cross-sectional family-based study that was carried out in Bir El Abd district, North Sinai Governorate. Six hundred and forty participants were interviewed face to face by trained interviewers. The participants (either husband or wife representing the head of the family) were invited to participate in a structured interview. The obtained data were coded, entered and processed. The appropriate statistical tests were used to identify significant difference. Chi square test was used for categorical data. Statistical significance was considered at p-value <0.05.

Results: A considerable proportion (38%) of the studied population had used CAM at some time in the past in their life. Herbal/nutritional therapies were the most frequently used (37 %) as CAM therapy, followed by cupping (36 %). Using honey as a treatment was practiced by 31% of members of the studied families. Spiritual therapy as a treatment was used by 11% of the studied families. Regarding the common morbidity for which complementary therapies were used, it is evident that hypertension (21%), diabetes mellitus (18%), irritable bowel syndrome (13%) and rheumatologic musculoskeletal disorders (10%) represented the most common morbidity among the studied families. The main source of information about CAM was relatives (45%), followed by traditional healer (21 %) and friends and neighbors (13 %). The majority of the studied

population (91 %) perceived CAM as beneficial. Concerning the relation of CAM use and some socio-demographic factors, it was evident that, use of CAM showed significant association with age and education ($P < 0.05$). CAM did not show significant association with gender, employment status, marital status, monthly income or coverage with health insurance using uni-variant analysis ($P > 0.05$).

Conclusion and recommendation: There is a considerable prevalence of CAM practices among the studied population in Bir El Abd-North Sinai. The results of the present study call for including CAM in the under and post graduate curriculum in medical schools, and continuous medical education programs. Training of primary health care teams could help in modifying behavior of the population in the catchment area towards proper use of CAM practices. The family physician has a crucial role in doing such a task with patients and families.

Key words: Complementary Medicine, Alternative Medicine

Introduction

Complementary and Alternative Medicine (CAM) encompasses all forms of therapies that fall outside the mainstream of medical practice. The domain of CAM is attracting more and more attention.(1) Complementary and Alternative Medicine (CAM) is attracting more and more attention within the context of health care provision and health sector reform. Practicing CAM is not free of contradictory views and reactions ranging from enthusiasm to skepticism. Use of CAM remains widespread in developing countries and is increasing rapidly in developed countries.(2) Cultural beliefs and practices often lead to self-care, home remedies or consultation with traditional healers, particularly in deprived areas away from high quality health care such as in rural and Bedouin communities.(3)

Regarding use of CAM among Arab countries, it is evident in Saudi Arabia, forty-six percent of the patients in the health facilities had used CAM at some time in the past (life time use) and about 19% had used it in the past 12 months.(4) In Africa up to 80% of the population uses Traditional/Complementary Medicine. In China, CAM accounts for around 40% of all health care delivered. The percentage of the population in developed countries which have used CAM at least once is 48% in Australia, 70% in Canada, 42% in USA, 38% in Belgium and 75% in France.(5) In a study conducted in Japan 2008, fifty percent of the attendants in the health facilities were using or have used at least 1 CA therapy within the past year.(6)

In a population-based study conducted in Turkey 2008, fifty-eight percent of the studied population reported that they had used a CAM method at least once in the previous 12 months.(7) About sixty-eight percent (67.6%) used CAM in the past year.(1) In many parts of the world, expenditure on CAM is not only significant, but growing rapidly. In Australia, Canada and the United Kingdom, annual CAM expenditure

is estimated at US\$ 80 million, US\$ 2400 million and US\$ 2300 million respectively. In Malaysia, an estimated US\$ 500 million is spent annually on this type of health care.(2) Studying of medicinal products from natural sources is now being included in the curriculum of some pharmacy schools and colleges in the United States.(8) The increasing use of CAM has not been associated with an increase in the quantity, quality and accessibility of clinical evidence to support CAM claims despite existence of strong evidence from randomized clinical trials for many uses of CA practices.(2)

It is evident that policy-makers, health professionals and the public in many parts of the world are faced with questions about the safety, efficacy and quality of such therapies. Many patients seek out alternative medicine after they have tried conventional medicine and found it to be ineffective or to result in terrible side-effects.(9) On the other hand; practicing of CAM may result in problems of compliance with conventional therapy and may expose patients to hazards of traditional remedies that have not been scientifically tested.(10,11,12)

There is strong recommendation issued by WHO towards rational use of CAM through integration of CAM into national health care systems and developing national policies on CAM, of the member states.(2) In spite of its importance, little is known about the overall prevalence, pattern of CAM use among the Egyptian population. Doctors' understanding of the pattern of CAM use, the characteristics of users and patients' perception is important for conducting successful consultation and effective care to the practice population. However, there is very little research that describes CAM use in Egypt. This study aimed at identifying prevalence and pattern of CAM use among family members in Bir El Abd district-North Sinai, Egypt as well as to identify factors that might affect CAM use.

Subjects and Methods

This cross-sectional family-based study was conducted in two villages (Elnasr and Nagella) representing a rural community belonging to Bir El Abd District, North Sinai Governorate. The estimated population of Bir El Abd was 72,678 for the year 2010. The population in this community is cared for by 16 primary health care units belonging to the Ministry of Health and Population (MOHP) and the other one is the Family Practice Center affiliated to the Faculty of Medicine Suez Canal University (FOM/SCU).

The sampling unit used in the study was the family. This was defined as a group of individuals living together in a household, and usually included the father, the mother, sons and daughters and sometimes grandparents. A structured questionnaire was designed to fulfill the study objectives. It consisted of two sections. The first section was concerned with the personal and socio-demographic characteristics of the participants (age, gender,) and education, income of the family and health insurance of the respondent. The second section enquired about CAM use at any time. Testing feasibility and reliability of the questionnaire was done by conducting a pilot study on 20 volunteers. Consent was obtained from the participants to participate in the study and answer the questionnaire, after sharing with them the objectives of the study. Also, confidentiality of data was ensured. The participants (either husband or wife representing the head of the family) were invited to a structured interview with the trained interviewers under supervision of the researcher. The obtained data were coded, entered and processed on a personal computer using Statistical Package of Social Science (SPSS). The appropriate statistical tests were used to identify significant difference. Chi square test was used for categorical data and Fischer Exact test was used if at least one expected value was less than 5. Also, logistic regression test was used. A stepwise logistic analysis was used to test association of CAM use with

the studied variables. Statistical significance was considered at p-value <0.05.

Results

In the current study, the total sample of 640 families were represented by either the head of the family (husband) or the housewife, of whom 305 were males (47.7%), and 335 were females (52.3 %). Seventy three percent of the respondents were married currently. More than one-third of the studied population (37 %) was either illiterate or could read and write at primary level. About three-quarters (77%) of the studied population were unemployed. Seventy percent of them have perceived their monthly income as inadequate for their families and 23 % were insured by the health system. A considerable proportion (38%) of the studied population had used CAM at some time in the past in their life. Herbal/nutritional therapies were the most frequently used (37 %) as CAM therapy, followed by cupping (36 %). Using honey as a treatment was practiced by 31% of members of the studied families. Spiritual therapy as a treatment was used by 11% of the studied families. Spiritual therapy including praying and treatment by Holy Qur'an (either by self-reciting the Qur'an or having the Qur'an recited over water which was then drunk or massaged). Bee sting and acupuncture were used by 7% and 2% respectively.

Regarding the common morbidities for which complementary therapies were used, it is evident that hypertension (21%), diabetes mellitus (18%), irritable bowel syndrome (13%) and rheumatologic musculoskeletal disorders (10%) represented the most common morbidity among the studied families. On the other hand bronchial asthma (5%), chronic liver disease (4%), impotence (2%), rheumatoid arthritis (1%) and peptic ulcer diseases (1%) came at the bottom of the list.

The main source of information about CAM was relatives (45%), followed by traditional healer (21 %) and friends and neighbors (13 %). On the other hand, physicians constituted

only 9 % as source of information for using CAM. The majority of the studied population (91 %) perceived CAM as beneficial and the lower proportion perceived it as not beneficial (9 %).

Concerning the relation of CAM use and some socio-demographic factors, it was evident that, CAM was used more frequently among males (51.4 %) than females without a statistical difference ($P>0.05$). Use of CAM showed significant association with age (being more users (89%) if age < 60 years), being more users if illiterate (29%) and read / write/ completed only primary education (32.7%)($P< 0.05$). On the other hand, CAM did not show significant association with marital status, monthly employment status, income and coverage with health insurance ($P>0.05$).

After adjustment using stepwise logistic regression analysis, the expected probability of CAM use among the studied population decreased by 0.5 if illiterate/read /write or completed primary or middle level of education ($P<0.05$). Also, it decreased by 0.68 if unemployed ($P<0.05$). Age, gender and monthly income as studied variables showed no effect on using CAM after adjustment using stepwise model when other variables are constant.

Discussion

The current study was conducted on 640 families in North Sinai, Egypt. It was aiming at identifying the prevalence and pattern of CAM use among the studied families As well as to identify factors that might influence use of CAM. In the current study, more than one-third (38%) of the studied families have used some forms of CAM at some time in the past for their family members. These results were in agreement with the obtained results from Belgium(42%) and China (40%).(2,13) Also, they were consistent with the reported results from two separate studies in USA (34 %) and (49%).(14,15) The use of CAM ranged, and ranged between forty-fifty percent,(6,16-18) in other countries such as Japan, Australia and European countries.

Socio-demographic characteristics		Total (640)	
		No	%
Gender type:	Male	305	47.7
	Female	335	52.3
Age groups	18- years	455	71
	45- years	146	23
	60- years	39	6
Education levels	Illiterate	112	18
	Read & Write/Primary	122	19
	Preparatory	52	8
	Secondary	245	38
	High	109	17
Employment status	Employed	150	23
	Unemployed	490	77
Marital status	Married	472	73
	Unmarried	100	16
	Divorced	18	3
	Widow	50	8
Income	Perceived as adequate	192	30
	Perceived as inadequate	448	70
Health Insurance	Insured	150	23
	Not- insured	490	77

Table 1: Socio-demographic characteristics of the studied families

Use of CAM among family members	Total (640)	
	No	%
Use of CAM	245	38
Non-use of CAM	395	62

Table 2: Distribution of the studied population according to the use of CAM among family members

The most common CAM modalities	Total (245)	
	No	%
Herbal /dietary remedy	91	37
Cupping	89	36
Honey	76	31
Spiritual Healing	26	11
Bee sting	18	7
Acupuncture	6	2

Table 3: Types of CAM practices among family members of the studied families

Common of morbidity	Total (245)	
	NO	%
Chronic Morbidly		
▪ Hypertension (HTN)	52	21
▪ DM	45	18
▪ IBS	33	13
▪ Rheumatologic musculoskeletal disorders	24	10
▪ Bronchial asthma	13	5
▪ Chronic Liver disease (CLD)	11	4
▪ Impotence	5	2
▪ Rheumatoid arthritis	2	1
▪ Peptic ulcer diseases	2	1
▪ Others	31	13

Table 4: Use of CAM therapies among family members according of the studied families according to the type of morbidity

Source of information for use of CAM practices	Total (245)	
	NO	%
▪ Relatives	111	45
▪ Traditional healer	51	21
▪ Friends/Neighbors	32	13
▪ Physician	12	9
▪ Others	2	1

Table 5: Use of CAM therapies among family members of the studied families according to source of information

Perception towards the benefit of CAM	Total (245)	
	NO	%
Perceived as beneficial	222	91
Perceived as not beneficial	23	9

Table 6: Distribution of the studied families according to their perception towards benefit of CAM practices

Socio-demographic characteristics		Use of CAM (640)				x ²	P
		Use CAM (NO= 245)		Not use CAM (NO=395)			
Gender type	Male	126	51.4	179	45.3	2.265	0.132
	Female	199	48.6	216	54.7		
Age groups in Years	18-	139	56.7	316	80	42.806	0.001**
	45-	79	32.3	67	17		
	60-	27	11	12	3		
Education Levels	Illiterate	73	29.8	39	9.9	62.378	0.001**
	Read/Write/Primary	80	32.7	94	23.7		
	Middle	65	26.5	180	45.6		
	High	27	11	82	20.8		
Employment status	Employed	63	25.7	87	22	1.147	0.284
	Unemployed	182	74.3	308	78		
Marital status	Married	175	71.4	297	75.2	1.105	0.293
	Divorced/Widow/ unmarried	70	28.6	98	24.8		
Income	Perceived as adequate	79	32.2	113	28.6	0.953	0.329
	Perceived as inadequate	166	67.8	282	71.4		
Health Insurance	Insured	63	25.7	87	22	1.147	0.284
	Not insured	182	74.3	308	78		

Table 7: Relation of using of CAM and some socio-demographic characteristics among the studied families

CAM Use	Coef.	S.E	Z-test	P-value	95%CI
• Gender	0.2	0.18	1.31	0.252	0.87 : 1.74
• Age group	0.37	0.17	5	0.025	-0.11 : 0.71
• Education levels	-0.5	0.08	38.45	0.001**	-0.66 : -0.34
• Unemployment	-0.68	0.26	6.88	0.009**	0.31 : 0.84
• Perceived income as inadequate	-0.28	0.24	1.38	0.24	-1.18 : 0.05
• Constant	1.158	0.51	5.07	0.024*	0.16 : 2.16

*Statistically significant
Table 8: Stepwise logistic regression analysis for CAM use among family members and studied variables

On the other hand, the results from the current study were lower than those reported from Africa and Canada. It is evident that up to 80% and 70% of the studied population have used CAM respectively.(2,13) A contradictory view was reported from population-based studies in USA and Australia which showed results ranging from 66%-68% by the year of 2002.(1,19) The situation in the Eastern Mediterranean Region was no exception where results of a household study showed 73% and 56% of the studied population have used CAM in Saudi Arabia and Turkey respectively.(4,7) The use of CAM as a treatment modality among those attending health facilities, was less. In a study conducted in health facilities in Saudi Arabia, it was found that nineteen percent used some form of CAM practices in the past.(20) In one of the earliest countries that paid more attention to CAM at the level of education and practice: reports from West Germany showed that, CAM was used by only six-percent of the studied population which was considered to be a low prevalence.(21)

The above mentioned studies showed moderate-high use of CAM in both developed and developing countries comparable to the midway results obtained from the current study. The relatively high use of CAM might be explained in the background of an existing trans-cultural view towards use of CAM practices before seeking medical advice from the medical profession or even after. Also, patients in rural areas experience a variety of unmet needs partly due to fewer resources to choose from, poverty, perceived reliability of these therapies based on folklore or family traditions and the availability of such practices. All of these factors may contribute to the use of CAM therapies. Also, physicians' attitudes towards CAM and poor patient-doctor communication may be other reasons why patients use CAM more and even without informing the treating physician.

The most frequently used types of CAM in the current study were

the herbal/dietary therapies (37%), cupping (36%), honey (31%), spiritual healing (7 %) as a treatment was used by 11% of the studied families. Spiritual therapy including praying and treatment by Holy Qur'an (either by self-reciting the Qur'an or having the Qur'an recited over water which was then drunk or massaged). Other therapies such as bee sting and acupuncture were not frequent (7% and 2%). These results were in partial agreement with reports from Saudi Arabia(4,20) where Qur'an, honey and herbs particularly black seed came at the top of the list. Among western countries, the results showed that prayer/spiritual healing; herbs, relaxation, vitamins, massage, acupuncture and commercial weight loss programs were common CAM practices among adults and elders.(1,15,22-25)

Herbal therapies are considered one of the most frequently used CAM practices. According to the World Health Organization (WHO), more than three-quarters of the world's population rely upon traditional medicine, mainly herbs.(26) These results were higher than those reported from North Carolina: twenty percent of participants had used medicinal herbs,(27,28) comparable to the results brought from Turkey where 58.5% of the studied population have used herbal therapies.(7) Evidence-based medicine is acquiring more interest worldwide. Herbal therapies are no exception. Awareness of health care providers who are in touch with herbal therapy as family physicians is acquiring more interest as emphasized recently by the American Academy of Family Practitioners (AAFP)- Annual Scientific Assembly-2006 to be evidence-based.(26,29)

It is evident in the present study that CAM practices were used for chronic morbidity. Hypertension (21%), diabetes mellitus (18 %), irritable bowel disease (13 %) and Rheumatologic musculoskeletal disorders (10%) were the common conditions for which CAM was used. On the other hand, use of CAM for bronchial asthma and chronic liver disease were uncommon. These

findings were consistent with those reported from Saudi Arabia where CAM use was highest for headache, irritable bowel syndrome and back pain.(20) Also, in another study, 17.4% of diabetic patients used herbs to treat diabetes mellitus.(30) The situation among Americans and Indians was not far from the obtained results, CAM was used to treat neck pain, joint pain or stiffness, back pain, diabetes mellitus, hypertension, arthritis and anxiety or depression.(31, 32)

The use of CAM therapies encompassed a wide spectrum of medical problems ranging from simple, transit and self limited up to serious, long term disabling and terminal problems. Such practices in the current study or among the other studies could be explained by the traditions, the deeply seated values and perception of the patient towards CAM. The majority of the studied population who used CAM (91 %) perceived it as a beneficial treatment modality. They used it widely in different medical problems. A higher figure (75%) was reported from Japan.(6) These results were in disagreement with those reported from Saudi Arabia, where 70% of patients perceived it as dangerous. (20)

The main source of information about CAM was relatives (45 %), followed by friends (23.1%) and traditional healer (21%). On the other hand, physicians constituted only 9 % as a source of information for using CAM. These results were consistent with those from Turkey where the source of information of CAM was mainly the relatives, friends or neighbors.(7) In Saudi Arabia, relatives, neighbors and friends were the main source of information. On the other hand media was mentioned less frequently.(20) A considerable proportion of the patients did not inform their treating physician about their CAM use.(7,20) Reports from the USA showed that CAM users were more likely to receive CAM information from friends, family, the popular media and the Internet than from their physicians.(33)

The discrepancy of the results obtained in the current study and the others might reflect the peculiarity of socio-demographic and cultural variables in each community. The need to make the physician a source of information was apparent. Also, being the only source of information is inadequate but to be evidence-based as emphasized recently by American Academy of Family Practitioners (AAFP) is beneficial.(29) A good doctor-patient relationship is of utmost importance in this regard, where in the absence of such a relationship, the patient may deny such CAM rather than informing his physician.

It was evident that CAM use has shown a significant association with some socio-demographic factors. It was used more frequently among males (51.4 %) compared to females without significant difference ($P>0.05$ %). CAM showed significant association with age and education ($P<0.05$). On the other hand it did not show a significant association with marital status, monthly income or coverage with health insurance ($P>0.05$). These results were in partial agreement with those reported from Japan and Turkey, USA where use of CAM was associated with gender (towards the female). Also, it was correlated to older age and higher education.(6,7,34) On the other hand, results have been obtained from Saudi Arabia in which housewives and individuals who had no formal education were found more likely to use CAM.(20)

After adjustment using stepwise logistic regression analysis, the expected probability of CAM use among the studied population decreased by (0.5) if illiterate/read/write or completed primary or middle level of education ($P<0.05$). Also, it decreased by 0.68 if unemployed ($P<0.05$). Age, gender and monthly income as studied variables showed no effect on using CAM after adjustment using stepwise model when other variables are constant. These results were in partial agreement with the results from the USA and showed that: rural residence, age, income, education,

and health insurance were unrelated to CAM use. (35) Also, in another study, being female will be more likely be a CAM user.(36) The role of socio-demographic variables are considered to be important as predictors of CAM use. The weight of such variables as predictors will vary from one country to another.

Conclusion

There was a considerable prevalence of CAM practices among the population in Bir El Abd, North Sinai. These results call for including CAM in the under and post-graduate curriculum in medical schools, and continuous medical education programs.

Training of primary health care teams could help in modifying behavior of the practice population towards rational use of CAM practices. Encouraging physicians to learn more about CAM products and treatments and to routinely screen all patients for CAM use is required. Urgent health education programs addressing safe and unsafe practices regarding CAM directed to the community are a pre-requisite. The Family physician is in a unique position to do such a task with patients because they maintain a good doctor-patient relationship with the practice population. Study limitation and generalizability The obtained results cannot be extrapolated or generalized on the Egyptian community because the study was conducted only in a Bedouin community that has specific characteristics. Further studies representing rural and urban areas are needed to give an overall view of CAM use in Egypt.

Acknowledgments

The authors would like to thank all participants in the study, the interviewers, directors, and staff members of family practice center affiliated to FOM-SCU for their assistance in conducting the study.

References

1. Brown CM, Barner JC, Richards KM, Bohman TM. Patterns of Complementary and Alternative Medicine Use in African Americans.

The Journal of Alternative and Complementary Medicine. 2007; 13(7): 751-758.

2. World Health Organization (WHO). WHO traditional medicine strategy 2002-2005. Geneva, Switzerland. 2002.

3. Azaizeh H, Saad B, Cooper E, Said O. Traditional Arabic and Islamic Medicine (TAIM) now join TCM, CAM, Kampo and Ayurveda. Evid based Complement Altern Med. 2008; doi:10.1093/ecam/nen039.

4. Al-Faris EA, Al-Rowais N, Mohamed AG, Al-Rukban MO, Al-Kurdi A, Al-Noor MAB, et al. Prevalence and pattern of alternative medicine use: the results of a household survey. Ann Saudi Med 2008; 28 1(1): 4-10.

5. WHO. Guidelines on Developing Consumer Information - Proper Use of Traditional, Complementary and Alternative Medicine. WHO Library Cataloguing-in-Publication Data (NLM classification: WB 890). Geneva, Switzerland. World Health Organization. 2004.

6. Hori S, Mihaylov I, Vasconcelos JC, McCoubrie M. Patterns of complementary and alternative medicine use amongst outpatients in Tokyo, Japan. BMC Complement Altern Med. 2008 April 23:8-14.

7. Aydin S, Bozkaya AO, Mazicioglu M, Gemalaz A, Ozcakir A, Oztork A. What Influences Herbal Medicine Use?-Prevalence and Related Factors. Turk J Med Sci 2008; 38 (5).

8. Foster F, Phillips RS, Hamel Mb, Eisenberg DM. Alternative medicine use in older American. Journal of the American Geriatric Society. 2000,48:1560-1565.

9. Kaptchuk TJ, Eisenberg DM: The Persuasive Appeal of Alternative Medicine. Ann Intern Med 1998, 129:1061-1065.

10. Astin JA, Shapiro SL, Lee RA, Shapiro JDH. The construct of control in mind-body medicine: implications for healthcare. Altern Ther Health Med 1999; 5:42-47.

11. Gaby AR: Natural treatments for osteoarthritis. Altern Med Rev 1999; 4:330-341.

12. Boon H, Stewart M, Kennard MA, Gray R, Sawka C, Brown JB et al. Use of Complementary/Alternative Medicine by Breast Cancer Survivors in Ontario: Prevalence and

- Perceptions. *J Clin Oncol* 2000; 18:2515-2521.
13. Ernst E. Prevalence of use of complementary/alternative medicine: systematic review. *Bulletin of WHO* 2000; 78 (2): 252.
14. Eisenberg DM, Kessle R Cr, Foster C, Norlock FE, Calkins DR, Delbanco TL. Unconventional Medicine in the United States-Prevalence, Costs, and Patterns of Use. *N Engl J Med* 1993; 329:1200-1204, Oct 14,
15. Cuellar N, Aycok T, Cahill B, Ford J. Complementary and alternative medicine (CAM) use by African American (AA) and Caucasian American (CA) older adults in a rural setting: a descriptive, comparative study. *BMC Complementary and Alternative Medicine* 2003; 3:8.
16. MacLennan AH, Wilson DH, and Taylor AW. Prevalence and cost of alternative medicine in Australia. *Lancet* 1996; 347: 56 9-73.
17. Fisher P, and Ward A. Complementary Medicine in Europe. *BMJ* 1994; 309:107-11.
18. Emslie MJ, Campbell MK, Walker KA. Changes in public awareness of, attitudes to, and use of complementary therapy in North East Scotland: Surveys in 1993 and 1999. *Complement Ther Med.* 2002; 10:148-153.
19. Xue CL, Zhang AL, Lin V, Costa C, Story DF. Complementary and Alternative Medicine Use in Australia: A National Population-Based Survey. *The Journal of Alternative and Complementary Medicine* 2007;13(6): 643-650.
20. Al-Faris EA. The Pattern of Alternative Medicine use among patients attending Health Centers in a Military Community in Riyadh. *Journal of Family and Community Medicine* 2000; 7 (2): 17-25.
21. Schwarz S, Messerschmidt H, V lzke H, Hoffmann w, Lucht M, D ren M. Use of complementary medicinal therapies in West Pomeranian Germany: a population-based study. *Climacteric* 2008; 11(2):124-134.
22. Eisenberg DM, Davis RB, Ettner SL. Trends in alternative medicine use in the United States, 1990-1997. *JAMA* 1998; 280(18): 1569-1575.
23. Winslow LC, Shapiro H. Physicians want education about complementary and alternative medicine to enhance communicate with their patients. *Arch Intern Med* 2002; 162: 1176-1181.
24. Del Mundo WF, Shepherd WC, Marose TD. Use of alternative medicine by patients in a rural family practice clinic. *Fam Med* 2002; 34 (3): 206-12
25. Palinkas LA, Kabongo MI. The use of complementary and alternative medicine by primary care patients. *J Fam Pract* 2000; 49: 1121-1130.
26. WHO Policy Perspectives on Medicines - Traditional Medicine - Growing Needs and Potential. Geneva. (2). 2002.
27. Wheaton AG, Blanck HM, Gizlice Z, Reyes M. Medicinal herb use in a population-based survey of adults: prevalence and frequency of use, reasons for use, and use among their children. *Ann Epidemiol* 2005; 15(9): 678-85.
28. Blumenthal M. Herb market levels after five years of boom. *Herbal Gram* 1999; 47: 64 -5.
29. Lie D. Evidence-Based Complementary and Alternative Medicine (CAM): What Should Physicians Know? The 2006 American Academy of Family Practitioners (AAFP) Annual Scientific Assembly.2006.
30. Al-Rowais N. Herbal Medicine in the treatment of diabetes mellitus. *Saudi Med J* 2002; 23 (11): 1327-1331.
31. Barnes P, Powell Griner E, McFann K, Nahin R. CDC. Complementary and alternative medicine use among adults: United States, 2002. *Adv Data.* 2004; 343:1-19.
32. Singh V, Deshandra M Raidoo DM, Harries CS .The prevalence, patterns of usage and people's attitude towards complementary and alternative medicine (CAM) among the Indian community in Chatsworth, South Africa. *BMC Complementary and Alternative Medicine* 2004, 4:3
33. Wheaton AG, Blanck HM, Gizlice Z, Reyes M. Medicinal herb use in a population-based survey of adults: prevalence and frequency of use, reasons for use, and use among their children. *Ann Epidemiol* 2005; 15(9): 678-85.
34. Corbin LW, Mellis BK, Beaty BL, Kutner JS. The Use of Complementary and Alternative Medicine Therapies by Patients with Advanced Cancer and Pain in a Hospice Setting: A Multi-centered, Descriptive Study. *Journal of Palliative Medicine.* January 2009, 12(1): 7-8.
35. Kaboli PJ, Doebbeling BN, Saag KG, Rosenthal GE. Complementary and Alternative Medicine by Older Patients With Arthritis: A Population-Based Study. *ARTHRITIS CARE & RESEARCH* 45:398-403, 2001
36. Loera JA, Ortiz CR, Kuo YF. Predictors of complementary and alternative medicine use among older Mexican Americans. *Complement Ther Clin Pract* 2007; 13(4): 224-231.

Tissue and plasma concentrations of meropenem in diabetic foot infected patients

Mohammed Abdullah Ali (1)
Nidhal AK Mohammed Ali (2)

(1) Department of Pharmacology, College of Pharmacy, Hawler Medical University, Iraq
(2) College of Medicine, Hawler Medical University, Iraq

Correspondence:

Nidhal AK Mohammed Ali
Department of Pharmacology, College of Pharmacy,
Hawler Medical University, Iraq
Email: nabdulqader@yahoo.co.uk

Introduction

Pharmacodynamics of antimicrobials explore the relationship between the attained drug concentrations and the infecting organism with the clinical outcome (1, 2).

Achieving therapeutic drug concentrations at the site of infection is one of the main goals of antibiotic therapy especially where peripheral vascular circulation is embedded in situations such as foot infections of diabetic patients (2, 3).

Some antibiotics when used in the treatment of diabetic foot infections, may attain adequate blood levels but may not achieve sufficient antimicrobial concentration in infected tissues to combat the infection leading to more complication that may necessitate amputation (1, 4, 5).

Choosing antibiotics for diabetic foot infections should include an agent active against staphylococci, Gram-negative bacilli, Enterococcus and anaerobic species especially in previously treated or severe cases as they are involved in diabetic foot infections (6, 7, 8).

Meropenem is a broad-spectrum carbapenem antibiotic with excellent activity against many pathogens associated with complicated skin and soft tissue infections (cSSTIs)(9).

The optimal pharmacodynamic parameter predicting microbiologic efficacy is the time that the drug concentration in the blood remains above the MIC ($T > MIC$) (1, 10, 11). Pharmacokinetic studies revealed that meropenem penetrates rapidly and widely into a range of body fluids and tissues (12, 13) resulting in sufficient $T > MIC$ in body fluids enough to kill bacteria (11, 14) and a regimen which provides a $T > MIC$ of 40% of the dosing interval has

Abstract

Objective: Meropenem is a broad antibacterial agent against most pathogens causing diabetic foot infections. The pharmacodynamics parameter, time during which antibiotic concentration remains above the MIC for the infecting pathogen ($T > MIC$) has been recommended for good efficacy. This study aimed to determine meropenem concentrations in plasma and foot infected tissues in diabetic patients and relate these values with microbiological findings.

Patients and Materials: Ten patients with diabetic foot infections were enrolled in the study. Microbiological examination and the minimum inhibitory concentration (MIC) were determined for foot infected samples. All patients received meropenem by intravenous infusion of 1000 mg for 30 minutes at 8 hourly intervals. Blood samples were taken after 1, 2, 4, and 8 hours of the last meropenem dose and

the plasma meropenem concentration was analyzed by HPLC. Viable soft tissue samples were obtained at time of amputation and meropenem concentration was determined by microbiological assay.

Results: Meropenem attained high concentrations in foot tissues in excess of the MICs of the isolated bacteria and the mean $T > MIC\%$ was 77.5 ± 19.45 .

Conclusion: The present data shows good tissue penetration of meropenem in foot tissues that permits its recommendation for the treatment of foot infections in diabetic patients.

Key words: pharmacodynamics, meropenem, $T > MIC$.

been recommended to be sufficient to produce maximum microbial killing (15, 16).

The objective of this study is to predict the exposure of pathogens isolated from foot lesions of diabetic patients to meropenem to characterize the relationship of pharmacodynamics indices to microbiological response.

Patients and Methods

The enrolled patients with a mean age 59±6 years (6 males, 4 females) had diabetes mellitus type 2 with foot lesions of Wagner grade III and IV and were to undergo surgical amputation in the orthopedic department in Erbil teaching hospital. Written consent was taken from all patients and the Ethical Committee Approval was obtained. Exclusion criteria were patients with a history of antibacterial medication within two weeks before the surgery, end stage renal impairment and history of allergy to b-lactams antibacterial. Blood sugar, renal function tests and X-ray were investigated for each patient. Serum glucose levels were controlled by insulin in each of these subjects, by the consultant during the study.

Microbiology

Sterile swabs were taken after debridement from the base of the infected ulcer for microbiological study. Bacterial isolation and identification for aerobic and anaerobic bacteria and the minimum inhibitory concentrations (MICs) of each bacterial isolate were determined using Vitek 2 compact diagnostic technique (BioMérieux Inc., Hazelwood, MO). The MIC was also determined by micro-dilution method according to the National Committee for Clinical Laboratory Standards (2003)(17).

Drug administration

All patients received the antibiotic meropenem (Merrem; AstraZeneca Pharmaceuticals, Wilmington, DE) as IV infusion at the recommended dose of 1000 mg for 30 minutes eight hourly intervals. Blood samples were withdrawn in heparinized tubes from an indwelling intravenous catheter

placed into the arm contralateral to the one used for the drug infusions after 1, 2, 4, and 8 hours of the last dose of meropenem administration. Plasma was obtained after centrifugation and kept at -40 ° C until analysis.

Analytical Methods

The concentration of meropenem in plasma was analyzed by a high performance liquid chromatography (HPLC) method (18). The HPLC instrument used was the Knauer HPLC instrument (Smartline manager 5000 with UV detector) equipped with ChromGate software.

Extraction of plasma samples:

Briefly, plasma samples (0.5 ml) were treated then with TCA (15%) and with a mixture of water: acetonitrile (80:20). The samples (10 µl) were then eluted on a reversed-phase column (C8) with a mobile phase containing Methanol: Water (80:20) with a flow rate of 1 ml/min and UV detector set at 254 nm.

Spiked plasma samples containing meropenem in the range of 0.1-1000 µg/ml was prepared by adding aliquots of meropenem stock solution to blank plasma. A calibration curve of different concentration of spiked meropenem was prepared and accordingly the unknown concentration of meropenem in patient's plasma was calculated.

Tissue samples: A peri necrotic soft tissue sample was excised from the infected foot deeply at the time of amputation from each patient at times relevant to the timing of the blood samplings. The tissues were wiped gently with dry sterile gauze, placed in sterile pre-weighed vials and stored at (-40 °C) until time of analysis by a microbiological method according to the method of Byl et al (19). The tissue samples were thawed to room temperature, sliced into small pieces (2-3 mm) with sterile surgical scalpel, weighed and placed into a sterile test tube to which phosphate buffer (pH 6.8) was added (1:1), and vortexed for 10 minutes. The supernatant was taken and treated with 0.5 ml of acetonitrile: water (1:1), vortexed, centrifuged

at 3000 rpm for 30 minutes and the supernatant was taken for analysis by microbiological assay method.

Muller Hinton agar medium was prepared and inoculated with fresh bacterial suspension (0.05 ml) of standard *E. coli* ATCC 25922. Hundred microliters of each extracted sample was placed into holes (4mm) made in each Petri-dish. Different concentrations of standard meropenem were prepared and extracted by the same procedure mentioned above and analyzed with the patients' samples for meropenem. For each unknown sample three Petri-dishes were used with a standard sample. The plates were then incubated for 18 hours at 37°C, after which the diameter of the zones of inhibition were read and then the concentrations of unknown meropenem in different samples were calculated.

Calculations of pharmacokinetic parameters (half-life($t_{1/2}$), apparent volume of distribution; V_d , Clearance (Cl), and the percent of dosing interval for which concentration exceeding the MIC ($T > MIC\%$) was calculated according to the mathematical equation given by Burton et al (20). The area under plasma concentration curve (AUC) was calculated by the trapezoidal rule method.

Results

The swabs obtained from the ten patients before meropenem administration revealed the presence of 13 different bacterial species such as *Klebsiella pneumoniae*, *Escherichia coli*, *Pantoea agglomerans*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Morganella morganii*, *Enterococcus faecalis*, *Enterococcus raffinosus*, *Leuconostoc lactis*, *Citrobacter freundii*, *Proteus vulgaris*, *Kocurea rosea* and *Yersinia enterocolitica* (Table 1 - next page).

In vitro antibacterial susceptibility test showed that all isolated bacterial strains were sensitive to meropenem. The MIC values of meropenem for the isolated bacteria ranged from 0.06 - 3.9 ± 0.9 µg/ml (Table 1).

Patient code	Isolated pathogens	MIC($\mu\text{g/ml}$)	%T>MIC
A	<i>Pseudomonas aeruginosa</i>	0.06	97.08
	<i>Klebsiella pneumonia</i>	0.12	86.76
B	<i>Morganella morgani</i>	0.24	87.37
	<i>Pantoea agglomerans</i>	0.48	74.72
C	<i>Klebsiella pneumonia</i>	0.48	79.74
	<i>Pantoea agglomerans</i>	0.48	79.74
D	<i>Klebsiella pneumonia</i>	0.48	64.77
	<i>Escherichia coli</i>	0.97	52.99
	<i>Enterococcus faecalis</i>	3.9	29.7
E	<i>Enterococcus raffinosus</i>	1.95	38.14
	<i>Klebsiella pneumonia</i>	0.06	91.81
F	<i>Leuconostoc lactis</i>	0.97	75.67
	<i>Escherichia coli</i>	0.97	75.67
G	<i>Yersinia enterocolitica</i>	0.06	97.5
H	<i>Citrobacter freundii</i>	0.06	96.87
	<i>Proteus vulgaris</i>	0.48	65.55
I	<i>Staph. aureus</i>	0.12	95.8
	<i>Klebsiella pneumonia</i>	0.06	85.45
J	<i>Kocurea rosea</i>	0.12	98.1
	<i>Klebsiella pneumonia</i>	0.24	85.57
Mean \pm S.D		0.61 \pm 0.9	77.5 \pm 19.45

Table 1: Microbiological findings, the minimum inhibitory concentrations (MIC) and the percent of dosing interval for which meropenem concentration exceeds the MIC (%T>MIC) of different pathogens isolated from the diabetic foot infected patients

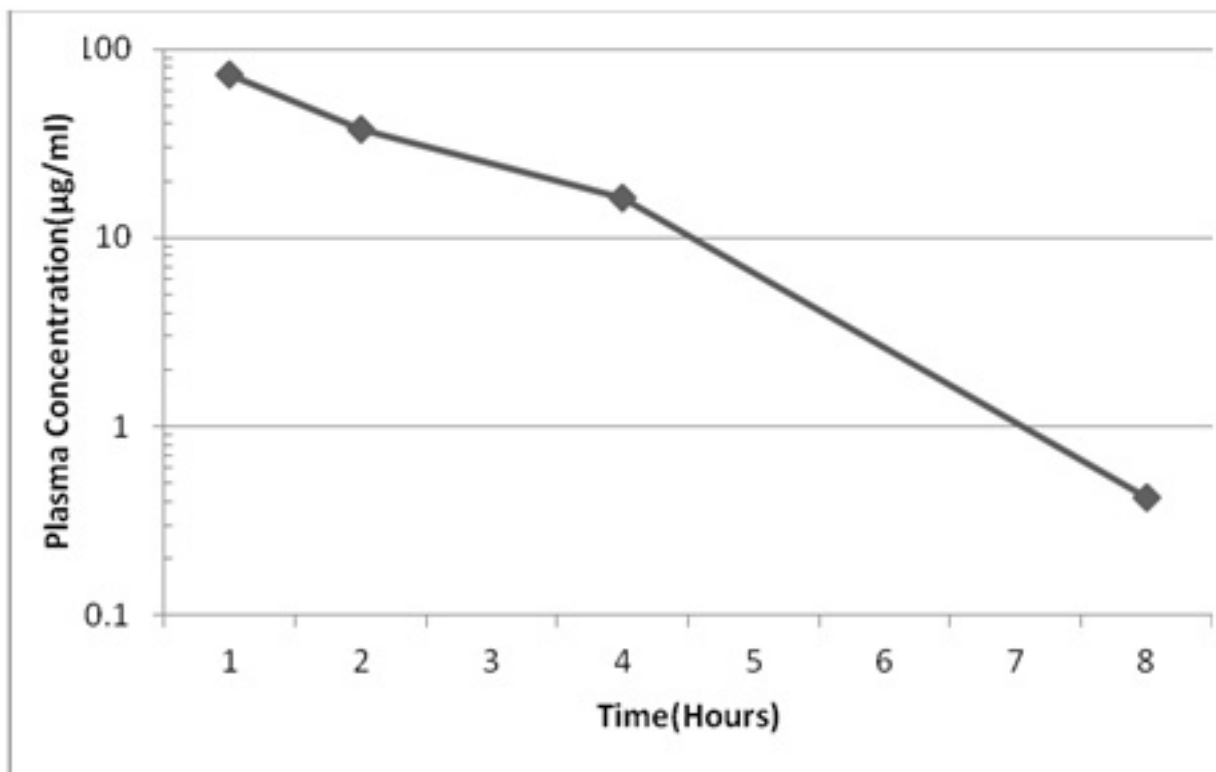


Figure 1: The mean plasma concentration curve of meropenem in ten patients after intravenous infusion of meropenem at 1000 mg over 30 minutes every eight hours

Tissue concentration ($\mu\text{g/g}$) Mean \pm SD	Time of sampling after meropenem administration (h)
14.98 \pm 3.48 (n=3)	1
32.00 \pm 11.03 (n=3)	2
24.54 \pm 5.34 (n=2)	4
10.84 \pm 15.32 (n=2)	8

n; number of patients.

Table 2: The mean plasma and tissue concentrations of meropenem after the last intravenous infusion of 1000 mg every eight hours to diabetic patients

Pharmacokinetic parameters	Mean \pm S.D
$t_{1/2}$ (h)	0.91 \pm 0.1
V_d (L)	31.41 \pm 7.44
Cl (L/h)	23.8 \pm 6
AUC ₀₋₈ (mg. h /l)	156.27 \pm 39

Table 3: Pharmacokinetic parameters of meropenem in ten diabetic patients after intravenous infusion of meropenem at 1000 mg over 30 minutes every eight hours

The mean plasma concentration of meropenem declined from 72.87 \pm 12.02 to 0.42 \pm 0.31 $\mu\text{g/ml}$ after 1 and 8 hours of administration of the last dose following first-order kinetics (Figure 1). Tissue concentrations were highly comparable after IV infusion of meropenem with the highest concentration 32.00 \pm 11.03 $\mu\text{g/g}$ obtained 2 hours after the last administered dose (Table 2). The pharmacokinetic parameters for meropenem in plasma (Table 3) showed that the mean plasma $t_{1/2}$, volume of distribution (V_d), total clearance and the area under the plasma curve (AUC) of meropenem in these patients were 0.91 \pm 0.1h, 31.41 \pm 7.44 (L/Kg), 23.8 \pm 6 (L/h) and 156.27 \pm 39 (mg. h /l) respectively.

The percent of T>MIC for the isolated bacteria from each patient ranged from 29.7 to 98.1% (Mean 77.5 \pm 19.45%); with the lowest percent for *Enterococcus faecalis* while the highest value was for the *Kocurea rosea* (Table 1).

Discussion

The most important criterion of antimicrobial activity is the actual tissue concentration at the site of infection (1, 11).

The high concentrations of meropenem achieved in foot tissues

of the diabetic patients shown in this study, exhibits its good penetration. Numerous studies have shown that meropenem penetration to different organs provides adequate tissue concentrations for the treatment of various infections caused by susceptible bacteria (19, 21, 22, 23, 24, 25). Sustained meropenem levels higher than the MIC₉₀ were observed in the colon, gall bladder, fascia, muscle, omentum, and skin (11, 26, 27, 28).

Meropenem exhibited an adequate spectrum of in vitro activity against all the bacterial isolates from the diabetic patients which coincide with those reported by numerous authors (29, 30, 31).

Although anaerobes may accompany skin and soft tissue infections (2, 9) however in these patients, no anaerobic bacterium was isolated.

The MIC values obtained for the isolated bacteria indicates that they were sensitive since their MIC values were close to those published for sensitive bacteria by many authors (32, 33,34,35) . Although different species of enterococci are shown to have higher MICs than enterobacteriace, nevertheless it was also close to those meropenem MIC values reported for this bacteria (36)

Meropenem is considered to exhibit time-dependent killing activity (37, 38) , this means that the antibacterial efficacy necessitates concentrations to be maintained at a certain minimal level for sufficient period of time. Indeed the levels of meropenem in the foot tissues in this study were above MIC₉₀ for susceptible bacteria (4 $\mu\text{g/ml}$) isolated from the patients and since that T> MIC of 20%- 40% is a good prognostic indicator for successful bacteriostatic and bactericidal responses of carbapenems(11,40) so the range of T> MIC (29.7-98 %) determined for meropenem indicates its effective antibacterial activity in diabetic foot infected patients.

Suggesting effective dosing regimen for time-dependent antibiotics requires drug concentrations to exceed the MIC of the causative pathogen for at least 40% to 50% of the dosing interval (39, 40) therefore, for instance in the present study, *klebsiella pneumonia* (MIC 0.12 $\mu\text{g/ml}$) produced a T> MIC% of about 86.76 % which means that meropenem will be effective for a period of 6.9 hours and for *Pseudomonas aeruginosa* (MIC 0.06 $\mu\text{g/ml}$) activity cover about 7.76 hours for each dosing intervals (8 hourly) which indicates a good efficacy in such a clinical condition. However, for *enterococcus faecalis*

and enterococcus raffinosus with a T> MIC% of 29.7% and 38.14% respectively and considering less than 40% of the dosing intervals for good efficacy, meropenem will remain effective only for less than 3.2 hours, therefore requires optimizing dosing strategies to maximize the duration of drug exposure as administering the drug at longer intravenous infusions or by continuous intravenous infusion (41, 42).

However, since these agents show some degree of post antibiotic effect (PAE) in spite of short duration (43, 44, 45, 46), then this persistent effect would allow a longer effective dosing interval. Indeed, twice-daily administration of meropenem has been shown to be as effective as 3-times daily administration in patients with bacterial infections. (11, 47, 48)

In conclusion, this study has shown that meropenem reaches sufficient concentrations in infected wound tissue of diabetic foot tissues and with debridement might cover an adequate spectrum well suited for the treatment of skin structure infections of diabetics, caused by susceptible organisms.

References

- 1- Mueller M, Dela Pen A and Derendorf H. Issues in Pharmacokinetics and pharmacodynamics of anti-infective agents: Kill curves versus MIC: Minireview. *Antimicrob Agents Chemother.* 2004; 48 (2): 369-77.
- 2- Lipsky BA. Medical treatment of diabetic foot infections. *Clin Infect Dis* 2004; 39 Suppl (2): S104-14.
- 3- Farnsworth J and Paulman P. Diabetic foot ulcer and poor compliance: how would you treat? *J Farm. Pract.* 2005; 54(9):768-76.
- 4- Fung HB, Chang JY and Kuczynski S. A practical guide to the treatment of complicated skin and soft tissue infections. *Drugs* 2003; 63:1459-80.
- 5- Boulton AJM, Kirsner RS and Vileikyte L. Neuropathic diabetic foot ulcers. *The New England J Medicine* 2004; 351:48-55.
- 6- Hena JV and Growther L. Studies on bacterial infections of diabetic foot ulcers. *African J. Clin. Exper. Microbiology* 2010; 11(3): 146-9.
- 7- Alavi SM, Khosravi AD, Sarami A, Dashtbozorg A and Montazeri EA. Bacteriologic study of diabetic foot ulcer. *Pak J Med Sci.* 2007; 23 (5): 681-4.
- 8- Timothy K. Fisher, Randall Wolcott, Donna M. Wolk, Manish Bharara, Heather R, Kimbriel, V. and Armstrong G. Diabetic foot infections: A Need for innovative assessments. *The Inter. J Lower Extremity Wounds* 2010; 9 (1):31-6.
- 9- Fish DN. Meropenem in the treatment of complicated skin and soft tissue infections. *Therapeutics and Clinical Risk Management* 2006; 2(4): 401-15.
- 10- Drusano, G. L. Prevention of resistance: a goal for dose selection for antimicrobial agents. *Clin. Infect. Dis.* 2003; 36(Suppl. 1):S42-S50.
- 11- Nicolau DP. Pharmacokinetic and pharmacodynamic properties of meropenem. *Clin Infect Dis.* 2008; 47:S32-40.
- 12- Tomaselli F, Maier A, Matzi V, Smolle-Jüttner FM, Dittrich P. Penetration of meropenem into pneumonic human lung tissue as measured by in vivo microdialysis. *Antimicrob Agents Chemother* 2004; 48:2228-32.
- 13- Drusano GL, Lodise TP, Liu W, Oliver AM, Van Scoy B, and Louie A. Meropenem penetration into epithelial lining fluid in mice and humans and delineation of exposure targets. *Antimicrob Agents Chemother* 2011; 55(7): 3406-12.
- 14- Kitzes-Cohen R. Pharmacokinetics and pharmacodynamics of meropenem in critically ill patients. *Inter J Antimicrob Agents* 2003; 19(2):105.
- 15- Krueger, W. A., G. Neeser, H. Schuster, T. H. Schroeder, E. Hoffmann, A. Heining, H. J. Dieterich, H. Forst, and K. E. Unertl. Correlation of meropenem plasma levels with pharmacodynamic requirements in critically ill patients receiving continuous veno-venous hemofiltration. *Chemotherap.* 2003; 49:280-6.
- 16- Ariano, RE, Nyhlen A, Donnelly JP, Sitar DS, Harding GK, and Zelenitsky SA. Pharmacokinetics and pharmacodynamics of meropenem in febrile neutropenic patients with bacteremia. *Ann. Pharmacotherap.* 2005; 39: 32- 8.
- 17- National Committee for Clinical Laboratory Standards. Methods for dilution antimicrobial susceptibility tests for bacteria that grow aerobically. Approved standard M07-A6. National Committee for Clinical Laboratory Standards 2003. Wayne, Pennsylvania.
- 18- Farin D, Kitsez-cohen R, Piva G and Gozlan I. High performance liquid chromatography for the determination of meropenem in the human plasma. *Chromatographia* 1999; 49(5): 253-5.
- 19- Byl B, Jacobs F, Roucloux I, De Franquen P, Cappello M and Thys JP. Penetration of meropenem in lung, bronchial mucosa, and pleural tissues. *Antimicrob Agents Chemother* 1999; 43:681-2.
- 20 - Burton ME, Show LM and Schentag JL. Applied pharmacokinetics and pharmacodynamics: principles of therapeutic drug monitoring. 4th edition. Lippincott Williams 2005; ISBN: 0-7817-4413-8.
- 21- Wise R, Logan M, Cooper M, Ashby JP and Andrews JM. Meropenem pharmacokinetics and penetration into an inflammatory exudate. *Antimicrob Agents Chemother.* 1990; 34(8): 1515-17.
- 22- Newsom SWB, Palsingh J, Wells FC and Kelly HC. Penetration of meropenem into heart valve tissue. *J Antimicrob. Chemother* 1995; 36, 57-62.
- 23- Gall S, Hemsell DL, McGregor JA, Martens MG, Pitkin D and Allen S. Tissue penetration of meropenem in patients undergoing gynecologic surgery. *Clin Infect Dis.* 1997; 24 (Supplement 2): S178-S180.
- 24- Manav Ay G, Akhan SC, Akhan S, Akhan ES, Ozkara S and Caglar Y. Comparison of intravitreal ceftazidime and meropenem in treatment of experimental pseudomonal posttraumatic endophthalmitis in a rabbit model. *J Appl. Research* 2004; 4(2): 336- 45.
- 25- Drusano GL, Lodise TP, Liu W, Oliver AM, Van Scoy B, and Louie A. Meropenem penetration into epithelial lining fluid in mice and humans and delineation of exposure targets. *Antimicrob Agents Chemother.* 2011; 55(7): 3406-12.

- 26- Granai F, Smart HL and Triger D. A study of the penetration of meropenem into bile using endoscopic retrograde cholangiography. *J Antimicrob. Chemother.* 1992; 29 (6): 711-18.
- 27- Condon RE, Walker AP, Hanna CB, Greenberg RN, Broom A and Pitkin D. Penetration of meropenem in plasma and abdominal tissues from patients undergoing intra-abdominal surgery. *Clin Infect Dis* 1997; 24(Suppl 2):S181-183.
- 28- Ikawa K, Nakashima A, Morikawa N, Ikeda K et al. Clinical pharmacokinetics of meropenem and biapenem in bile and dosing considerations for biliary tract infections based on site-specific pharmacodynamic target attainment. *Antimicrob. Agents Chemother.* 2011; 55(12): 5609-15.
- 29- Raghavan M and Linden PK. Newer treatment options for skin and soft tissue infections. *Drugs* 2004; 64:1621-42.
- 30- Embil JM, Soto NE, and Melnick DA. A post hoc subgroup analysis of meropenem versus imipenem/cilastatin in a multicenter, double-blind, randomized study of complicated skin and skin-structure infections in patients with diabetes mellitus. *Clin Therap* 2006; 28:1164-74.
- 31- Mohr JF. Update on the efficacy and tolerability of meropenem in the treatment of serious bacterial infections. *Clin Infect Diseases* 2008; 47:S41-51.
- 32- Giske CG, Bore'n C, Wretling B and Kronvall G. Meropenem susceptibility breakpoint for *Pseudomonas aeruginosa* strains hyperproducing mexB mRNA. *Clin Microbiol Infect* 2005; 11: 662-9.
- 33- Wiskirchen DE, Koomanachai P, Nicasio AM, Nicolau DP, and Kuti JL. In vitro pharmacodynamics of simulated pulmonary exposures of tigecycline alone and in combination against *Klebsiella pneumoniae* isolates producing a KPC carbapenemase. *Antimicrob Agents Chemother.* 2010; 55(4): 1420-27.
- 34- Sueke H, Kaye S, Neal T, Murphy C and Hall A. Minimum inhibitory concentrations of standard and novel antimicrobials for isolates from bacterial keratitis. *Invest Ophthalmol Vis Sci.* 2010; 51: 2519-24.
- 35- Hope R, Chaudhry A, Adkin R, Guleri A, Williams S, Sharma R and Livermore D. Minimum inhibitory concentrations of meropenem and doripenem for *Pseudomonas aeruginosa* from the UK. *European Society of Clinical Microbiology and Infectious Diseases* 2011; Abstract number: P1177.
- 36- Turner PJ and Edwards JR. Activity of meropenem against *Enterococcus faecalis*. *J Antimicrob Chemother* 1997; 40:456-7.
- 37 - Mouton JW, Dudley MN, Cars O, Derendorf H and Drusano GL. Standardization of pharmacokinetic/ pharmacodynamics (PK/PD) terminology for anti-infective drugs. *Int J Antimicrob Agents* 2002; 19:355-8.
- 38- Filho LS, Kuti JL and Nicolau DP. Employing pharmacokinetic and pharmacodynamics principles to optimize antimicrobial treatment in the face of emerging resistance. *Brazilian J Microbiol.* 2007; 38:183-93.
- 39- Vincent HT, Schilling AN, Shadi N, Keith P, David AM and Elizabeth AC. Optimization of Meropenem minimum concentration/MIC ratio to suppress in vitro resistance of *Pseudomonas aeruginosa*. *Antimicrob Agents Chemother.* 2005; 49 (12): 4920-7.
- 40- Smith BP, Cohen-Wolkowicz M, Castro LM, Poindexter B, Bidegain M, Weitkamp JH et al. Population pharmacokinetics of meropenem in plasma and cerebrospinal fluid of infants with suspected or complicated intra-abdominal infections. *Pediat. Infect. Dis. J.* 2011; 30(10): 844-9.
- 41- Jaruratanasirikul S and Sriwiryajan S. Comparison of the pharmacodynamics of meropenem in healthy volunteers following administration by intermittent infusion or bolus injection. *J. Antimicrob. Chemother* 2003; 52, 518-21.
- 42- Mattoes HM, Kuti JL, Drusano GL and Nicolau DP. Optimizing antimicrobial pharmacodynamics: dosage strategies for meropenem. *Clin Ther* 2004; 26:1187-98.
- 43- Odenholt-Tornqvist I. Studies on the postantibiotic effect and the postantibiotic sub-MIC effect of meropenem. *J. Antimicrob. Chemother* 1993; 31 (6): 881-92.
- 44- Mackenzie M, Gould IM, Chapman DG and Jason D. Postantibiotic effect of meropenem on members of the family Enterobacteriaceae determined by five methods. *Antimicrob Agents Chemother.* 1994; 38(11): 2583-9.
- 45- Novelli A, Fallani S, Cassetta MI, Conti S, and Mazzei T. Postantibiotic Leukocyte enhancement of meropenem against Gram-positive and Gram-negative Strains. *Antimicrob Agents Chemother* 2000; 44(11): 3174-6.
- 46- Tomozawa T, Sugihara C, Kakuta M, Sugihara K and Koga T. In vitro postantibiotic effects of tomopenem (CS-023) against *Staphylococcus aureus* and *Pseudomonas aeruginosa*. *J. Med Microbiol* 2010; 59 (4): 438-41.
- 47- Sharma KK, Sangraula H, and Mediratta PK 2002. Some concepts in antibacterial drug therapy. *Indian J Pharmacol.* 2002; 34: 390-6.
- 48- Capitano B, Nicolau DP, Potoski BA, et al. Meropenem administered as a prolonged infusion to treat serious gram-negative central nervous system infections. *Pharmacotherapy* 2004; 24:803-7.

Hepatitis-B Virus Seropositivity among Adults attending a Primary Care Clinic in Jordan

Hussein H. Dmour
Amal S. AL-Tahieneh
Adnan Zayadeen

Correspondence:

Dr. Hussein H. Dmour
Family Medicine Department, Royal Medical Services,
Amman, Jordan
Mobile number: 0777777679.
Email: dmour_hussein@yahoo.com

Introduction

Hepatitis B Virus (HBV) infection is an important cause of chronic hepatitis, cirrhosis, and hepatocellular carcinoma.

Although the reported rate of HBV has declined in the U.S.A by over 50% since 1987 (1), "probably as a result of vaccination programmes, behavioral changes, refinements in blood screening procedures, and availability of virus inactivated blood components", it remains high in the Western Pacific and South East Asia (2). The prevalence of HBV carriage in the Middle East has been reported to vary from 5-18% (3, 4). In some regions, rates of less than 5% have been reported (5, 6), while parts of Saudi Arabia and Egypt have rates as high as 28% and 20%, respectively. (7)

The distribution of HBV in the Middle East is characterized by considerable variability in carrier rates, according to geographical areas and the community sampled (8, 9, 10).

Patients and Method

Three hundred patients who attended the primary care clinic at Marca Medical Center in Jordan were studied during the years January 2005-April 2006 after obtaining their consent. They were chosen randomly through simple random method. A detailed history was taken from each including socioeconomic status, family members, personal history of jaundice, blood transfusion, injections, sexual contact, history of jaundice or hepatitis among family members, dental procedures and travel abroad.

Complete and thorough examination was done for each patient and a sample of blood for hepatitis B surface antigen was sent to King Hussein Medical Center laboratory (both the haemoagglutination and the Elisa tests were used), liver function

Abstract

Objective: The aim of this study was to estimate the hepatitis-B virus (HBV) carrier frequency among adults attending a primary care clinic in Jordan.

Methods: This study was performed from January 2005 to April 2006. Three hundred patients aged 35-55 years, female:male 173:127 attending a primary care clinic were chosen randomly by simple random method and studied by detailed history, thorough physical examination, and serum HBs Ag was tested. Abdominal ultrasound, liver function tests and hepatitis profile were done for those with positive HBs Ag screening tests. Screening tests also were carried out on family members of those patients with positive tests.

Results: HBs Ag was positive in 10 patients (3.3%) who came from a low socioeconomic class. Three of them (30%) had mild elevation of liver enzymes but all had normal abdominal ultrasound and negative tests for other types of hepatitis. HBs Ag was detected among 8 family members of 6 infected patients.

Conclusion: It is concluded that the HBV seropositivity rate (3.3%) among adults attending a primary care clinic is low in comparison to the average previously recorded rate (10%) in Jordan. Screening test is not necessary, but a hepatitis B vaccine program and health education should be considered.

Key words: Hepatitis B, Adults, Carrier, Primary care clinic

tests, hepatitis profile (hepatitis A antibodies, hepatitis C antibodies, anti-HBe and HBe Ag). In addition an abdominal ultrasound was performed on these patients. A screening test for HBs Ag was carried out for each member of families of carrier patients. Family members who were negative were advised to take the hepatitis B vaccine as recommended.

Results

Most patients came from families of low socioeconomic class with an income of less than 300 JD monthly (the classification of the socioeconomic status in Jordan depends on an arbitrary base in which low class is defined as a family income of less than 350 JD per month). A history of jaundice was found in 7 patients and one of them had positive HBs Ag. A history of jaundice was observed in 13 family members of the patients, two of them had neonatal jaundice and 11 had clinical hepatitis. None of the patients received blood and a history of injections, or drug abuse was not divulged. Five patients had a history of dental procedures but none of them was a carrier of HBV. Ten patients were found to be HBs Ag positive. Only one of them had a history of jaundice and none of them had history of blood transfusion, surgery or sexual contact or history of hepatitis B vaccination in the last 5 years. Three of them had mild elevation of liver enzymes as shown in Table 1 and the ten students had normal abdominal ultrasound and negative tests for other types of hepatitis.

Eight family members of those patients were HBs Ag positive, two of them were sons and six were wives.

Discussion

Previous studies in Jordan (9, 11) have shown that family size and particularly socioeconomic status

have an important influence on the adult HBV carrier rate, with the highest rate (11%) being reported in the lower socioeconomic category, and the lowest rate (4%) in the higher category.

Our results are consistent with those described in the literature. Most of our patients came from low class families and had large family members. The size of the patient's family adversely affected the carrier rate as reported by Toukan et al (11). The ten patients with positive tests had an average of 10 family members.

Prenatal transmission of HBV in the Middle East probably contributes only minimally to the HBV carrier population. In a combined study of four countries in the Middle East, only 21% of children born to HBs Ag positive mothers became infected. One factor accounting for this may be the low prevalence of hepatitis B e antigen (HBe Ag) positivity (13%) in HBs Ag positive mothers in the region (9).

Interfamilial non-sexual, non-parental contact has been emphasized as an important means of virus transmission (11) and is the major route of infection among children in the Middle East. In our study the pattern of transmission could not be determined.

All seropositives were asymptomatic and potentially ineffective. However the number is small and a routine screening of these patients for HBs Ag is not mandatory but a vaccine program for those who are susceptible to HBV is to be considered. A vaccination program of newborns was started in 1995 in Jordan.

To clarify the current evidence of this study further studies are needed on larger populations and over longer periods.

Conclusion

The seropositivity of HBV among adults attending primary care clinic is low (3.3%) as compared to the 4-11% carrier state previously recorded among the population in general in Jordan; screening test is not mandatory but vaccination programmes and health education are suggested.

References

- 1- Hollinger F B, "Comprehensive control (or elimination) of hepatitis B virus transmission in the United States "Gut 1996; 38 (supp 2):S24-S30
- 2- I D Gust, "Epidemiology of hepatitis B infection in the Western Pacific and South East Asia "Gut 1996; 36 (supp2):S18-S23
- 3- Shinoj P, Al-Kassab S, "Hepatitis B antigen in Iraq "Lancet 1973; ii: 1269
- 4- El-Guneid A M, Gunaid A A, O'Neil A M, Zuriekat N I, Coleman J C, Murray- Lyon IM, "Prevalence of hepatitis B, C and D virus markers in Yemeni patients with chronic liver diseases "J .Med Virol 1993 ;40:330-3
- 5- Al Kaderi S, Al-Nakib W , "Prevalence of HBs Ag and anti HBV in Kuwait "J Kuwait Med Assoc 1983 ;13:99-105
- 6- Nashef L, Thalgi A, "Hepatitis B serology among the Palestinian population "Ann Trop Paediatr 1992 ;12:321-5
- 7- Toukan A, and the Middle East Regional Study group, "Strategy for virus infection in the Middle East and Africa "Vaccine 1990; 8:S117-S121.
- 8- Al-Faleh F Z, "Hepatitis B infection in Saudi Arabia "Ann Saudi Med 1988; 8:474-80
- 9- Toukan A U, Sharaiha Gut 1996; 38Z K, Abu-El-Rub O a, et al "The epidemiology of hepatitis B virus among family members in the Middle East "Am .J Epidemiol 1990; 132:220-32

NO.	ALT (U/L)	AST (U/L)	ALP (U/L)	Total bilirubin (mg/dl)
1	46	38	101	1.0
2	51	48	99	0.8
3	63	55	250	2.3

Table 1: Liver function test

10- Al-Faleh F Z ,Ayoola E A ,Arif M , "Seroepidemiology of hepatitis B virus infection in Saudi Arabia children : a base line survey for mass vaccination against hepatitis B "J Infect 1992 ;24:197-206

11- Toukan A U, "Hepatitis B in the Middle East: aspects of epidemiology and liver disease after infection "Gut 1996; 38 (supp2):S2-S4.

CME Quiz

Ahmed, aged 3 months, presents with a 24 hour history of lethargy, general disinterest, anorexia, fever and cold skin.

On examination the child looks sick, inactive, with facial flushing and a fine macular rash on his trunk.

His vital signs are:

Respiratory rate 44/minute

Pulse 120/minute

BP 90/60

Temperature 39 C

There is no neck stiffness but the extremities feel cold



Ahmed is observed in the emergency department for 4 hours after which time he became very lethargic and developed the rash similar to that in the photograph.

His vital signs were recorded as follows:

Temperature 39.5 C

Respiratory rate 48

Pulse 130

BP 85/50

In reference to Ahmed's condition, which of the following statements do you consider to be correct/true?

- A. The rash is haemorrhagic (purpura).
- B. The probability diagnosis is staphylococcal septicaemia.
- C. Blood should be taken for culture.
- D. Intravenous benzylpenicillin should be administered.
- E. Intravenous benzylpenicillin should be administered.

Source: Child health. Professor John Murtasgh
Publishers: medi+WORLD International 2009

Answers are on page 47

Qualitative Research: Stigma Associated with Psychiatric Diseases

Manal Koura
 Latifa Al-Sowielem
 Badria al-Dabal
 Raja'a A. Shaheed
 Afaf Al-Halal
 Najwa Al-Mahfoodh
 Abrar Hashishi

Department of Family and Community Medicine
 College of Medicine, Dammam University, Saudi Arabia

Correspondence:

Manal Riad Koura
 Zamil compound, Unit B3-6
 PO Box 899
 Khobar 31952
 Saudi Arabia
 Cell phone number: 00966-50 194 6517
 Fax number: 00966-3- 864 5612
 Email: mkoura@ud.edu.sa

Introduction

Erving Goffman defined stigma as the process by which normal identity is spoiled by the reactions of others [1]. Stigmatization of individuals with mental illnesses is widespread and serves as a major barrier to treatment [2].

The public generally holds negative stereotypes toward individuals with psychological problems, leading to potential discrimination toward these individuals. The internalization of these negative beliefs results in self-stigma, leading to reduced self-esteem and motivation to seek help [3].

Research on psychological correlates of stigmatization of mental illness has shown that an important and surprising predictor of stigma is the greater belief in biological or genetic bases of mental illness [4]. Phelan theorized that genetic causes of mental illness are perceived as permanent, which raises discomfort because of the implication that complete recovery is impossible. Conversely then, optimism about the effectiveness of treatment might be expected to reduce stigma [5].

Stigma may be obvious and direct, such as someone making a negative remark about your mental health condition or your treatment. Or it can be subtle, such as someone assuming you could be violent or dangerous because you have a mental health condition. These and other forms of stigma can lead to feelings of anger, frustration, shame and low self-esteem, as well as discrimination at work, school and in other areas of life. For someone with a mental illness, the consequences of stigma can be devastating. Some of the harmful effects of stigma include: trying to pretend nothing is wrong, refusal to seek treatment, rejection by family and friends, work or school problems or discrimination, difficulty finding housing, being

Abstract

Background & objective: The aim of the present study was to identify the causes of stigma associated with psychiatric diseases and methods of its alleviation in Saudi Arabia.

Methods: Sixteen focus groups were conducted in half of the Primary Health Care (PHC) centers of Khobar. The average number of adult female PHC attendees participating in each session was six. Each session lasted between 45-60 minutes. Each session was conducted by 3 female researchers. The moderator followed a semi-structured questionnaire for asking about reasons of stigma associated with psychiatric diseases and how to overcome such a stigma. Ten sessions could be audio-recorded after taking the consent of participants. The rest were transcribed by the assistant moderator. Collected data was analyzed for repeated themes and some quotations were selected.

Results: Useful opinions were given, which might help in alleviation of stigma, like: Providing mental health services by PHC centers or general hospitals to avoid the embarrassment associated with visiting psychiatric hospitals. Since many people seek "Sheikhs" for mental problems, Muslim clergymen may participate in health education campaigns for alleviation of stigma. Providing mental health consultation by a psychologist at school and involving the children and their families in solving the problem might help in increasing acceptability of psychiatric services early in childhood. Providing a hot line for psychiatric consultation might reduce embarrassment.

Conclusion: Reducing the stigmatization of mental illness continues to be an important goal for mental health professionals in our community.

Key words: stigmatization, psychiatry

subjected to physical violence or harassment or inadequate health insurance coverage of mental illnesses [6].

The focus group method is a technique of group interview that generates data through the opinions expressed by participants. Focus groups have become an increasingly popular method of data collection in health care research.

Since stigma associated with psychiatric diseases is a social related problem, focus group technique is thought to be the best methodology to understand the attitudes of the Saudi community. Our aim was to identify the causes of stigma associated with psychiatric diseases and methods of its alleviation in Khobar, Saudi Arabia.

Methodology

A qualitative research was conducted in four out of eight PHC centers in Khobar. Health centers with the largest population were selected. Sixteen focus groups were conducted during November 2010. Adult female consumers, attending the health centers for any reason were invited to participate in the study. The average number participating in each session was six. Each session lasted between 45-60 minutes. Each session was conducted by three female researchers.

The moderator ran the session following a semi-structured questionnaire. She asked about the participant's opinion about the magnitude of mental health problems in Saudi society, type of care the community seeks in case of mental health problems, the attitude towards seeking a psychiatric consultation, reasons of stigma associated with psychiatric diseases and how to overcome such stigma. She ensured that everyone had a chance to say what they wished to and that the group was not dominated by one individual. She also kept neutral during the whole session.

One assistant moderator audio-recorded or transcribed the session.

The other assistant moderator was responsible for observing and reporting the non-verbal responses. Ten sessions could be audio-recorded after taking the consent of participants and assuring them about the confidentiality of the gathered information, while transcripts were made for the rest. At the end of each session summary comments were verified with the participants to check if they really represented their opinions. Sessions were conducted until no new data emerged.

Collected data was analyzed for repeated themes and some quotations were selected.

Results and Discussion

It should be noted that this research is qualitative in nature. Its purpose is not to find how many people are engaged in a certain behavior or hold a certain opinion, but to identify the kinds of behavior and opinion that exist, and the possible reasons for this behavior.

Type of care the community seeks in case of mental health problems:

- It was frequently mentioned that some patients seek help of their family or friends first and then may consult the psychiatrist, as many girls would turn to their mothers in solving their problems.
- On the other hand, it was also reported that many patients go to "sheikhs" (religious people) for treatment by Qur'an. However, others think that most patients even refuse to go to the sheikh.
 - o It was stated that: "*People who have severe psychiatric problems may even attempt suicide to be relieved before seeking psychiatric care*".
- A minority of people seek medical advice from a psychiatrist when they have mental health problems. However, they prefer to keep it secret or consult psychiatrists away from their community.
- Some participants stated that acceptance of psychiatric counseling differs by age (young generations would accept it more than the older generations) and gender (females would accept it more than males).

The study conducted by Mann and Himelein about factors associated with stigmatization of persons with mental illness, reported similar findings as stigmatization among females was significantly less than among males [2].

Although the word "stigma" indicates something negative or shameful, stigma may also be useful. As David Shaffer has pointed out, "we need to destigmatize mental illness and its treatment ... but we do not want to destigmatize suicide and suicide attempts." The harmful effects resulting from destigmatization of suicidal behavior is that it may normalize it and make it appear more reasonable [7,8]. The only study conducted in Saudi Arabia for investigating the parasuicide phenomena reported a parasuicide rate of 20.7 per 100,000 in an Arab industrial community in the Eastern Province [9]. It is substantially lower than the reported rates in the West, which range between 3-5% [10]. The results of the study confirm that the act is predominantly the activity of young females, and disordered interpersonal relationships with spouses and parents stand out as precipitating factors. Acute reaction to stress was the commonest diagnosis followed by depression [9]. Accordingly, we believe that Islamic rules prohibiting suicidal behavior play an important positive role in stigmatization of suicidal attempts.

The systematic review conducted by Gulliver et al. in 2010 for perceived barriers and facilitators to mental health help-seeking revealed that only 35% of those surveyed with a common mental disorder sought help during the previous year. Analysis of qualitative studies revealed that the most frequently mentioned barrier was stigma, which was reported in over three-quarters of the studies. In addition, almost half of the studies cited issues related to confidentiality and trust. Over one-third of studies referred to concern about the characteristics of the provider and reliance on self as perceived barriers to help-seeking. Friends and family were often the preferred sources of help over health professionals.

The reported findings were similar to our findings [11].

Reasons for stigma associated with psychiatric diseases in the Saudi community:

- Traditions, cultural norms and the way people were raised were frequently mentioned as a main reason:
 - o One of the participants stated *“this is something we grow with, as part of our culture, because in the past psychiatric hospitals were treating crazy people only”*.
 - ...o Another one said *“if anyone goes to these hospitals people will directly consider him crazy”*.
- About half of the participants mentioned that people fear the reactions of psychiatric patients; they expect anger and violence.
- Many participants reported that people think psychiatric diseases can't be cured.
- Many stated that psychiatric diseases are hereditary.
 - ...o *“Families hide their psychiatric patient. If the society would know about the mentally ill family member, girls of the family wouldn't marry”*.
- Lack of community awareness was frequently mentioned:
 - o One of the participants mentioned: *“People are not aware that their soul can get sick as well as their body”*.
 - o Another participant stated: *“The community doesn't exactly understand the role of psychiatrist.”*
- Some participants mentioned the fear of side effects of psychiatric medications.
- Less frequently mentioned was the belief that the doctor is a stranger and not trustworthy.
- The psychiatric medical record might be used against the patient in case of legal conflicts.
 - o It was mentioned that: *“In case of marital conflicts the wife may use the psychiatric medical certificate for getting divorce.”*
 - o *“It can be an excuse for multi-marriage in case of female patients.”*

According to WHO, 64% of countries do not have any mental health legislation or have legislation that is more than 10 years old. Therefore, countries should adopt appropriate mental health policies, laws and services that promote the rights of people with mental disabilities and empower them to make choices about their lives, provide them with legal protections, and ensure their full integration and participation into the community. In Saudi Arabia, a mental health act is awaiting approval. The General Directorate for Mental Health has developed a manual of procedures and regulations for mental health institutions in the country until the mental health act is approved. Details about the year of enactment of the mental health legislation are not available [12].

The systematic review conducted by Gulliver et al. [11] revealed that top rated barriers from quantitative studies were; believing that no one could help [13], not liking to disclose personal matters to a stranger [14], and not feeling comfortable talking to a general practitioner whom the person did not know [15], which are similar to our findings.

Suggestions for alleviating the stigma:

- It was frequently reported that providing mental health services by primary health care centers or general hospitals may encourage people to seek psychiatric care.
 - o One of the participants even stated: *“Change the name of psychiatrist, give it a new name more acceptable to the community.”*

It is worth mentioning that the Ministry of Health, according to recommendations of WHO, started implementing a mental health program through primary health care in the Eastern Province. Primary care physicians provide basic mental health services and selected primary care physicians, who have received additional training, serve as referral sources for complex cases. One of the eight health centers in Khobar is considered a referral center [16].

It was frequently suggested to raise public awareness:

- o About the importance of early detection and management of psychiatric diseases for better outcome.
- o And to emphasize that mental health disorders have a biological aspect and can be treated like any other health condition.
- Providing a psychologist instead of social worker at school, would help in introducing the habit of seeking psychological care since childhood. It will also increase the acceptance of children and parents to mental health problems.
- Involving the family and friends of the psychiatric patients in the treatment process would increase community acceptance.
- Providing a hot line for psychiatric consultation would be highly effective since the identity of the patient will be totally unknown.

Conclusion and Recommendations

Our findings suggest that reducing the stigmatization of mental illness continues to be an important goal for mental health professionals in our community.

Many useful opinions were given during the focus group sessions, which might help in alleviating the stigma, like:

- 1- Providing mental health services by primary health care centers or general hospitals to avoid the embarrassment associated with visiting psychiatric hospitals.
- 2- Raising public awareness about mental health problems and their treatability.
- 3- Since many people seek “Sheikhs” for mental problems. Muslim clergymen may participate in health education campaigns for alleviation of stigma.
- 4- Providing mental health consultation by a psychologist at school and involving children and their families in solving the problem helps in increasing acceptability of psychiatric services early in childhood.
- 5- Providing a hot line for psychiatric consultation service.

- 6- Future research should assess stigma associated with a wider variety of predictors and disorders. The more precise researchers can be, about variables associated with stigma, the more effectively we can pursue our ultimate goal: the elimination of prejudice toward individuals with mental illnesses.
- 7- Mental health legislation should be encouraged.

References

- 1- Goffman E. *Stigma: Notes on the Management of Spoiled Identity*. London: Penguin Books Publishing; 1990.
- 2- Mann CE, Himelein MJ. Factors Associated With Stigmatization of Persons With Mental Illness. *Psychiatric Services* 2004; 55(2): 185-7.
- 3- Greene-Shortridge TM, Britt TW, Castro CA. The stigma of mental health problems in the military. *Military Medicine* 2007; 172(2): 157-61.
- 4- Read J, Harre N. The role of biological and genetic causal beliefs in the stigmatisation of "mental patients". *Journal of Mental Health* 2001; 10: 223-35.
- 5- Phelan JC. Genetic bases of mental illness: a cure for stigma? *Trends in Neuroscience* 2002; 25:430-1.
- 6- Mental Health America. *Stigma: Building awareness and understanding*. Available from: <http://www.nmha.org/go/action/stigma-watch> [Accessed 29th Dec 2010].
- 7- Gould MS, Shaffer D. The impact of suicide in TV movies: evidence of imitation. *New England J Medicine* 1986; 315: 690-4.
- 8- Gould MS, Shaffer D, Kleinmann M. The impact of suicide in televised movies: replication and commentary. *Suicide Life Threat Behav* 1988; 18: 90-9.
- 9- Daradkeh TK, Al-Zayer N. Parasuicide in an Arab industrial community: the Arabian-American Oil Company experience, Saudi Arabia. *Acta Psychiatr Scand* 1988; 77(6): 707-11.
- 10- Weissman MM, Bland RC, Canino GJ, Greenwald S, Hwu HG, Joyce PR, et al. Prevalence of suicide ideation and suicide attempts in nine countries. *Psychol Med* 1999; 29(1): 9-17.
- 11- Gulliver A, Griffiths KM, Christensen H. Perceived barriers and facilitators to mental health help-seeking in young people: a systematic review. *BMC Psychiatry* 2010, 10: 113.
- 12- WHO. *Mental Health Atlas*. Geneva: WHO, 2005.
- 13- Dubow E, Lovko K Jr, Kaush D. Demographic differences in adolescents' health concerns and perceptions of helping agents. *Journal of Clinical Child & Adolescent Psychology* 1990; 19(1): 44-54.
- 14- West J, Kayser L, Overton P, Saltmarsh R. Student perceptions that inhibit the initiation of counseling. *School Counselor* 1991; 39: 77-83.
- 15- Wilson C, Deane F, Marshall K, Dalley A. Reducing adolescents' perceived barriers to treatment and increasing help-seeking intentions: effects of classroom presentations by general practitioners. *Journal of Youth and Adolescence* 2008; 37(10): 1257-69.
- 16- WHO, Wonca. *Integrating mental health into primary care. A global perspective*. Geneva: WHO and Singapore: Wonca, 2008: 135-42.
- (References continued from page 52)
- 13) Molassiotis AA. Conceptual model of adaptation to illness and quality of life for cancer patients treated with bone marrow transplants. *J Adv Nurse* 1997; 26(3):572-9.
- 14) Meszaros A, Orosz M, Magyar P, Mesko A, Vincze Z. Evaluation of asthma knowledge and quality of life in Hungarian asthmatics. *Allergy* 2003; 58(7): 624-8.
- 15) Moudgila H, Marshallb T, Honeybourne D. Asthma education and quality of life in the community: a randomised controlled study to evaluate the impact on white European and Indian subcontinent ethnic groups from socioeconomically deprived areas in Birmingham, UK. *Thorax*. 2000; 55:177-183
- 16) Krishna S, Francisco BD, Balas BA, König P, Graff GR, and Madsen RW. Internet-Enabled Interactive Multimedia Asthma Education Program: A Randomized Trial. *Pediatrics* 2003; 111 (3): 503-510.

Answers to CME Quiz page 43:
(A True B False, C True, D True
E True)

Effect of computer learning on quality of life of Iranian asthmatic patients

Mitra Zolfaghari (1)
 Leila Dehghankar (2)
 Younes Mohamadi (2)
 Arezoo Mohamadkhani Ghiasvand (2)
 Sana Eybpoosh (3)

(1) Center for Nursing Care Research, Tehran University of Medical Sciences, Tehran, Iran.

(2) Faculty of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran.

(3) Research Center for Modeling in Health, Kerman University of Medical Sciences, Kerman, Iran.

Correspondence:

Sana Eybpoosh,
 Research Center for Modeling In Health, Department Of Epidemiology And Biostatistics,
 Kerman University of Medical Sciences, Haft Bagh Avenue,
 Kerman, Iran

Phone: +989126587896; Fax: 0098-341-2263725

Email: sana_eybpoosh@yahoo.com

Introduction

Asthma is the most common chronic respiratory disease and a major health problem in most regions of the world (1, 2) with a prevalence of 40% in some areas. The prevalence of asthma in Iran is 7.5% but this estimate is higher in urban areas especially metropolitan areas (3). Asthma symptoms can disturb a patients' physical activity, quality of sleep, emotional functioning, and family life (4). These issues affect patients' Quality Of Life (QOL). Asthma cannot be cured when it occurs(5), moreover it is a chronic condition; therefore, promoting QOL is of importance to asthma patients.

As noted above, symptoms and signs are mainly responsible for destroying a patients' quality of life; therefore, proper management of these problems could be considered as a solution in this regard (6). Several studies on asthma patients have reported the effect of educational intervention on symptom alleviation, anxiety control (7), QOL promotion (7, 8), and self care (9). Gaining the ability of participating in daily physical activity and reducing the number of medical encounters and hospitalization (10) are among other beneficial effects of educational interventions on asthma patients. However, little is known about the effectiveness of computer learning programs on QOL especially in asthma patients. Therefore, the aim of present study was to evaluate the effect of an educational program based on computer learning methods on QOL of asthma patients.

Materials and Methods

A quasi-experimental study was conducted. A convenience sampling method was implemented to recruit 60 asthma patients from people who were referred to the lung clinics of Tehran University of Medical Sciences' hospitals (Tehran, Iran,

Abstract

Background: Asthma is a chronic condition which affects quality of life and is a major health problem in most regions of the world. Therefore, we assessed the impact of a computer learning program on asthmatic patients' quality of life.

Methods: A quasi-experimental study was implemented. Patients with asthma were randomly assigned to intervention and control groups. The intervention of this study was a computer learning program aiming to improve asthma patients' quality of life and was delivered to the intervention group. The control group received no training. Patients' quality of life in physical, psychological, economic, and general health dimensions was assessed using

the standard SF-36 questionnaire before, and three months after, intervention.

Results: Sixty patients were recruited to the study (intervention: n=30; control: n=30). In the intervention group, quality of life was significantly improved in physical (P=0.003), psychological (P=0.033), and general health (P=0.000) dimensions while comparing post-test to pre-test results; but there was no improvements in the economic aspect (P=0.202). In the control group, no significant difference was revealed between pretest and post test results.

Conclusions: Computer learning approach can be a useful method in promoting quality of life in patients suffering from asthma.

Keywords: Computer learning, Asthma, Quality of Life

May-December 2010). Participants were then randomly assigned to intervention (n=30) and control (n=30) groups. All participants should be asthmatic patients based on the physician's diagnosis, while no other concomitant chronic disease such as cancer, diabetes, and psychological disorders should be present; subjects were also to be in an age range of 18 to 65 years, be able to speak in Persian language, have basic reading/writing skills, and be able to work with the computer. Participants were excluded from the study if they experienced severe asthma attacks or other disorders which noticeably affected QOL; they were also excluded if they did not use the educational Compact Disc (CD) or the researcher could not contact them during follow-up time.

The intervention method was a CD which was delivered to the intervention group; the control group did not receive any education. Each patient in the intervention group received instructions on the application of the CD. The researchers prepared the CD and obtained its publication license from the Ministry of Culture and Islamic Guidance. Developing the CD, researchers first established the learning goal and identified the target population (asthma patients). The main educational goal was "to promote asthma patients' knowledge about asthma and its management". Achieving this goal, the educational content of the CD was developed in eight sub-titles, including:

- 1) definition and classification of asthma,
- 2) Prevalence of asthma,
- 3) Risk factors of the disease,
- 4) Signs and symptoms,
- 5) Exacerbating factors,
- 6) Medication in asthma and how to use supplement instruments of medication,
- 7) ways to prevent and manage the exacerbating factors, and
- 8) how to prevent, control, manage and treat asthma.

The CD was designed in the form of multimedia software, in which patients could choose the written

or the audiovisual format of the information. Furthermore, patients could double click on each sub-title to review it. Patients were followed for 12 weeks. The researcher arranged 3-4 phone calls during follow-up time to assure that all patients had used the CD and to answer patients' queries. Data was collected before and 12 weeks after intervention in both groups.

The questionnaire of the present study consisted of three parts: 1) baseline characteristics, including age, sex, marital status, educational level, employment, dependency for care at home, and tobacco/ alcohol use; 2) disease related information, including duration of the disease, number of medical encounters and hospitalization, severity of the disease, types of medication, symptoms of asthma (e.g. cough, wheezing, sweating, etc.), sexual problems, and digestive complications; and 3) QOL questionnaire, including four dimensions: physical (13 questions), psychosocial (14 questions), socio-economic (8 questions), and general health (four questions). One open-ended question was included at the end of the questionnaire assessing patients' satisfaction of and opinion about the educational CD.

Designing the QOL questionnaire, SF-36 and Asthma Quality Of Life Questionnaires (AQLQ) were used. Minor revisions in the content and face validity of the questionnaire were made by implementing the results of the consensus of 10 experts' opinions. Assessing the reliability of the QOL questionnaire, Cronbach's alpha coefficient was used which was 62% in the physical dimension, 84% in the psychosocial dimension, and 79% and 68% in socio-economic and general health dimensions respectively.

Comparing both groups regarding demographic and health related statistics, Pearson chi-square and Fisher's exact tests were used. Comparing both groups in terms of QOL, independent t-test was used. Paired t-test was implemented for the comparison of QOL before and

after intervention in each group. Spearman's correlation coefficient was used to assess the correlation between ordinal variables. Ethics committee of TUMS approved the research protocol. The aim of the study was demonstrated and written informed consent was obtained from all study participants. They were assured about the confidentiality of their information and free participation in the study. After finishing the post-test phase, the educational CD was delivered to the control group as well.

Results

At baseline, both groups were homogenous regarding baseline characteristics, health related information, QOL (Table 1 - next page).

Comparing pre-test/post-test results, no significant difference was shown in the QOL of the control group. In the intervention group, however, QOL was significantly improved in physical, psychological, and general health dimensions but was not improved in the economic aspect (Table 2 - page 51).

In intervention vs. control group, there was a significant increase in mean scores of physical ($P=0.002$), psychological ($P=0.001$), and general health ($P=0.000$) dimensions in the post-test phase. However, the socio-economic dimension did not improve significantly in this phase ($P=0.061$) (Table 3 - page 51).

Twenty one (70%) participants were completely and nine patients (30%) were moderately satisfied with the educational method in this study.

Discussion

Educating patients has been identified as a cornerstone in management of asthma; however, there are still ambiguities about the benefits of different teaching techniques (11). The results showed that computer learning improved the quality of life of asthmatic patients in physical, psychosocial, and general health dimensions. Improvement in the physical dimension might be the result of improvement in the

Variable	Control n (%) (n= 30)	Intervention n (%) (n= 30)	P value
Age			
18-25	6 (20)	4 (13.3)	0.32*
26-45	13 (44)	16 (53.3)	
46-65	11 (36)	10 (33.3)	
Sex			
Male	14 (46.7)	12 (42.4)	0.071*
Female	16 (53.3)	18 (57.6)	
Marriage status			
Single	4 (13.3)	8 (26.7)	0.110**
Married	24 (80)	21 (70)	
Widow/Widower	2 (6.7)	1 (3.3)	
Employment			
Unemployed	2 (6.7)	1 (3.3)	0.063**
Homemaker	16 (53.3)	15 (50)	
Worker	3 (10)	6 (20)	
Employee	3 (10)	3 (10)	
Free job	4 (13.3)	1 (3.3)	
Other	2 (6.7)	4 (13.3)	
Educational level			
Elementary	9 (30)	6 (20)	0.052*
Some schools	4 (13.3)	9 (30)	
Diploma	13 (40)	5 (16.7)	
Academic	5 (16.7)	10 (33.3)	
Duration of the disease			
< 1 year	10 (33.3)	9 (30)	0.071*
2 to 5 years	13 (43.3)	10 (33)	
6 to 10 years	4 (13.3)	7 (23.3)	

* Pearson chi square, ** Fisher Exact Test

Table 1: Frequency distribution of the baseline and health related characteristics of study participants

(Continued top of next page)

> 10 years	3 (10)	4 (13.3)	
Disease severity			
< 2 days/week	16 (53.3)	14 (46.7)	0.091 [†]
> 2 days/week	7 (23.3)	5 (16.7)	
Daily	2 (6.7)	5 (16.7)	
Continuous	5 (16.7)	6 (20)	

(Left: Table 1 continued)

QOL dimensions	Control group			Intervention group		
	Pre-test	Post-test	P value ^o	Pre-test	Post-test	P value ^o
	Mean (SD)	Mean (SD)		Mean (SD)	Mean (SD)	
Physical	40.7 (6.9)	42.1 (7.6)	0.249	41.7 (6.8)	45.9 (8.7)	0.003
Psychological	43.2 (11.4)	43.0 (8.8)	0.424	44.4 (7.2)	48.1 (7.9)	0.033
Socio-economic	25.7 (6.7)	25.6 (6.4)	0.154	26.9 (5.9)	28.2 (4.8)	0.202
General health	11.7 (3.2)	12.7 (2.8)	0.900	12.2 (2.8)	16.5 (2.5)	0.000
Total	123.5 (19.5)	122.6 (23.5)	0.628	126.8 (25.3)	138.9 (16.0)	0.007

^oPaired t-test

Table 2. Comparison of the QOL between pre-test and post-test phases in control and intervention groups

QOL dimensions	Intervention group	Control group	P value ^o
	Mean (SD)	Mean (SD)	
Physical	45.9 (8.8)	42.1 (7.6)	0.002
Psychological	48.1 (7.9)	43.0 (8.8)	0.001
General health	16.5 (2.5)	12.7 (2.8)	0.000
Socio-economic	28.2 (4.8)	25.6 (6.4)	0.061

^oIndependent t-test

Table 3. Comparison of the QOL in post-test phases between control and intervention groups

the patients' perception of their ability to perform daily living activities. This is one of the perceptions which we tried to induct to the learners in our educational intervention. Bakhshandeh et al. (2004) concluded that breathing training facilitates daily living activities of asthmatic patients by enhancing their physical capacity which itself promotes their QOL (12).

Results also showed that our intervention improved the psychological dimension of QOL. Since participants obtained knowledge about the disease's nature and management, their self-esteem and sense of independency might be enhanced which itself can help them to "feel better". Molassiotis (1997) noted that feeling of self-control, self-assurance, and having a positive attitude toward the disease are important elements that affect patients' quality of life (13).

Results showed significant improvement in the general health dimension of patients in intervention group. Mezarous (2003) stated that educating patients with asthma helps a 40% improvement in scores of QOL in all dimensions (14). Moudgila et al (2000) reported the effect of education on improving all dimensions of QOL (15). In the research by Krishna et al. (2003), some information was delivered to the control group while in the intervention group, information was delivered through a multimedia animation CD as well as face to face education. The results indicated that the method of education applied for the intervention group led to an increase in knowledge about asthma and reduction of the number of emergency visits by physicians (16).

There was no significant correlation between QOL and demographic characteristics. Similarly, Naeemi et al (2007) found no significant correlation between demographic variables and QOL and anxiety (7). Only a significant direct association was found between educational level and QOL in which the increase in educational level led to an increase in QOL. Therefore, promoting educational levels, knowledge and

information might help improve the QOL in these patients.

Conclusion

Findings showed that the quality of life in asthmatic patients receiving computer learning can promote their quality of life in physical, psychological and general health domains but has no effect on the socio-economic aspect. Therefore, the research hypothesis "computer learning improves the quality of life of asthmatic patients" is accepted. These findings emphasize the necessity of effective education in managing asthma and improving quality of life in asthma patients. Further investigations are recommended for assessing the effect of computer learning on other aspects of asthma patients and on other chronic diseases.

ACKNOWLEDGMENTS

The present study was approved and financially granted by the Student Research Center of Tehran University of Medical Sciences in (grant number: 132/754) 31 Oct 2009. We thank hereby all participants who cooperated with us in this study.

References

- 1) Pedram Razi SH, Bassampour SH, Kazemnejad A. Quality of Life in Asthmatic Patients. *Hayat* 2007; 13(1): 29-34 (Persian)
- 2) Heidarnia M A, Entezari A, Mehrabi Y, Pourpak Z, Moein M. Prevalence of asthma symptom in Iran: a meta-analysis. *Medical journal of Shahid Beheshti university of medical sciences* 2007; 31)3(: 217-225(Persian)
- 3) Fazlolahi M. National Asthma Guideline Prevention? Diagnosis and Management Protocol . Ministry of Health and Medical Education Undersecretary for Health Center for Noncommunicable Disease Control National Committee on Asthma & Allergy Tehran. 2009; 2 - 4 (Persian)
- 4) Lemanske RF, Nayak A, McAlary M, Everhard F, Fowler-Taylor A, and Gupta N. Omalizumab Improves Asthma-Related Quality of Life in Children with Allergic Asthma. *Pediatrics*. [Internet]. (2002) [cited January 8, 2011]; 110 (5). Available from: <http://www.pediatrics.org/cgi/content/full/110/5/e55>
- 5) Clark NM, and Partridge MR. Strengthening Asthma Education to Enhance Disease Control. *CHEST* 2002; 121 (5): 1661-69.
- 6) Juniper EF, Wisniewski ME, Cox FM, Emmett AH, Nielsen KE, O'Byrne PM. Relationship between quality of life and clinical status in asthma: a factor analysis. *European Respiration Journal* 2004; 23: 287-291.
- 7) Naeemi-Hosseini F, Majidi F, Ghayyumi MAA. Comparative study of two educational methods on anxiety and quality of life in asthma patients in Shiraz. *Southern Iran. Iranian Red Crescent medical journal* 2007; 9(3):150-153
- 8) Graff and Richard W, Madsen Santosh K, Benjamin D, Francisco E, Andrew B, Peter K, et al. Internet-Enabled Interactive Multimedia Asthma Education Program: A Randomized Trial. *Pediatrics* 2003;111; 503-510.
- 9) Perneger TV, Sudre P, Muntner P, Uldry C, Courteuse C, Naef A, and et al. Effect of Patient Education on Self-Management Skills and Health Status in Patients with Asthma: A Randomized Trial. *The American Journal of Medicine* 2002; 113: 7-14.
- 10) Gibson PG, Powell H, Coughlan J, Wilson AJ, Abramson M, Haywood P, Bauman A, Hensley MJ, Walters EH. Self-management education and regular practitioner review for adults with asthma (Cochrane Review). In the Cochrane Library. Issue 2, 2003. Oxford Update Software. Available from: <http://www.update-software.com/abstracts/ab001117.htm>
- 11) Ignacio-Garc?´a J-M, Pinto-Tenorio M, Chocro´n-Giraldez MJ, Cabello-Rueda F, Gil AIL, Ignacio-Garc?´a J-M, de Ramo´n-Garrido E. Benefits at 3 yrs of an asthma education programme coupled with regular reinforcement. *European Respiration Journal* 2002; 20: 1095-1101.
- 12) Bakhshandeh SH, Yarndy A, Ahmadi Z. The assessment of respiration exercising education on quality of life in asthmatic patients. *Journal of Iranian Nursing* 2004; 17(38):16-24. (Persian)

(References continued page 47)