

Assessment of Diabetic Patients Knowledge and Comorbidities

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Objective: To assess diabetic patients' knowledge and comorbidities.

Design: A Cross-Sectional Study.

Setting: Primary Care Department, Bahrain Defense Force Hospital, Bahrain.

Method: Two hundred sixty-five diabetic patients were evaluated for knowledge in foot care and comorbidities. The following comorbidities and vitals were documented: retinopathy, vasculopathy, previous foot ulcer, neuropathy, HbA1c level, hyperlipidemia, hypertension, BMI and smoking status. A pre-tested structured questionnaire was used as a study tool, which was a set of 15 'yes' or 'no' questions of the knowledge. A score of more than 70% (11-15) was considered good knowledge; score of 50%-70% (10-8) satisfactory knowledge; less than 50% (<8) poor knowledge, P-value less than 0.05 was considered significant.

Result: The mean age was 48.7 years and the mean body mass index (BMI) was 32.78. One hundred sixty-two (61.1%) were males; 210 patients (79.2%) were Bahrainis; 237 (89.4%) were married. The mean HbA1C was 8.49 ± 1.81 . Two hundred fifty-one (94.7%) had no history of foot ulcer, and 156 (58.9%) patients were not receiving foot care educations. Ninety-eight (37 %) had a satisfactory knowledge, 54 (20.4%) had good knowledge of diabetic foot care and 113 (42.6%).

Conclusion: The study revealed a marked gap in foot care knowledge among diabetic patients, which reflects the need of an educational interventional program targeting the community.

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Diabetes mellitus DM is a chronic disease with an increasing incidence worldwide. A recent publication by WHO estimated that the prevalence of diabetic patients had risen from 108 to 422 million in the last 34 years, from 4.7% to 8.5%¹. The prevalence of diabetic patients in the Middle East and North Africa (MENA) is expected to rise to 72.1 million by 2040. There were 154,300 cases of diabetes in Bahrain in 2015 with a prevalence of 15.6%².

Poor control of diabetes accelerates the development of late complications, which may lead to major morbidities, such as cardiovascular disease, retinopathy, nephropathy, cerebrovascular accidents and neuropathies. Diabetic foot causes major public health problems and is a leading cause of admission as well as mortality. It is believed that every 30 seconds, a lower limb is lost somewhere in the world due to diabetes³. Foot ulcer can cause a considerable economic burden on families and health systems because it leads to severe disability and hospitalization^{4,5}. Infection occurs in approximately half of the diabetic foot ulcers^{5,6}. More than half of non-traumatic lower limb amputations are preceded by foot ulcers in about 85% of diabetes-related amputation^{7,8}.

The quality of life of patients with foot ulcers is compromised^{9,10}. In diabetics, the following major factors contribute to the development of foot ulcers: neuropathy, mechanical stresses, and angiopathy; however, other important contributors to diabetic foot complications are improper footwear and inappropriate foot care¹¹⁻¹³.

Researchers have recognized that between 49%-85% of all amputations could be prevented⁸. Therefore, preventing DM foot ulceration was found to be cost effective by increasing the knowledge, awareness and self-care of the foot among diabetic patients¹⁴. Primary prevention method, such as health education plays a key role in managing individuals suffering from diabetes. A prepared questionnaire from the American College of Foot and Ankle Surgeons was used in this study to assess the knowledge of foot care^{15,16}.

The aim of this study is to assess the knowledge of foot care among diabetics.

METHOD

Participants were recruited from 1 November 2016 to 31 May 2017. Eligibility criteria included: age 18 years and above,

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patients diagnosed with DM, patients visiting the clinic regularly and duration of the disease of more than one year. Patients who consented to participate in the study were asked to complete a questionnaire. A random sampling of 265 patients was calculated and included in the study. The questionnaire was classified into three main sections. The first section contained personal characteristics, such as age, gender, nationality, marital status, income, education level, employment and DM duration, treatment, the presence of risk factors and diabetic complications. The second section included patient knowledge about foot care. The third part was about previous diabetic foot health education.

The questionnaire was pilot-tested on twenty-five type 2 diabetic patients; the result of the pilot study was not included in the main study. Data documented were as follows: HbA1c, height, weight, diabetic comorbidities and complications. SPSS software was used for data analysis. P-value less than < 0.05 was considered significant. There were 15 'yes' or 'no' questions about the knowledge of foot care, see table 4. Each 'yes' was equal to one point and zero for 'no'. A score of 11-15 ($>70\%$) was considered good knowledge, a score of 8-10 ($50\%-70\%$) was considered satisfactory knowledge, and a score of <8 ($<50\%$) was considered poor knowledge.

Participants were informed that they had the right not to participate in the study or to withdraw from the study at any time if they wish. The data were kept confidential and utilized for study purposes only; the questionnaires were destroyed after transferring the information into the software. Participants were asked to read and sign a consent form.

RESULT

Two hundred sixty-five patients were included in the study, the mean age was 48.7 years ± 14.72 and the mean BMI was 32.78 ± 7.89 ; 162 (61.1%) were males, 210 (79.2%) were Bahrainis, and 237 (89.4%) were married. One hundred forty-three (53.9%) were employed, and 101 (38.1%) were able to read and write but did not complete secondary school. One hundred and fourteen (43%) patients earned 200-500 Bahraini Dinar(s) monthly; 212 (80%) were non-smokers, see table 1.

One hundred ninety-seven (74.3%) had uncontrolled HbA1c >7 ; the mean HbA1C was 8.49 \pm 1.81. Ninety-three (35.1%) were using hypoglycemic agents and life style modifications. The duration of diabetes was ≤ 5 years in 163 (61.5%). One hundred eighty-one (68.3%) had hyperlipidemia, 50 (18.9%) had retinopathy, 90 (34%) had hypertension, see table 2. Two hundred fifty-one (94.7%) had no history of foot ulcer and 156 (58.9%) patients were not receiving foot care educations. One hundred nine (41.1%) received foot care education, 36 (3.5%) from doctors and 34 (12.8%) from diabetic nurse. One hundred thirty-nine (52.4%) patients with no previous foot care education were willing to receive foot care, see table 3 and 4. The knowledge score divided the patients into three categories, 113 (42.6%) had poor knowledge score, 98 (37%) had satisfactory knowledge and 54 (20.4%) had good knowledge, see table 5.

Table 1: Personal Characteristics of the Study Population

		n	%
Gender	Male	162	61.1%
	Female	103	38.9%
Total		265	100%
Age Mean 48.7	<40	55	20.8%
	40-49	69	26.0%
	50-59	91	34.3%
	60-69	50	18.9%
Total		265	100%
Marital status	Never Married	13	4.9%
	Married	237	89.4%
	Separated/Divorced	7	2.6%
	Widowed	8	3.0%
Total		265	100%
Nationality	Bahraini	210	79.2%
	Non-Bahraini	55	20.8%
Total		265	100%
Occupation	Employed	143	53.9%
	Unemployed	94	35.5%
	Retired	28	10.6%
Total		265	100%
Income	< 200 BD	56	21.1%
	200-500 BD	114	43.0%
	> 500-1000 BD	78	29.4%
	> 1000 BD	17	6.4%
Total		265	100%
Education	Illiterate	22	8.3%
	Did not complete secondary school but able to read and write	101	38.1%
	Secondary school graduate	95	35.8%
	Graduate degree	47	17.7%
Total		265	100%
Smoking	No	212	80%
	Yes	53	20%
Total		265	100%
BMI Mean 32.78	Healthy Weight	40	15.1%
	Overweight	68	25.7%
	Obese	71	26.8%
	Severely Obese	46	17.3%
	Morbidly Obese	40	15.1%
Total		265	100%

Table 2: Details Regarding Disease among the Study Population

Variable		n	%
HbA1c mean 8.49	≤7	68	25.7%
	>7	197	74.3%
Total		265	100%
Duration of Diabetes Mean 6.71	<5 years	163	61.5%
	5-10 years	43	16.2%
	>10 years	59	22.3%
Total		265	100%
Current Diabetic Treatment	Life style modification & tablets only	93	35.1%
	Life style modification & Insulin injections only	76	28.7%
	Life style modification + Tablets + insulin injections	76	28.7%
	Life style modification & insulin	20	7.5%
Total		265	100%
Foot ulcer	No	251	94.7%
	Yes	14	5.3%
Total		265	100%
Retinopathy	No	215	81.1%
	Yes	50	18.9%
Total		265	100%
Neuropathy	No	229	86.4%
	Yes	36	13.6%
Total		265	100%
Vasculopathy	No	245	92.5%
	Yes	20	7.5%
Total		265	100%
Foot deformity	No	259	97.7%
	Yes	6	2.3%
Total		265	100%
Hypertension	No	175	66%
	Yes	90	34%
Total		265	100%
Hyperlipidemia	No	85	32.1%
	Yes	180	67.9%
Total		265	100%
Had foot care education	No	156	58.9%
	Yes	109	41.1%
Total		265	100%
Would you like to receive foot care education if no previous was given?	No	17	6.4%
	Yes	139	52.5%
Total		156	58.9%
If yes, do you prefer the sessions with group or on individualized basis	Group	75	28.3%
	Individual	64	24.2%
Total		139	52.5%

Table 3: Sources of Foot Care Education

Source	n	%
Doctor	36	13.6%
Diabetic nurse	34	12.8%
Health Educator	9	3.4%
Podiatrist	3	1.1%
Social media (TV, internet, educational leaflets)	27	10.2%
Total	109	41.1%

Table 4: Responses to Questions of the Knowledge of Foot Care

No.	Knowledge	Yes		No.	
		n	%	n	%
1	Do you know the importance of taking anti-diabetic treatment to prevent complications?	236	89.1%	29	10.9%
2	Do you wash your feet daily?	256	96.6%	9	3.4%
3	Do you use warm water for washing/bathing?	195	73.6%	70	26.4%
4	Do you Check the temperature of the water before using it?	160	60.4%	105	39.6%
5	Do you dry the feet after washing?	189	71.3%	76	28.7%
6	Do you use Talcum powder in spaces between your toes to keep them dry?	34	12.8%	231	87.2%
7	Do you put moisturizing lotion on your feet daily?	129	48.7%	136	51.3%
8	Do you know that you should not apply lotions in spaces between toes?	76	28.7%	189	71.3%
9	Do you change your socks daily?	191	72.1%	74	27.9%
10	Do you trim the nails of the feet with care?	69	26.0%	196	74.0%
11	Do you/or care giver inspect your feet once a day?	103	38.9%	162	61.1%
12	Do you wear comfortable shoes (and not opened sandals)?	149	56.2%	116	43.8%
13	Do you check the shoes from inside before wearing?	123	46.4%	142	53.6%
14	Do you know that you should not walk bare foot?	113	42.6%	152	57.4%
15	Do you know the foot warning signs, which require consulting your doctor?	128	48.3%	137	51.7%

Table 5: Levels of Knowledge Score

Level of Knowledge	n	%	Chi-Square	P-value
Poor	113	42.6%	21.29	0.000
Satisfactory	98	37.0%		
Good	54	20.4%		
Total	265	100%		

Two hundred thirty-six (89.1%) participants were aware of the importance of blood glucose control in preventing foot complication. Two hundred fifty-six (96.6%) wash their feet daily. One hundred ninety-five (73.6%) patients use warm water for washing feet, and 160 (60.4%) check the temperature of the water before use. One hundred eighty-nine (71.3%) dry their feet after washing and 191 (72.1%) change socks daily.

Table 6: Factors Associated with Knowledge of Foot Care among the Study Participants

		N	Mean	Std. Deviation	P - value
Age	<40	55	7.80	3.03	0.006
	40-49	69	7.45	2.76	
	50-59	91	8.96	2.77	
	60-69	50	7.86	2.99	
Total		265			
Gender	Male	162	7.78	2.93	0.017
	Female	103	8.65	2.82	
Total		265			
Education	Illiterate	22	6.14	2.73	0.000
	Didn't finish secondary school but able to read and write	101	7.67	2.67	
	Secondary school graduate	95	8.11	2.89	
	Graduate degree	47	10.02	2.62	
Total		265			
Marital status	Never Married	13	6.62	3.43	0.152
	Married	237	8.14	2.90	
	Separated/ Divorced	7	9.14	2.91	
	Widowed	8	9.13	1.64	
Total		265			
Income	< 200 BD	56	8.57	3.08	0.000
	200-500 BD	114	8.82	2.53	
	> 500-1000 BD	78	6.86	2.87	
	> 1000 BD	17	7.71	3.29	
Total		265			
HbA1c	≤7	68	9.29	2.49	0.000
	7>	197	7.71	2.95	
Total		265			
Foot ulcer	No	251	8.27	2.84	0.000
	Yes	14	5.29	2.84	
Total		265			
Duration of Diabetes	<5 years	163	7.29	2.68	0.00
	5-10 years	43	9.19	2.56	
	>10 years	59	9.63	2.97	
Total		265			
BMI	Healthy Weight	40	10.13	2.76	0.000
	Overweight	68	7.76	2.84	
	Obese	71	8.32	2.85	
	Severely Obese	46	7.57	2.59	
	Morbidly Obese	40	6.98	2.77	
Total		265			
Received foot care education	No	156	6.67	2.57	0.000
	Yes	109	10.19	1.98	
Total		265			

One hundred twenty-nine (48.7%) apply lotion to their feet on daily and 76 (28.7%) were aware that they should not apply lotion between toes. Thirty-four (12.8%) use Talcum powder in the inter-digital space to keep them dry and 69 (26%) trim toenails straight. One hundred three (38.9%) inspect their feet daily, 149 (56.2%) wear comfortable shoes, 113 (42.7%) were aware that they should not walk barefoot and 128 (48.3%) knew the foot warning signs that require doctor counseling.

Some variables had a statistically significant association with the knowledge score, including age group, female gender, higher education level, middle income, healthy BMI, controlled HbA1C, longer duration of DM, no history of foot ulcer and previous foot education, see table 6.

DISCUSSION

This study showed that a large number of diabetics have poor knowledge in foot care. In our study, 96.6% wash their feet daily, 12.8% apply talcum powder, 28.7% apply lotion in the interdigital space, 26% trim the toe nails straight, 73.6% use warm water and 60.4% check the temperature of the water before using it. Keeping the interdigital space dry by applying talcum and avoiding application of lotion is also important to prevent fungal infections¹⁷. Approximately 38.9% of patients inspect their feet daily and 57.4% walk barefoot, similar to another study¹⁸. Less than 46.4% check the insides of their shoes before wearing and 48.3% were not aware of the warning signs that require consultation, which is similar to another study¹⁹. Foot care knowledge score revealed that patients received little information about foot complications and how these could be avoided^{20,21,22}. Boulton et al found that diabetics are prone to foot ulcer and amputations²³. Diabetes is the premier cause of non-traumatic lower extremity amputation in the western world.

In this study, 42.6% of participants had poor knowledge about foot care, 37% had a satisfactory knowledge, and 20.4% had good knowledge, which is comparable with other studies^{16,19,24}. Other studies highlighted a lower level of foot care knowledge^{25,26}. A study, revealed that family physicians play an important role in ensuring that patients with diabetes should receive early and optimal care in association with health education to reduce the risk of complication²⁷.

In our study, females have better knowledge score regarding foot care, similar to the findings of Pollock et al²⁸. There was significant association among age groups 50-59 years and other age groups regarding knowledge score in several countries^{19,24,28}.

Marital status had no association with knowledge score. Patients with middle-income (BD 200-500) have higher mean knowledge score compared to other groups. The majority (94.7%) had no previous foot ulcers, but they did have other comorbidities and complications, such as hyperlipidemia (68.3%), hypertension (34%), smoking (20 %) and retinopathy (18.9%). Diabetic patients have a high risk of atherosclerosis and retinopathy; they are more prone to accidents and trauma that would be a cause for foot ulceration. Most of the patients were married (89.4%), able to read and write (38.1%) and had diabetes for more than five years (61.5%).

Karter et al reported that there is a relation between healthy behavior and educational achievement²⁹. Patients with good control of diabetes (HbA1c ≤ 7) and long diabetes duration \geq ten years had a significant statistical association with diabetic foot knowledge score. The present study also reveals that diabetic patients with healthy weight and BMI had statistically significant foot care knowledge score.

The study indicates the need for the establishment of a Diabetic Educational Program. In addition, it indicates the need for future research. The study was limited because it was performed in one center and was questionnaire-based, where participants' responses might not reflect the actual status of self-care.

CONCLUSION

In this study, the knowledge of foot care was poor. That might cause lower extremity complications, as well as recurrent foot infections and might lead to physical and emotional disabilities.

Strategies must be planned to develop a primary prevention program involving all health care centers to enhance public awareness of diabetes and its complications.

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