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Knowledge about Management of Diabetic Foot among Physicians in Makkah, Saudi Arabia

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Abstract

Introduction: In Saudi Arabia, the largest country in Middle East, diabetes mellitus is identified as a common chronic disease with rapidly increasing incidence. Saudi Arabia has the second rank in the prevalence of diabetes among Middle East countries and the seventh rank internationally. This study aims to evaluate the level of physicians' awareness about diabetic foot and associated complications; and the influence of demographic factors on this knowledge.

Methods: This study followed a cross-sectional design. Physicians who were work in hospitals and public health centers were included in this study. Physicians who were working in clinical practice for at least one year were included in the study. Physicians who were unwilling to participate in the study were excluded. A self-administered questionnaire were used to collect data from physicians using Google forms application. It consists of two sections, the first section questioning about demographic and background variables such as age, sex, nationality, education and source of knowledge about diabetes. The second section contain questions regarding the knowledge about diabetic complications such as diabetic foot.

Results: A total sample of 388 physician, working in Eastern province, were included in this study. More than a half of the respondents were females (59.3%) and the majority (98%) were Saudis. Regarding specialty of the physicians, about 60% were either general practitioners or residents, whereas 29.4% and 10.8% were specialists or consultants, respectively. The knowledge about diabetes mellitus, the majority (55.9%) of the physicians had poor knowledge about diabetes mellitus. Significant determinants for knowledge among the physicians were specialty and presence of previous training in diabetes mellitus.

Conclusions: The level of knowledge about diabetes foot among physicians was insufficient as the majority had inadequate level of knowledge. Significant determinants for knowledge were specialty and presence of previous training on diabetes mellitus.

Keywords: Knowledge, Awareness, Diabetes. Hyperglycemia, Health professionals, Saudi

Introduction

Diabetes mellitus is a syndrome with relative or absolute deficiency in insulin secretion which results in hyperglycemia [1]. It is associated with long-term complications in different body organs such as kidney, eye, peripheral nerve and blood vessels [2].

The prevalence of diabetes mellitus in Saudi Arabia was dramatically increased from 3.4 % in 1996 to more than 20% in recent years which is attributed to change in the lifestyle. Saudi Arabia, ranked the seventh among top ten countries in regards to diabetic mellitus prevalence [3]. Diabetes associated complications increase the burden of disease globally due to prolonged morbidity. About 366 million people have developed diabetes in 2011 and 552 million are expected to be diabetic in 2030 [4].

People aged 40-59 years old are mostly affected and about 183 million (50%) diabetic patients are still undiagnosed. It is estimated that about seven million of the Saudi population are diabetic and almost about three million are pre-diabetics [5]. The spread of sedentary lifestyles and adoption of western dietary habits – high in refined carbohydrates and fat – are driving an increase in the number of people with obesity-related type 2 diabetes.

The premature death due to diabetes complications is also increasing globally with half of diabetes related deaths occurred among patients less than 60 years old [6]. It is important to mention that 35 of 219 countries have a prevalence higher than 12% which is considered very high when compared to 4.4% global incidence in year 2016. Most of these countries with high prevalence of diabetes mellitus are Arabic countries particularly gulf countries [5].

In Saudi Arabia, the largest country in Middle East, diabetes mellitus is identified as a common chronic disease with rapidly increasing incidence. Saudi Arabia has the second rank in the prevalence of diabetes among Middle East countries and the seventh rank internationally [7]. Recent studies reported a prevalence of 34.1% in men and 27.6% in women [8]. This study aims to evaluate the level of physicians' awareness about diabetic foot and associated

complications; and the influence of demographic factors on this knowledge.

Methods

This study followed a cross-sectional design. Physicians who were work in hospitals and public health centers were included in this study. Physicians who were working in clinical practice for at least one year were included in the study. Physicians who were unwilling to participate in the study were excluded.

The number of participants required to estimate the level of knowledge is calculated using the proportion equation.

The expected good level of knowledge about diabetic foot, which is one of the diabetes complications, is approximately 51% based on previous study conducted in Saudi Arabia. Thus, at the confidence level of 95% and estimation error of 0.05, the minimal sample size was calculated to be 377.

A convenience sample of physicians were selected in this study. An online link were sent to the telephone numbers of the selected physicians through SMS or WhatsApp groups. A self-administered questionnaire were used to collect data from physicians using Google forms application. It consists of two sections, the first section questioning about demographic and background variables such as age, sex, nationality, education and source of knowledge about diabetes. The second section contain questions regarding the knowledge about diabetic complications such as diabetic foot. One point was awarded for each correct answer. A score of > 75% was considered satisfactory knowledge while a score of <75% was considered poor knowledge.

Screening of data were conducted in univariate and multivariate levels, and any outliers were managed according to the effect on the results of analysis. The missing data were explored using missing patterns graph to identify any specific patterns of missing. The regression amputation techniques were used to replace missing data if the missing occurs at random manner.

The data were coded and introduced to the Statistical Package of Social Sciences (SPSS) version 26. The data were analyzed to present the findings in the descriptive and inferential statistics. The descriptive statistics include frequencies and percentages for categorical variables, while means, median and standard deviations were used to summarize numerical data. The significant associations between demographic and background variables were detected at < 0.05 significance level using chi-square, and t-test according to the type of data.

The questionnaire were translated to Arabic language and pre-tested on 20 physicians to ensure the clarity of the questions then accordingly, it were revised. The Cronbach's alpha were calculated to estimate the level of internal consistency among Saudi Physicians. The authors described the aim and objectives of the study for the students and ask them to provide a written consent. No names required to assure confidentiality of data and all information were kept confidential only for this study purposes..

Results

A total sample of 388 physician, working in Eastern province, were included in this study. More than a half of the respondents were females (59.3%) and the majority (98%) were Saudis. Regarding specialty of the physicians, about 60% were either general practitioners or residents, whereas 29.4% and 10.8% were specialists or consultants, respectively. Only 18.1% responded to the question of working days and 12.7% were working 4-7 days per week. The majority of the physicians (61.3%) had been trained in the management of diabetes mellitus (table 1).

Distribution of correct answers, towards knowledge of diabetes mellitus, among the respondents is demonstrated in table 2. Proportion of correct answers of knowledge questions were widely variable as it ranges from 36.3%, in regards to the statement "treatment should not be based solely on laboratory findings", to 91.7% in regards to etiology of diabetes mellitus. Moreover, questions about diagnosis had a low rate of correct answers as only 43.1%. Regarding general knowledge about diabetes mellitus, the

majority (55.9%) of the physicians had poor knowledge about diabetes mellitus.

Table 3 shows the association between respondents' factors and knowledge about diabetes mellitus using bivariate analysis. Significant determinants for knowledge were specialty and presence of previous training in diabetes mellitus. However, association between knowledge and other factors such as gender, age groups, work load, and years of experience were not statistically significant. A significantly higher percentage of the consultants (72.7%) had good knowledge when compared to other categories, particularly GPs and residents. Those who attended previous training about diabetes mellitus had a good knowledge in comparison to those who had not (50.4% versus 34.2%). When the bivariate Spearman's correlation between knowledge score and years of experience was estimated, it was significant positive correlation with $r=0.18$.

Table 4 shows the findings of logistic regression where predictors selected by backwards step-wise selection. After exclusion of non-significant factors, only degree of specialty was significantly associated with knowledge about diabetes mellitus. Residents were 2.3 more likely to had a good knowledge than general practitioners ($p=0.046$). Moreover, specialists and consultants were 3.6 and 8.4 more likely to had a good knowledge than general practitioners ($p=0.002$ and <0.001), respectively.

Discussion

Diabetes mellitus is one of the most common chronic disease with a progressively growing prevalence [9]. Globally, it was estimated to reach 366 million diabetes patients in 2030 but the number of diabetic patients now exceeds this number [10]. Diabetes mellitus is declared by World Health Organization to be an epidemic which usually attributed to increase in aging, obesity, sedentary life style [11]. Additionally, a major concern is the estimation of 175 million undiagnosed patients who are going to develop the diabetes complications, such as diabetic foot, in few years and increase the burden of diseases on health system and the community [12].

Table (1): Distribution of the demographic and occupational characteristics of the respondents

<i>Characteristic</i>	<i>Frequency</i>	<i>Percent (%)</i>
Gender		
Male	158	40.7
Female	230	59.3
Age		
24-34	226	58.3
35-44	124	31.9
45-54	30	7.8
≥55	8	2.0
Nationality		
Saudi	380	98.0
Non-Saudi	8	2.0
Degree of specialty		
General practitioner	95	24.5
Resident	137	35.3
Specialist	114	29.4
Consultant	42	10.8
Number of shifts spend in the clinic per week		
4-7	49	12.7
8-10	21	5.4
Have you trained in the management of diabetes mellitus?		
Yes	238	61.3
No	150	38.7

The presents study found inadequate level of knowledge about diabetes mellitus in general and diabetic foot, particularly among physicians. American Diabetic Association highlighted the importance of education about self-management among diabetic patients. Patients can contribute significantly in their diabetic care as stated “the cornerstone of treatment for all people with diabetes” [13]. The aims of self-management are to improve the

quality of life by maximizing metabolic control and prevention of acute and chronic complications, while cost-effective approaches [14]. Although no cure found for diabetes mellitus, it could be prevented or adequately managed by control of blood sugar. Hyperglycemia is the result of uncontrolled blood sugar which can, in long-term duration, damage the vital body systems and tissues such as blood vessels and nerves [15, 16]. Thus, uncontrolled blood sugar with prolonged hyperglycemia, is associated with severe complications such as renal failure, cataract, hypertension, diabetic foot and increases risk of stroke [17]. There is adequate evidence that self-management is an effective intervention particularly in adults with type 2 diabetes regardless of age, ethnicity or racial differences [18].

Self-management interventions aim to increasing patients’ knowledge and empowering them to participate effectively in the management process. They are complex, time-consuming and affect all aspects of a patient’s life. Barriers of self-management include lack of knowledge, patients’ life style and background characteristics [19]. In another study, the overall prevalence of diabetes was 23.7% in Riyadh region which was significantly higher in the urban areas compared to rural areas [20]. Another study reported that more than half of Saudi adults (≥ 30 years old) are either diabetic or in in prediabetic phase [21]. The Saudi health system has a large burden of diabetes mellitus with estimation of 0.9 billion dollars spent in 2010 to treat complications of diabetes [22]. The diseases burden can be decreased by implementation of effective public health strategy which aim to increase awareness of patients, improve the manageability of blood sugar, and decrease the incidence of diabetic complications. Patients education and increase in awareness about control of blood sugar is the cornerstone of these strategies. Assessment of the current awareness level is essential to develop educational materials and approaches.

Conclusions:

The level of knowledge about diabetes foot among physicians was insufficient as the majority had inadequate level of knowledge. Significant

determinants for knowledge were specialty and presence of previous training on diabetes mellitus. Significant positive correlation was found between knowledge score and years of experience.

Conflict of interests

The authors declared no conflict of interests

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Table (2): Distribution of correct answers for knowledge about diabetes mellitus among the respondents

Items	Frequency	Percent (%)
DM patients should take medication regularly because they liable to get DM complication		
Incorrect answer	86	22.1
Correct answer	302	77.9
Type 1 and type II diabetes mellitus must be treated differently?		
Incorrect answer	114	29.4
Correct answer	274	70.6
What is the most common causes of diabetes mellitus?		
Incorrect answer	32	8.3
Correct answer	355	91.7
Treatment should not be based solely on laboratory findings?		
Incorrect answer	247	63.7
Correct answer	141	36.3
What is the most common complications of diabetes mellitus?		
Incorrect answer	74	19.1
Correct answer	314	80.9
Selected key recommendations for the management of diabetic foot.		
Incorrect answer	154	39.7
Correct answer	234	60.3
Presentation of diabetic foot.		
Incorrect answer	139	35.8
Correct answer	249	64.2
Diagnosis of diabetic foot.		
Incorrect answer	220	56.9
Correct answer	167	43.1
Knowledge (good knowledge > 75% correct answers)		
Poor knowledge	217	55.9
Good knowledge	171	44.1

Table (3): Association between respondents' characteristics and knowledge about diabetes mellitus

Characteristics	Knowledge about diabetes mellitus complications		Chi-square	P value
	Poor knowledge	Good knowledge		
Gender				
Male	84 53.0%	74 47.0%	0.47	0.494
Female	133 57.9%	97 42.1%		
Age				
24-34	133 58.8%	93 41.2%	5.6	0.133
35-44	67 53.8%	57 46.2%		
45-54	17 56.3%	13 43.8%		
≥55	0 0.0%	8 100.0%		
Have you exposed to a specific training on the management of diabetes mellitus?				
Yes	118 49.6%	120 50.4%	5.2	0.023*
No	99 65.8%	51 34.2%		
Degree of specialty				
General practitioner	72 76.0%	23 24.0%	17.8	<0.001*
Resident	80 58.3%	57 41.7%		
Specialist	53 46.7%	61 53.3%		
Consultant	11 27.3%	30 72.7%		
Years of experience				
One year	25 72.2%	10 27.8%	2.2	0.337
2-5 years	118 54.9%	97 45.1%		
> 5 years	74 53.4%	65 46.6%		

Table (4): Findings of logistic regression model for predictors of knowledge of diabetes mellitus complications among the physicians

Predictors	Categories	Reference group	Lower limit (95% C.I)	Risk ratio	Upper limit (95% C.I)	p value
Degree of specialty	Residents	General practitioner	1.1	2.3	5.1	0.046*
	Specialists	General practitioner	1.6	3.6	8.3	0.002*
	Consultants	General practitioner	2.7	8.4	26.4	<0.001*