



Assessment of Knowledge and Practices of Diabetic Patients Regarding Diabetic Foot Care, in Makkah, Saudi Arabia

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Abstract: Background: 20.5% of Saudis between 20 and 79 years are diabetics. Diabetic foot is a chronic complication of diabetes. The incidence of non-traumatic lower extremity amputations is at least 15 times greater in those with diabetes than non-diabetics. Patient education is important to reduce lower extremity complications. Objective: To assess the knowledge and practices of the diabetic patients regarding foot care and diabetic foot complications. Methods: In Makkah hospitals, 350 diabetic patients who met the inclusion criteria were involved in this cross sectional study. Interviewing questionnaire and patients' charts review were used to collect the data. Results: Mean age of patients was 53.0083±13.1 years, and mean duration of diabetes was 11.24±8.7 years. 35.1% had history of foot ulcer while 25.7% had ulcer on the time of interview. 11.7 % had history of amputation and 83.1% had numbness. 77.1 % examine their feet while 49.1% received foot care education and 34% read handouts on foot care. 34% walk around in bare feet. There is a significant statistical association between foot education, practices and diabetic foot ulcer (p-value < 0.05). Conclusion: Patient knowledge and practices regarding diabetic foot care is significantly associated with the reduction of diabetic foot ulcer.

Keywords: Knowledge, Practice, Diabetes, Foot Care

1. Introduction

Diabetes mellitus (DM) is a major public health problem that is increasing in its prevalence. The number of people affected by DM was expected to rise from 171 million in the year 2000 to 366 million by 2030. [1] In 2011, there were 366 million people affected with diabetes mellitus globally. [2] In 2014, The International Diabetes Federation estimated that there were 20.5% of Saudis between 20 and 79 years are diabetics. [3]

Together with the rising prevalence of diabetes, a substantial increase in its complications is expected. [4] One

of the most serious complications of diabetes causing high degrees of morbidities and mortalities and care cost is diabetic foot. It describes various degrees of angiopathy and neuropathy affecting the foot with tendency towards destruction of the foot tissue, ulceration and infection. [5] Many risk factors may lead to diabetic foot including long duration of diabetes, poor metabolic control, foot deformities, older age, peripheral vasculo-pathy and poor knowledge of diabetics. [5]

Diabetic foot was found to affect 8-17% of diabetics. [6]

Almost 85% of diabetes-related amputations are preceded by foot ulcers, and it accounts for more than 50% of non-traumatic lower limb amputations, [7] which is at least 15 times greater in those with diabetes than non-diabetics. American Diabetes Association estimates that one in five people with diabetes who seek hospital care do so for foot problems. [4]

Of all the diabetes related complications, those that occur in the foot are considered the most preventable. [8, 9] The United Kingdom Prospective Diabetes Study has shown that appropriate control of blood sugar through dietary control, exercise and proper medications prevents the development of microvascular complications. [6] Apparently, the practice of diabetic foot care measures such as daily foot examination and the use of appropriate footwear are important as regard the early detection and prevention of the expected complications. Patients with poor knowledge and practices regarding diabetic foot care have a higher incidence of foot complications including ulcers. [10] Studies suggest that patient education with proper foot care practices may reduce diabetes related foot ulceration and amputations. [11] Also, foot care practices reduce common foot problems such as corns and callosities and facilitate healing of foot ulcers.[12]

There have been few studies on knowledge and practices regarding foot care among diabetic patients in Saudi Arabia, but studies like these are crucial for prevention of drastic foot complications like foot ulcers and amputation. The objectives of the current study was to assess the patients' knowledge and practices regarding self-foot care among diabetic patients attending secondary care hospitals in Makkah, Saudi Arabia. The information gained on the knowledge and practices regarding foot care can aid health care providers and policy makers to develop targeted self-management education programs for people with diabetes.

2. Methods

This was a cross sectional study conducted at the outpatient clinics of three secondary healthcare hospitals (Alzahir, Security Forces, and Al-Nour), in Makkah, Saudi Arabia during the first quarter of 2015. Ethical approval was obtained from the ethics and research review committee of Umm Alqurah Faculty of Medicine.

A total of 350 diabetic patients were surveyed in consideration of the inclusion and exclusion criteria where adult diabetic patients above the age of 18 who consented to participate in the study were included. Simple random selection of patients who met the inclusion criteria was surveyed.

A method that has been used in various studies in different countries [13, 14] was adapted for this study of knowledge and self-foot-care practices in a Saudi population. The knowledge and self-foot care practices of the subjects were assessed via a structured, pre-tested and an interviewer-administered questionnaire. The interview was hold in the outpatient department (OPD) setting of the mentioned hospitals. The questionnaire was administered by MBBS

students who were adequately trained to ensure uniform data collection in the Arabic language.

2.1. Study Instrument

A medium-sized-four-parts questionnaire adopted from the Diabetic Foot Care Questionnaire of Diabetes Care Program Nova Scotia 2009 was used for data collection [15]. The first part of the questionnaire consisted of socio-demographic and some clinical information; the body mass index (BMI) and the level of the patient's glycated hemoglobin (HbA1c). The second part explores the history of foot problems involving 3 questions about the past history, and 5 questions about the current history of foot problems. The third part consisted of 18 questions about foot care practices divided into 6 questions about basic foot care practices, 2 questions about the kind of foot wear, and 10 questions about practices for safety and prevention of foot problems. The fourth part focused on foot care education and consisting of 4 questions.

A pilot study on 30 patients was done prior to the start of the study to ensure reliability of the questionnaire and to ensure the questions asked were understood by the respondents.

Patients' charts were reviewed to collect data regarding BMI and HbA1c.

2.2. Statistical Analysis

The results were collected, tabulated and statistically analyzed by SPSS software program (Statistical Program for Social Science), Version 20. Quantitative data were expressed as mean and standard deviation. Qualitative data were expressed as numbers and percentages. To assess the differences in frequencies on the dichotomized qualitative variables (scored present or absent) Chi-Square test (χ^2) was used with 5% level of significance.

3. Results

Mean age of patients was 53 ± 13.1 years, and mean duration of diabetes was 11.24 ± 8.7 years. Among the diabetes patients 160 (45.7%) are males and 190 (54.3%) are females. Majority of the patient's education 136 (36.9%) belong to low education (primary school and read and write) with no illiterate patients, 103 (29.4%) belong to moderate education who had secondary school, 118 (33.7%) belong to high education who had university and postgraduate education. Majority of the patients 183 (80.9%) were Saudi, 300 (85.7) were married, 2 (4%).106 (30.3) were smokers. Maximum number of patients 179 (51.1%) were having duration of diabetes more than 10yrs 35.1% had history of foot ulcer while 25.7% had ulcer on the time of interview. 11.7 % had history of amputation and 83.1% had numbness. 77.1 % examine their feet while 49.1% received foot care education and 34% read handouts on foot care. 34% walk around in bare feet. There is a significant statistical association between foot education, foot care practices, and diabetic foot ulcer (p-value < 0.05)

Table 1. Socio-demographic Characteristics of Patients.

Patient Characteristics	Total number of patients (350)	
	Number	Percentage (%)
Gender		
• Male	160	45.7
• Female	190	54.3
Nationality		
• Saudi	283	80.9
• Non Saudi	67	19.1
Marital status		
• Married	300	85.7
• Single	31	8.9
• Divorced	19	5.4
Education		
• High	118	33.7
• Moderate	103	29.4
• Low education	129	36.9
Duration of DM		
• <1 year	16	4.6
• 1-5	85	24.3
• 6-10	70	20.0
• >10	179	51.1
BMI		
• Overweight	126	36.0
• Obese	175	50
HbA1c		
• Controlled	47	13.4

Table 2. Past and current history of foot problem.

Type of foot problem	Total number of patients (350)	
	Number	Percentage (%)
Past history:		
• Sore or cut on foot or leg	138	39.4
• Foot ulcer	123	35.1
• Amputation	41	11.7
Current history:		
• Ulcer	90	25.7
• Blood on socks	62	17.7
• Calluses	136	38.9
• Numbness	291	83.1
• Tightness	256	73.1

Table 3. Foot care practices.

Type of foot problem	Total number of patients (350)	
	Number	Percentage (%)
Examine feet daily	269	76.9
Frequency of examination		
• every day	132	37.7
• 2-6 times week	51	14.6
• once per week or less	30	8.6
• only when has problem	57	16.3
Reach bottom of foot	270	77.1
wash feet everyday	337	96.3
dry well between the toes	137	39.1
use a moisturizing cream on feet	218	62.3
cut own toenails	262	74.9
Suitable shoes	137	39.1
Suitable socks	215	61.5

Table 4. Practices to prevent foot problems.

Practice	Total number of patients (350)	
	Number	Percentage (%)
Soak feet	109	31.1
Test water temperature before immersion	170	48.6

Practice	Total number of patients (350)	
	Number	Percentage (%)
Use medicated products for warts, corns or calluses	105	30.0
Put moisturizing creams or lotions between toes	118	33.7
Walk around in bare feet	119	34.0
Wear shoes without wearing any socks	185	52.9
Inspect shoes for foreign objects or torn linings	225	64.3
Use a hot water bottle or heating pad on feet	63	18.0
Sit with legs crossed	141	40.3
Smoking	106	30.3

Table 5. Health education methods.

Education Method	Total number of patients (350)	
	Number	Percentage (%)
• Attended a class on how to care for your feet	172	49.1
• Read any handouts on foot care	119	34.0
• Read any handouts on proper footwear	102	29.1
• Would like to have health education	291	83.1

Table 6. Relationship between health education and foot care practices.

		Attending classes for foot education		X ²	P value
• Examine feet	Yes	139 (80.8%)	130 (75.6%)	2.977	0.084
	No	33 (19.2%)	42 (24.4%)		
• Use moisturizing creams	Yes	119 (69.2%)	99 (57.6%)	6.855	0.009
	No	53 (30.8%)	73 (42.4%)		
• Soak feet	Yes	45 (26.2%)	64 (37.2%)	3.911	0.048
	No	127 (73.8%)	108 (62.8%)		

Table 7. Relationship between health education and foot ulcer.

		Attending classes for foot education		X ²	P value
Foot ulcer	Yes	51 (29.7%)	72 (41.8%)	4.475	0.034
	No	121 (72.3)	100 (58.2%)		

4. Discussion

This study was conducted to assess the knowledge and practices of the diabetic patients on foot care. It was found that mean age of patients was 53.0083±13.1 years, mean duration of diabetes was 11.24±8.7 years, mean BMI was 30.58±6.24 and mean HgA1c was 10.05±5.70

The study showed feet numbness was complained by 83 % of patients. Good blood sugar control was achieved in only 13.4% of patients, while poor control was observed in most of the patients (86.6%). Similar findings were reported by Ali et al. who found that 54.2% of diabetic patients suffered from hotness sensation in their feet, feet numbness was complained by 47.7% of patients, and controlled blood glucose was achieved only by 14.1% of patients. [16] Similar finding was observed also by Al-Maskari and El-Sadig who conducted their cross-sectional survey to assess the

prevalence of diabetes complications in Al-Ain district, United Arab Emirates. They reported symptoms including cramp like-pain in legs or feet, tingling, numbness, and burning sensations with a "stocking and glove distribution" in 35% of them, while good diabetes control was achieved by 38% of patients. [17]

Past and current history of foot problem of diabetic patients' feet within the present study revealed that 11.7% of patients underwent amputations as well as sores (39.4%), skin ulcers (35.1%), callus (38.9%). This is higher than results of study of Ali *et al.* which revealed that amputation was detected in 1.4% of the patients, nails abnormalities (12.7%), feet swelling (6.9%), deformity (7.4%), muscle atrophy (6%), skin cracks/ulcers (10.2%), callus (6.9%), temperature fluctuation (1.4%). This difference is explained by the fact that the most of the participants of the current study were hired from diabetic foot clinics providing specific and intensive care to patients with past or current history of diabetic foot problems.

The prevalence of diabetic foot in the present study is higher than that stated by Boulton, [18] who reported that, worldwide, the prevalence of the diabetic foot ranges between 1.4% and 5.9%. He added that foot ulceration and amputation are significantly inter-related in diabetes. More than 85% of amputations resulted from a previous ulcer. Importantly, diabetes is the foremost cause of non-traumatic lower extremity amputation in the western world, amputation rates among diabetic patients being 15 times higher than in the non-diabetic subjects.

On analysis of foot care practices, the majority (76.9%) of study subjects said they inspected their feet and 37.7% of them examine feet daily, while almost all (96.3%) of the study subjects wash their feet regularly. This finding is different from the study carried out in Chandigarh, where it was found that only 63.3% of the patients with diabetes take care of their feet through regular washing. [19] This difference may be explained on the basis of the Islamic rituals which the participants of the current study are performing religiously without knowing that some of these activities are part of good foot care practices, so the participants were practicing washing of the feet as they did ablution before offering prayers. However, many other studies from India revealed poor foot care practices. [20]

In the current study, 64.3% of the respondents admitted they had the knowledge to always check the shoes before wearing. This coincides with the study done by Seema Hasnain *et al.* [21] that found 73.3% checked their shoes before wearing.

There were some deficiencies in the knowledge and practices regarding foot care identified by the current study. Many patients (60.9%) don't dry their feet after washing, and 34.0% walk bare feet at home which is less than subjects in another study which revealed that vast majority (87.3%) of patients walk bare feet. [22]

The prevalence of peripheral neuropathy in the current study was 81.1%. The prevalence of peripheral neuropathy varied from 15% to 60% in different studies done in India.

[23] The variations could be because of the variations in the instruments used to detect peripheral neuropathy. The current study used one question regarding numbness, while in other studies the Mittchigan Neuropathy Screening Instrument (MNSI) was used to assess neuropathy. MNSI is a rapid, simple and reliable test for screening diabetic peripheral neuropathy in both diabetes clinics and epidemiological surveys. [24]

The role of physicians is very important in improving knowledge and practices regarding foot care and foot care education is the most crucial tool for preventing lower leg amputation. In this study 49.1% received information about diabetes through attending classes in diabetic foot care education, while 34% read handouts regarding foot care. In a study from Italy, more than 50% of the patients reported that they did not have their feet examined by their physician and 28% referred that they had not received foot education. Thus patients' knowledge and practices are strongly related to physicians' attitudes. [25]

The current study showed that educational brochures on foot self-care were received by about 34%, while 49.1% attended classes for foot care health education. This is nearly in agreement with study by Ali *et al.* [16] who found that less than half of diabetic patients underwent feet examination by primary health care physicians. Health education sessions on importance of and how to conduct foot care have been held only for less than half of patients.

Al-Mahroos and Al-Roomi [26] emphasized that family physicians have a leading role in ensuring that patients with diabetes should receive early and optimal care and health education to prevent skin ulcers. However, foot examinations are infrequently performed by primary care physicians on diabetic patients and the feet of hospitalized diabetics are also inadequately evaluated.

In the current study, there was a significant statistical association between foot education, foot care practices, and diabetic foot ulcer (p -value < 0.05). Karter *et al.* [27] emphasized that the associations between educational attainment and health behaviors are particularly important in diabetes, given the critical role of health behaviors, including diabetes self-management and health-related life-style. Using a sample of managed care patients with diabetes, Karter *et al.* identified the relationships between educational attainment and smoking, physical activity, self-monitoring of blood glucose, foot self-exam, and diabetes-related health-seeking behaviors. In addition, Shah *et al.* [28] added that there is an increasing amount of evidence that the patient education is the most effective way to lessen the complications of diabetes and its management.

5. Conclusion

This study concludes a high rate of diabetic foot ulcers, incorrect knowledge, and improper practices. Patient education regarding diabetic foot care is associated with reduced foot ulcers.

Recommendations

This study recommends improving diabetic patients' knowledge regarding foot care. This could be done through diabetic foot care clinics that should be readily available in every health care facility providing care to diabetic patients. The clinic should provide a diversity of health education methods using both classes and handouts to improve patients' knowledge and practices regarding foot care. Mass media utilized to transfer the health education message on the necessity of proper self-foot care.

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