

Awareness of Diabetic Complications, Perceived knowledge, Compliance to Medications and Control of Diabetes Among Diabetic Population of Makkah City, Kingdome Saudi Arabia: Cross-Sectional Study

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ABSTRACT

Background: According to World Health Organization (WHO) in 2012, an estimated 1.5 million deaths were a direct outcome to diabetes and another 2.2 million deaths were attributively related to high blood glucose in a global population. As a consequence, researches confirmed that diabetics have a shorter life expectancy than non-diabetic individuals and this extravagant mortality is predominantly due to diabetic complications.

Methods: We have conducted a descriptive cross-sectional study on Makkah Region population, Saudi Arabia. All Saudi patients diagnosed with DM, regardless the type, and living in Makkah regions were included in this study. The total sample obtained was 299 patients. A self-administered questionnaire, about knowledge of diabetes mellitus complications, was filled by participants.

Results: Participants were classified into five categories according to age. Male and female groups percent was (39.1%) and (60.9%) respectively. Nearly two thirds of participants have the disease for more than five years (63.2%), and nearly two thirds were compliant to their medications (62.5%). Three quarters of participants (76.9%) had positive family history of diabetes mellitus. (26.1%) of participants had only one family member with diabetes mellitus, (16.7%) had two members, and (14.7%) had five members or more with diabetes mellitus. **Conclusion:** To develop effective patient education and improve patients' diabetic control and own complications, educational strategies are needed so as they may help diabetic patients to improve self-knowledge and recognition of early signs and symptoms of DM complications, and this will prevent further deterioration, which will improve life quality and increase life expectancy for those patients.

Keywords: diabetes mellitus, awareness, complications

INTRODUCTION

Diabetes mellitus (DM) is considered to be one of the main 4 groups of Non-communicable diseases (NCDs) which are the biggest cause of death worldwide. More than 36 million die annually from NCDs (63% of global deaths) where diabetes account for 1.5 million NCDs deaths annually. While its complications can lead to cardiovascular disease, cerebrovascular disease, retinal disease, renal disease and lower limb amputation. Limited data is available regarding the awareness and knowledge about these complications in our population^[1]. According to International Diabetes Federation (IDF), Saudi Arabia had 3.4 million cases of diabetes in 2015 (Prevalence of diabetes in adults aged 20-79 years is 17.6%). It is estimated that 415 million people have diabetes in the world while more than 35.4 million people (9.1% of adults aged 20-79), are in the Middle East and North Africa (MENA) Region. It is anticipated by the year 2040 this will rise to 72.1 million. Over 40.6% of these are undiagnosed. Health expenditure on diabetes in the region accounts for just 2.5% of global spending on the disease. This is expected to almost double by 2040 but will likely not be enough to adequately treat all people with the disease. Regarding mortality, diabetes was responsible for 342,000 deaths (51.3%) in 2015 which occurred in people under the age of

60, taking into account early deaths. In 2015, Saudi Arabia had 23,420 deaths in adults due to diabetes^[2]. According to World Health Organization (WHO) in 2012, an estimated 1.5 million deaths were a direct outcome of diabetes and another 2.2 million deaths were attributively related to high blood glucose in global population^[3]. As a consequence, researches confirmed that diabetics have a shorter life expectancy than non-diabetic individuals and this extravagant mortality is predominantly due to cardiovascular cause which considered one of the interminable diabetic complications^[4]. Another study confirmed the virtually higher risk of death, minimal survival, and lower life expectancy of diabetic adults in comparison to non-diabetic adults^[5]. DM is considered a lifelong problem; but with the proper management; the quality of patient's life can be improved noticeably. Thus individual training is an integral part of self-management of diabetes. In conclusion optimum management requires patient participation and cooperation to be aware of the nature of the disease and therefore decide the consequence of the disease, dimensions of treatment and its complications^[6, 7]. This study was performed to evaluate awareness and recognition of the signs and symptoms regarding diabetic complications among Makkah population, and to calculate the frequency of diabetic complications occurrence.

METHODS

We have conducted a descriptive cross-sectional study on Makkah Region population, Saudi Arabia. The study was conducted during the period from 2015-2016. All Saudi patients diagnosed with DM regardless the type and living in Makkah regions were included in this study. The participants were selected by random sampling. Sampling was stratified for the different geographical areas of the Region. The total sample obtained was 299 patients. A self-administered questionnaire, about knowledge of diabetes mellitus complications, was filled by participants. A letter that explains the objectives of the study and asks for participants consent was sent with the questionnaire. The questionnaire required information about diabetes mellitus, compliance to treatment, knowledge about complications of diabetes mellitus, and symptoms and signs of diabetes mellitus complications.

The questionnaire responses were analyzed using the Statistical Package for the Social Science (SPSS Inc. Chicago, IL, USA) version 23. Categorical variables were described by frequencies and percentages. Descriptive analysis involving Chi-square test was used to test significance of association between categorical variables. The level of significance was set at $P < 0.05$. The research was approved by the local Research Committee of the Faculty of Medicine, Umm Al-Qura University.

RESULTS

Table 1 shows general characteristics of the participants. Participants were classified to five categories according to age: from 15 to 20 years old, from 21 to 30 years old, 31 to 40 years old, 41 to 50 years old, and above 50 years old. Male and female groups contributed to (39.1%) and (60.9%) respectively. The majority of participants were university graduates (39.8%), about (26.8%) were secondary education, and (33.4%) were below secondary education. The majority of participants reside in northern and eastern of Makkah city, and they contributed to (30.1%) and (26.1%), respectively. Occupation of participants were as follow: majority were housewives (37.1%), governmental work (25.4%), student (11.3%), and retired (6.4%).

Table 2 shows characteristics of participants. Nearly two thirds of participants had the disease for more than five years (63.2%), and (16.4%) had it for less than one year. The duration of DM of remaining participants ranged from two to four years. Regarding the compliance to medications, nearly two thirds were compliant to their medications (62.5%), (25.1%) reported themselves as somewhat compliant to their medications, and (12.4%) were incompliant to their medications. Almost three quarters of

participants (76.9%) have positive family history of diabetes mellitus. Regarding the number of family members with diabetes mellitus, (26.1%) had only one member with diabetes mellitus, (16.7%) had two members, (14.7%) had five members or more with diabetes mellitus.

Table 3 shows perceived knowledge and source of information about long term DM complications. The majority of participants knew little about the specialized organizations of diabetes mellitus (60.3%), about one quarter of participants did not know about the specialized organizations of diabetes mellitus (25.7%), and only (14%) knew enough about them. About two thirds of participants assessed the knowledge and awareness of diabetes mellitus in Saudi Arabia as good, a quarter of them assessed it as poor (26.4%), and only (7.3%) though it was excellent. Participants were asked if they ever heard about long term complications of diabetes mellitus if blood sugar was uncontrolled. Nearly (80%) heard about it, and they mentioned from who they heard about it as follows: Diabetologists (23.7%), relatives (20%), social media (18.7%), and from other doctors (10.7%).

Table 4 shows Common complications of DM as recognized by participants. The mostly recognized complications of diabetes mellitus were as follow in order: eye disease (72.9%), diabetic foot 71.2%), renal disease (56.2%), peripheral neuropathy (53.8%), sexual impairment (42.5%), heart disease (40.1%), high blood pressure(33.1%), sudden death (20.4%), and cerebrovascular disease (18.7%). Table 5 shows common symptoms reported by participants, which may indicate the presence of DM complications. The mostly recognized symptom was much and frequent urination (61.2%), visual impairment (54.8%), peripheral limbs numbness and tingling (53.5%), lower limb swelling (31.1%), and obesity (28.8%).

Table 6 shows significant relation between diseases, other than DM, existing with participants and if they have been diagnosed as a complications of DM. The most prevalent existing disease among participants were eye and retinal diseases (57.9% of total sample), and they were the most common diagnosed complication of diabetes mellitus (59% of who have the disease)($P < 0.01$). Decrease or absence of sensation in peripheral limbs was present in (36.5% of participants), and it was diagnosed as a complication of diabetes mellitus in 59% among them($P < 0.01$). Renal diseases present in (12.7%) of participants, and only a third of them were diagnosed with it as a complication of diabetes mellitus (34.2%)($P > 0.05$). Participants who ever had heart attacks were (9.4%), and half of them considered these attacks as a complication of diabetes mellitus (50%)($P > 0.05$).

Table 1: General characteristics (n=299)

Character		
Age	From 15 to 20 (n(%))	029 (9.7%)
	From 21 to 30 (n(%))	034 (11.4%)
	From 31to 40 (n(%))	035 (11.7%)
	From 41 to 50 (n(%))	071 (23.7%)
	More than 50 (n(%))	130 (43.5%)
Gender	Male (n (%))	117 (39.1%)
	Female (n (%))	182 (60.9%)
Education	Not educated (n (%))	038 (12.7%)
	Basic education (n (%)) (Primary/intermediate)	062 (20.7%)
	Secondary (n (%))	080 (26.8%)
	Graduate (n (%))	119 (39.8%)
Resident (Makkah)	Southern Makkah (n (%))	078(26.1%)
	Eastern Makkah (n (%))	012(4%)
	Northern Makkah (n (%))	090(30.1%)
	Western Makkah (n (%))	043(14.4%)
	Central of Makkah (n (%))	017(5.7%)
	Jeddah (n (%))	019(6.4%)
	Taif (n (%))	006(2%)
	Others (n (%))	034(11.4%)
Work	Governmental work (n (%))	076(25.4%)
	Housewife (n (%))	111(37.1%)
	Private work (n (%))	021(7%)
	Free work (n (%))	019(6.4%)
	Student (n (%))	034(11.3%)
	Retired (n (%))	019(6.4%)
	Others (n (%))	019(6.4%)

Table-2: Diabetes Mellitus characteristics

Character		%
Duration of Diabetes Mellitus.	1 Year	16.4%
	2 Years	7.7%
	3 Years	6%
	4 Years	6.7%
	5 Years or more	63.2%
Compliance to DM medications	Yes	62.5%
	No	12.4%
	Somewhat compliant	25.1%
Family history of DM	Yes	76.9%
	No	23.1%
Number of Family Members with DM	None	23.1%
	1	26.1%
	2	16.7%
	3	11%
	4	8.4%
	5 or more	14.7%

Table-3: Perceived knowledge and source of information about long-term DM complications

Character		%
Do you Know that if there are organizations specialized in DM Saudi Arabia?	No	25.70%
	Yes, I know little	60.30%
	Yes, I know	14%
How do you assess the knowledge and awareness of DM in Saudi Arabia?	Excellent	7.30%
	Good	66.30%
	Poor	26.40%
Did you heard about long term complications of DM if did not control your blood sugar	Yes	80.60%
	No	19.40%
From who you heard about long term DM complications if blood sugar not controlled	Diabetologists	23.70%
	Other doctors	10.70%
	Relatives	20%
	Social media	18.70%
	Books, Papers	6.30%
	Volunteer campaigns	3.60%
	Others	17%

Table 4: Common complications of DM as recognized by participants.

Complications of DM	n=299	%
Eye disease	218	72.9%
Diabetic Foot Disease	213	71.2%
Renal disease	168	56.2%
Peripheral neuropathy	161	53.8%
Sexual impairment	127	42.5%
Heart disease	120	40.1%
High blood pressure	99	33.1%
Sudden death	61	20.4%
Cerebrovascular disease	56	18.7%
Do not know	31	10.4%

Table 5: Common symptoms known by participants as if it found, it may indicate the presence of DM complications.

Symptoms	n=299	%
Frequent or much urination	183	61.2%
Visual impairment	164	54.8 %
Peripheral limbs numbness and tingling	160	53.5 %
Lower limb swelling	93	31.1 %
Obesity	86	28.8 %
Sudden loss of consciousness	75	25.1 %
Loss of teeth	55	18.4 %
Chest pain	50	16.7 %
Difficulty memorizing things	56	18.7 %
Difficulty hearing	33	11 %
I have no idea	28	9.4 %
Tinnitus	29	9.7 %
Bleeding gums	28	9.4 %
Shortness of breath	27	9 %
Difficulty speaking	21	7 %
Waking up at night due to shortness of breath	31	10.4 %
Dyspepsia	34	11.4 %
Constipation	37	12.4%
Difficulty swallowing	9	3 %
Diarrhea	12	4 %
Unfrequent or little urination	10	3.3 %

Table-6: Diseases diagnosed as a complications of DM within participants who had the disease. n=299

The name of disease	n(%)	The disease is diagnosed as a complications of DM			p-value
		yes	No	I do not know	
Decrease or absence of sensation in peripheral limbs	109(36.5%)	59(54.1%)	27(24.8%)	23(21.1%)	<0.01
Heart attack	28(9.4%)	14(50%)	4(14.3%)	10(35.7%)	>0.05
Renal impairment	38(12.7%)	13(34.2%)	13(34.2%)	12(31.6%)	>0.05
Eye and retinal disease	173(57.9%)	102(59%)	40(23.1%)	31(17.9%)	<0.01

DISCUSSION

The chronic hyperglycemia of diabetes is associated with long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels^[8]. In this study, (62.5%) of participants were compliant to their medications, (25.1%) reported themselves as somewhat compliant to their medications, and (12.4%) were incompliant to their medications. Another study reported higher results as compliant participants contributed to (87.8%)^[9]. We reported the positive family history of diabetes mellitus among participants and it contributed to (76.9%). Another study reported approximately (80%) of their participants had someone who was diabetic in the family^[10]. Nearly (80%) of participants were aware about complications of diabetes mellitus. Another study done recently, reported lesser results. It showed the level of knowledge of the complications of diabetes mellitus and the majority did not have knowledge about diabetes complications (60.0%), and only (13.1%) had adequate knowledge^[10]. Regarding the source of knowledge about diabetes complications, the mostly reported sources were diabetologists and other doctors (34.4%), relatives (20%), and social media (18.7%). Another study reported nearly similar results, and it was as follows, doctors (47.3%), relatives/friends (32%), and mass media (14.8%)^[9]. In this study, The mostly recognized complication of diabetes mellitus by participants were as follow in order: eye disease (72.9%), diabetic foot disease (71.2%), renal disease (56.2%), peripheral neuropathy (53.8%), sexual impairment (42.5%), heart disease (40.1%), high blood pressure (33.1%), sudden death (20.4%), and cerebrovascular disease (18.7%). Different results were reported recently and they were as follows: (51.5%) knew diabetic foot as the most common complication followed by hypertension (35.4%), neuropathy (29.2%), hypoactive sexual arousal (25.4%), arousal disorder (21.5%), eye diseases (17.7%), heart disease (9.2%), and renal disease (5.4%)^[11]. A second study reported 67% of participants knew that DM can result in loss of

sight while 46.5% knew that DM can cause poor wound healing. Few respondents knew that DM can lead to kidney failure (13.5%), skin sepsis (12.0%), heart failure (5.5%) and stroke (4.5%)^[10]. Common symptoms reported by participants, which may indicate the presence of DM complications, were as follow: frequent urination (61.2%), visual impairment (54.8%), peripheral limbs numbness and tingling (53.5%), lower limb swelling (31.1%), and obesity (28.8%). Another study reported the awareness about symptoms of diabetes complications, which were as follows: Diminished vision (Diabetic Retinopathy)(62%), Tingling sensations/numbness/ burning or pain in peripheral limbs (30%), non-healing wound/skin (25%), swelling of legs and foot (12%), trouble during maintaining an erection (4%), and dry and itchy skin (2%)^[12].

In conclusion, more attention is needed in primary prevention programs that focus on awareness of diabetic complications and the symptoms of these complications should be emphasized. Compliance to diabetes medications and control of blood sugar are essential to prevent development of diabetic complications, and early identification of diabetic complications is essential.

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