

Diabetic Patients Awareness about Diabetic Foot in Chronic Disease Clinic, AL-Kharj Hospital, Saudi Arabia

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DOI: 10.31080/ASMS.2023.07.1622

Received: June 15, 2023

Published: July 07, 2023

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Abstract

Background: The diabetic foot is a global threat to public health system with enormous economic consequences for diabetes, families, and society, affecting both quality of life and quality of care. The prevalence of diabetes mellitus (DM) in Saudi Arabia is 18.3% in 2020. One of the most common complications that affects diabetic patients is diabetic foot disease (DFD). Early identification of DFD and diabetic patient's awareness and how to take care of DFD will reduce the incidence of the disease. This study aimed to assess knowledge, awareness and practice with diabetic foot among diabetic patients attended to Chronic Diseases Clinic in Al-Kharj hospital.

Methods: A descriptive cross-sectional study was conducted at chronic diseases clinic, in Al-Kharj hospital, Riyadh Saudi Arabia between 9th of February to 8th of March 2022. standardized questionnaire was used to collect information upon knowledge, attitude and practice toward diabetic foot care. Data entry was performed using SPSS.

Results: The responses of 165 of which (63.6%) were male, (55.2%) were older than fifty years. moreover 32.1% have high school degree (24.2%), have bachelor's degree. The duration of diabetic foot is more than 6 years among 74.5% of the patients. (62.4%) of participants had good glycemic control. Most (72.1%) of participants claimed to be nonsmoker.

Concerning knowledge (60.6%) of the patients indicating higher level, (mean 5.50, standard deviation 1.80). It was observed that near half of participants (48.5%) had a negative awareness towards the disease (mean 3.07, standard deviation 2.18). while in practice (37.6%) participants scored poorly, (mean 6.77, standard deviation 2.74).

We discovered that educational background, family income, gender, glycemic control, duration of diabetes and smoking correlated with patients' practice and awareness about foot care.

Conclusions: Participants have adequate knowledge; motivate to improve their awareness and practices toward diabetic foot care. As well as patient education should be provided to patients, the results of this study may help guide those groups most in need and help reducing the incidence of diabetic foot.

Keywords: DM; Diabetic Foot Care; Knowledge; Awareness and Practices

Introduction

"Diabetes is a chronic disease that occurs either when the pancreas does not produce enough insulin or when the body cannot effectively use the insulin it produces. Insulin is a hormone that regulates blood sugar. Hyperglycemia, or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially the nerves and blood vessels" [1].

The world health organization (WHO) estimates that about 422 million people worldwide have DM, the majority living in low- and middle-income countries, and 1.6 million deaths are directly attributed to diabetes each year. Its prevalence is growing over years where its prevalence increased from 108 million in 1980 to 422 million in 2014 [2].

"Diabetic foot is one of the most significant and devastating complications of diabetes, and is defined as a foot affected by ulceration that is associated with neuropathy and/or peripheral arterial disease of the lower limb in a patient with diabetes" [3].

Saudi Arabia is one of the 21 countries and territories of the international diabetes federation Middle East and North Africa (IDF MENA) region, the prevalence of DM in Saudi Arabia is 18.3% in 2020 [2,4].

DFD is a major challenge for the healthcare system in both high-income countries and LMICs, with substantial economic consequences for the patients, their families, and society [5,6].

Risk factors for development of foot problems in diabetics include smoking, old age, diabetes for longer than 10 years, uncontrolled diabetes, history of previous foot ulcers or amputations, poor foot care, co-existing diseases such as peripheral neuropathy with loss of protective sensation, bone deformities, peripheral vascular disease, nail pathologies can further increase the risk [7,8].

According to what published in 2009 in Saudi Arabia, ninety diabetic amputations are performed monthly in Saudi Arabia capital of Riyadh and this number is increasing quickly and becoming to appear at younger age [9].

Early identification of DFD and diabetic patient's awareness of DFD and how to take care of it will reduce the incidence of more complications like amputation [10,11].

In this study, we aimed to evaluate knowledge, awareness and practice with diabetic foot among diabetic patients attended to Chronic Diseases Clinic. It is the largest center of family medicine centers in Al-Kharj city, Riyadh Saudi Arabia.

Methodology

The study was a descriptive cross-sectional study that was conducted at Chronic Diseases Clinic, F&CM in Al-Kharj hospital, Riyadh Saudi Arabia. Have been done on period between 9th of February to 8th of March 2022.

A structured Questionnaire; self filled by the participants and will be collected in the same sitting. Family medicine experts and biostatistician will undergo to validate the content and versions of questionnaire.

A pilot study of 10 patients allowed the modified questionnaire to be used. The questionnaire was translated into Arabic language, as it is the main language in Saudi Arabia, and back-translated into English to ensure accurate translation.

Questionnaire contains four parts: (i) socio-demographic data, (ii) knowledge (iii) awareness toward diabetic foot care, and (VI) practice of diabetic foot care. The questionnaire.

Verbal informed consent was obtained. Ethical approval will be obtained from the research ethical committee in prince sultan medical military city (PSMMC) followed by an approval from the ministry of defense. After that a permission will be taken from the in charge doctor of AL-kharj Hospital.

Sample technique used is simple random sampling. 165 patients were enrolled in the study.

Statistical analyses

Data were captured on an Excel spreadsheet and analysed using IBM SPSS version 26 by the biostatistician. Descriptive data are presented as means, standard deviations, frequencies and percentages depending on whether the variables were continuous or categorical. The sum score of each outcome was assessed based on Bloom's cut-off point [12].

Knowledge was classified into the low level (03- scores), moderate level (4-5 scores) and high level 7-6) scores).

Awareness were classified into negative awareness (1-2 scores), neutral awareness (3-4 scores) and positive awareness (5-6 scores). Practices were classified into the poor (0-5 scores), moderate (8-6scores), and good (9-11 scores) levels.

Pearson’s correlation analysis was used to determine the correlations between knowledge, awareness and practices of diabetic foot care. Association of sociodemographic and clinical characteristics with knowledge, awareness, and practice was also assessed using Pearson correlation coefficient and p values were calculated to ascertain the statistical significance of any correlation found. The level of significance was set at $p < 0.05$.

Results

Demographic characteristics

Table 1 represents the distribution of patients regarding demographic characteristics, A total of 165 participants participated in the study, of whom 105 (63.6%) were male and 60 (36.4%) were female. Concerning age, more than half of participants were older than fifty years (55.2%). Followed by (23.6%) belonged to (41-50 years) age group while 21.2% aged between (20—40 years).

Fifty-three participants (32.1%) had high school education, Forty (24.2%) of the subjects had university education and the rest (13.9%) had Middle school and (10.9%) had Primary school education while (18.8%) were Uneducated.

Regarding employment (35.2%) of participants they are employed, (33.9%) participants said “no, they are unemployed” while (30.9%) had been retired. of whom (47.9%) worked in a military job, (40.6%) worked in a civilian job while (11.5%) were housewives.

Almost 53.9% of participants (n = 89) earned < 10000 SR, followed by 24.2% of participants received between 11000 SR and 150000 SR monthly, while 21.8% of participants (n = 36) earned > 16000 SR.

Concerning Diabetic Foot Disease (DFD) duration (25.5%), participants diagnosed in the past 5 years, those flown up (6-10 years) were 21.2%, moreover (11-15 years) and > 20 years durations shared the same percent (18.8%) for each, while flown up (16-20 years) were 15.8%.

Among of patients (54.5%) partially managed the disease by oral hypoglycemic agents, 24% by insulin followed by one third

were use both oral and Insulin while (12.1%) use Insulin, and. The analysis of glycemic control showed that (62.4%) of participants had good control compared to (37.6%) were not.

Most (72.1%) of participants claimed to be nonsmoker, followed by smokers (18.2%) and former smoker (9.7%).

Variables	Options	F	%
Gender	Male	105	63.6
	Female	60	36.4
Age groups	20-30 years	12	7.3
	31-40 years	23	13.9
	41-50 years	39	23.6
	51 years and above	91	55.2
Education	Uneducated	31	18.8
	Primary school	18	10.9
	Middle school	23	13.9
	High School	53	32.1
	University	40	24.2
Employment	No	56	33.9
	Yes	58	35.2
	Retired	51	30.9
Job Type	Civilian job	67	40.6
	Military job	79	47.9
	House wife	19	11.5
Family Income	5000 SR or Less	54	32.7
	6000 - 10000 SR	35	21.2
	11000- 15000 SR	40	24.2
	16000- 20000 SR	29	17.6
	> 20000 SR	7	4.2
Years of treatment	1-5 years	42	25.5
	6-10 years	35	21.2
	11-15 years	31	18.8
	16-20 years	26	15.8
	> 20 years	31	18.8
hypoglycemic agent	Oral	90	54.5
	Insulin	20	12.1
	Oral and Insulin	55	33.3
Glycemic Control	No	62	37.6
	Yes	103	62.4
Smoking status	Yes	30	18.2
	Former smoker	16	9.7
	Non smoker	119	72.1

Table 1: Patients` Demographic characteristics.

Knowledge about diabetic foot care

Table 2 presents the level of knowledge about diabetic foot care. Most patients knew that DM might develop the following in their feet: reduced blood flow (60%), lack of sensation (72.7%), foot

ulcer (78.8%) and gangrene (95.8%).in addition they were more prone to foot ulcer if blood flow reduced (67.3%) or lost sensation in their feet (77%) and (98.2%) of patients knew that dietary is important in controlling DM.

Knowledge questions	NO		Yes	
	F	%	F	%
Do you Know that DM patients may develop reduced blood flow in their feet?	66	40.0	99	60.0
Do you Know that DM patients may develop lack of sensation in their feet?	45	27.3	120	72.7
Do you Know that DM patients may develop foot ulcers?	35	21.2	130	78.8
Do you Know that DM patients may develop gangrene?	7	4.2	158	95.8
Do you know that with loss of sensation in your foot, you are more prone to foot ulcers?	54	32.7	111	67.3
Do you know that with reduced blood flow in your foot, you are more prone to foot ulcers?	38	23.0	127	77.0
Do you Know that Diet is important in the control of DM?	3	1.8	162	98.2

Table 2: Knowledge about diabetic foot care.

DM: Diabetes Mellitus.

Awareness about diabetic foot care

Table 3 presents the level of awareness about diabetic foot care. (64.8%) of patients believed that smoking contributes to reduced blood flow to feet, Majority of the participants said that foot examination should be their own responsibility (94.5%).

More than half of participants (53.9%) had not attended a class on how to care for your feet, similarly (59.4%) of participants had not received information about foot care whilst waiting to see the doctor.

On the contrary (56.4%) of participants had read handouts on foot care or footwear and (55.8%) had received education about foot care from the health care worker.

Awareness questions	NO		Yes	
	F	%	F	%
Are you aware that smoking can reduce blood flow in your feet?	58	35.2	107	64.8
Do DM patients should take responsibility for self-foot examination?	9	5.5	156	94.5
Have you ever attended a class on how to care for your feet?	89	53.9	76	46.1
Have you ever read any handouts on foot care or footwear?	72	43.6	93	56.4
Have you ever received education about foot care from the health care worker?	73	44.2	92	55.8
Have you ever received information about foot care whilst waiting to see the doctor?	98	59.4	67	40.6

Table 3: Awareness about diabetic foot care.

Practice about diabetic foot care:

Table 4 shows the level of practice about diabetic foot care, (64.8%) of participants did not walk barefoot, (66.7%) inspect thier shoes prior to wearing them, (70.9%) of participants do not wore socks, while (64.2%) examined their feet.

Moreover (59.4%) of participants washed their feet every day, (64.2%) dry between their toes and used cream on feet (63%).

In addition, (78.2%) of the participants use medicated foot products and trimmed their toenails (80.6%), More than half of

participants (58.2%) were not using hot-water bottle on feet; as a result, 57% of participants did not check the water temperature before soaking their feet.

Practice questions	NO		Yes	
	F	%	F	%
Do you walk barefoot?	107	64.8	58	35.2
Do you inspect your shoes prior to wearing them?	55	33.3	110	66.7
Do you soak your feet?	117	70.9	48	29.1
Do you examine your feet?	59	35.8	106	64.2
Do you wash your feet every day?	67	40.6	98	59.4
Do you dry between your toes?	59	35.8	106	64.2
Do you use cream on your feet?	61	37.0	104	63.0
Do you use medicated foot products?	36	21.8	129	78.2
Do you trim your toenails?	32	19.4	133	80.6
Do you use a hot-water bottle on your feet?	96	58.2	69	41.8
Do you check the water temperature before soaking your feet?	94	57.0	71	43.0

Table 4: Practice of diabetic foot care.

Participants` Scores for knowledge, Awareness and practice on diabetic foot care

Table 5 shows descriptive statistics of knowledge, awareness and practices on DFC scores. High scores represent best responses.

The highest possible score for all knowledge-related questions was 7. Based on the data of the 165 participants, the knowledge score ranged between 0 and 7 (mean ± standard deviation, 5.50 ± 1.83), indicating higher knowledge level among 60.6% of them. Further, 20% participants scored low on knowledge about diabetic foot care.

Regarding awareness, the highest possible score for all awareness related questions was 6. Based on the data of the 165

participants, the awareness score ranged between 1 and 6 (mean± standard deviation, 3.07 ± 2.18). It was observed that near half of participants (48.5%) had a negative awareness towards the disease, reversely (37.6%) showed high awareness.

Concerning practice, scores ranged between 0 - 11, (mean± standard deviation, 6.77 ± 2.74). Practices of foot self-care revealed that, (37.6%) participants scored poorly, while (35.2%) of patients followed good diabetic foot care practices.

Although most participants showed good knowledge about DFC, they had mediocre scores for awareness and practice of DFC respectively.

Domain	Score range	Frequency	Percent	Mean (SD)
Knowledge	Low (0-3)	33	20.0	5.50 (1.83)
	Moderate (4-5)	32	19.4	
	High (6-7)	100	60.6	
Awareness	Negative (1-2)	80	48.5	3.07 (2.18)
	Neutral (3-4)	23	13.9	
	High (5-6)	62	37.6	
Practice	Poor (0-5)	62	37.6	6.77 (2.74)
	Moderate (6-8)	45	27.3	
	Good (9-11)	58	35.2	

Table 5: Participants Scores for knowledge, Awareness and practice on DFC.

Correlation between Knowledge, Awareness and Practices of DFC

A correlation test indicated a direct and significant correlation between knowledge and awareness ($P < 0.01, r = 0.669$), knowledge

and practices ($P < 0.01, r = 0.650$), and attitudes and practices ($P < 0.01, r = 0.777$).

		Knowledge domain	Awareness domain	Practice domain
Knowledge domain	Pearson Correlation	1	.699**	.650**
	Sig. (2-tailed)		.000	.000
	N	165	165	165
Awareness domain	Pearson Correlation	.699**	1	.777**
	Sig. (2-tailed)	.000		.000
	N	165	165	165
Practice domain	Pearson Correlation	.650**	.777**	1
	Sig. (2-tailed)	.000	.000	
	N	165	165	165
**. Correlation is significant at the 0.01 level (2-tailed).				

Table 6: Correlations between Knowledge, Awareness and Practices of Diabetic Foot Care.

Correlations between demographic and patients’ for knowledge, awareness and practice of DFC

Table 7 presents the Correlations between demographic variables and participants’ knowledge, awareness and practice regarding DFC. There was a positive relationship between gender, awareness and practice, with a positive Pearson coefficient (r) of 0.172 and 0.228 respectively, p -values that were significant ($p < 0.05$).

There was also a positive relationship between educational background, family income and foot care knowledge ($p < 0.05$), contributed in achieving a better score.

There was a significant negative correlation between participant’s job type and the score for DFC ($p < 0.05$), implying that people are more likely to prone to foot ulcers unless take responsibility for self-foot examination.

There was a positive relationship between years of treatment duration, awareness and practice, with a positive Pearson coefficient (r) of 0.166 and 0.163 respectively, p -values that were significant ($p < 0.05$).

There was a positive relationship between hypoglycemic agent, awareness and practice, with a positive Pearson coefficient (r) of 0.246 and 0.227 respectively, p -values that were significant ($p < 0.05$). Similarly comes the relationship between smoking, awareness and practice.

There was a significant positive correlation between participant’s glycemic control and the score for DFC ($p < 0.05$), implying that glycemic good control reduced foot ulceration.

Variables		Knowledge	Awareness	Practice
Gender	r	.084	.172*	.228**
	p	.282	.028	.003
Age groups	r	-.071-	-.077-	.060
	p	.368	.324	.443
Educational Background	r	.242**	.146	.036
	p	.002	.061	.644
Employment	r	.040	-.004-	-.072-
	p	.609	.955	.360
Job Type	r	-.297-**	-.321-**	-.357-**
	p	.000	.000	.000
Family Income	r	.192*	.119	-.014-
	p	.013	.129	.858
Years of treatment	r	.030	.166*	.163*
	p	.702	.033	.036
Type of hypoglycemic agent	r	.078	.246**	.227**
	p	.320	.001	.003
Glycemic Control	r	.386**	.506**	.448**
	p	.000	.000	.000
Smoking	r	.078	.157*	.192*
	p	.321	.044	.013

Table 7: Correlations between demographic and patients’ for knowledge, awareness and practice of diabetic foot care.
 r, Pearson coefficient; p, p-value; ** and *, Correlation is significant at $\alpha = 0.01$ or $\alpha = 0.05$.

Discussion

Late complications of diabetes, especially diabetic foot, may lead to amputation, resulting in functional decline, increased economic burden on patients and a sharp decline in the patients' quality of life. Therefore, care about diabetic foot is necessary.

As measured by current survey, 60.6% of patients with diabetes have good knowledge on diabetic foot care and (48.5%) have a negative awareness toward diabetic foot care. However, only 35.2% of patients with diabetes followed good diabetic foot care practices.

The practice scores were lower than knowledge scores as revealed by the questionnaire, thus reflecting poor compliance with good self-care practices.

These results were comparable to those of other studies where the practice scores were always lower than knowledge scores [13,14].

Patients' knowledge on diabetic foot care

In our study, 56.1% of the participants had moderate and 25.1% had poor knowledge on diabetic foot. These results are in accordance with those of a previous study conducted in Pakistan among admitted diabetic patients reported that most patients 79.17% were uneducated and (37.50%) had poor knowledge about the diabetic complication [15].

Li, *et al.* reported that most patients with type 2 diabetes have a medium level of knowledge [16], In 2015 KAP Study done in Brazil, among patients with Type 2 DM showed that, 49.4% had no knowledge about foot care or how to observe and 80% of them need to know about foot care [17].

Study conducted in South Africa results revealed that: patients who had a higher level of education and less than 65 years old had a better score for foot care education [18].

In brief, the influence of long-term hyperglycemia, oxidative stress, and various vascular and neurological complications, wound healing in patients with diabetes is usually delayed, resulting in chronic ulcers and diabetic foot. As untimely treatment or improper management can lead to local or general infection, gangrene in serious cases, and even to amputation [19].

Patients' awareness on diabetic foot care

The results of the present study demonstrated that (48.5%) of the participants had a negative awareness toward diabetic foot care. Agrawaal study in 2015 found that, 51% of patients diagnosed with DM knew about the relationship between DM and delaying of wound injury healing and only 3% of them take care of their foot. The study showed lack of awareness about the major complication in general, especially care of foot [20], another study reported similar results [15].

Saudi study published in 2010, measured the diabetic foot care program, result showed "increased the awareness of both patients and health care staff about the prevention and management of diabetic foot disease, and decreased the rate of lower extremity amputation after the diabetic foot care education program [21].

Analysis of awareness dimension indicated that patients are negatively aware of pay little attention to diabetic foot care and lack motivation to take preventive measures. Furthermore, diabetic foot complications develop slowly, which leads patients to not realize the serious consequences in a short period of time, patients think that they will not have diabetic foot or complications, which subsequently leads to patients not taking care to prevent diabetic foot.

Patients' Diabetic Foot Care practices:

Diabetic foot care practices among the sample of the study are fluctuated (37.6%) participants scored poorly, while (35.2%) of patients followed good diabetic foot care practices. This is consistent with the findings of studies conducted around the world [22,23]. Patients chose to self-treat their foot problems, possibly due to a lack of foot-care knowledge or poor availability of medical facilities.

The results of this study also agreed with study conducted 2009 in Jeddah city, showed weakness in foot care knowledge and more in the practice among diabetic patients [24].

Poor implementation of practice dimension may be related to the patients' lack of knowledge on foot care for diabetic. Furthermore, foot care necessitates commitment, and checking feet and shoes every day can be repetitive and boring.

Demographic variables influencing DFC knowledge, awareness and practices

Our study examined the relationship between demographic variables and diabetic foot care knowledge, awareness and practices among the participants. We found that gender is positively correlated with diabetic foot care awareness and practices.

Similar findings were also reported in studies conducted by Rossaneis, *et al.* in Brazil. The difference observed may be attributed to the fact that men have lower levels of health literacy and concern for their health than women. Moreover, Women pay more attention to the signs and symptoms of diseases, are more concerned about their body image, and have difficulty accepting the inability to walk properly and physical defects caused by diabetic foot [25].

This study revealed that educational background had impact on the diabetic foot care practice scores. Some studies found a significant association between education status and diabetic foot-care practice levels [26,27]. In addition, agreed with a previous study concluded that patients who have a higher level of education have better knowledge of diabetic foot care [28].

However, significant negative correlation was detected between DFC scores and different jobs. This relationship can be explained by the lack of self-commitment that most of patients did not seek medical care even after being diagnosed with a chronic disease. This may be due to a lack of time during the working days, their schedules not in conformity with the working hours of health services, lack of severe symptoms, facing challenges in accessing medical services [29].

According to Study done in Oman 2017 found that, good foot care related to higher income, educational level, and patient awareness. DM complications and its management [30], our study revealed similar findings.

Knowledge, awareness and practice influenced by the duration of diabetes; patients having diabetes for a long duration were more likely to have repetitive educational sessions, which may favor their awareness and practice. Therefore, individualized and systematic education should be developed and guidance should be provided according to disease duration to improve the DFC knowledge, awareness and practice. This is consistent with the findings of previous research [16,31].

The risk of ulcers and lower limb amputations is higher in males, in patients with diabetes duration of 10 years or more, those who have poor glycemic control or have other cardiovascular retinal or renal complications [32].

It is interesting to note that most of the surveyed population (56.3%) were educated and that 62.4% of them had good glycemic control; and, the results are inconsistent with findings, as reported elsewhere [33].

The study revealed that (81.8%) of patients were non smoker or previous smoker the participant were aware that smoking can reduce blood flow in their feet. current smokers had lower levels of knowledge and poor attitudes toward diabetic foot prevention than those who never smoked.

Smoking accounts for more than half of the risks contributing to the development of peripheral artery disease and DFD. Improving knowledge by using smoking cessation interventions amongst diabetic patients may be a good public health strategy in decreasing the risks of DFD [28,34].

Limitation

This study was conducted in at Chronic Diseases Clinic in Al-Kharj hospital; the result of this study may not represent the entire Riyadh city. Responses were determined through a self-reported questionnaire, which may have response and recall biases.

To improve this issue, conducting a prospective study with larger sample size to cover different places, including rural areas and to explore the socio-cultural, clinical, and psychological factors that influence foot-care behavior.

Conclusion

Participants have good knowledge, but showed negative awareness and poor practice toward the disease. We discovered that educational background, family income, gender, glycemic control, duration of diabetes and smoking were influencing patients' practice and awareness about foot care. It is necessary to strengthen the education of diabetic foot prevention to improve the knowledge and practices in order to motivate positive awareness among diabetic foot patients.

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