Original Article

Attitude and knowledge about foot care among diabetic patients in Riyadh, Saudi Arabia

Zainab J. Alshammari[1], Leila A. Alsaid[1], Parameaswari PJ[2], Abrar A. Alzahrani[3]

[1]Department of Family Medicine, King Saud Medical City, [2]Research Center, King Saud Medical City, [3]Almaarefa University, Riyadh, Saudi Arabia

Abstract

Introduction: Saudi Arabia ranks second as the highest country with the highest prevalence of diabetes mellitus (DM) in the Middle East and seventh in the world. Knowledge, attitude, and good practice for foot care are essential in the management and prevention of diabetic foot ulcers. **Objective:** This study was conducted to determine the knowledge, attitude, and practice to diabetic foot care among patients attending a diabetic clinic in Riyadh, Saudi Arabia. **Materials and Methods:** We conducted a descriptive cross-sectional study of all the patients with Type 1 and Type 2 diabetes aged ≥15 years seen at a diabetic clinic of King Saud Medical City in Riyadh, Saudi Arabia. A structured questionnaire on knowledge, attitude, and practices was used to collect the data. **Results:** In total, 368 diabetic patients were surveyed, comprising 111 (30.2%) males and 257 (69.8%) females. About 282 (76.6%) patients had good knowledge of diabetic foot and foot ulcers. Only 41 (11.1) patients have attended a class on diabetic foot care, and 81 (22.0%) received education on diabetic foot care from a doctor and 38 (10.3%) from a nurse. Majority of them washed their feet daily (98.4%), 59.8% inspects shoes before wearing them, but less than half of the patients (47.6%) actually self-inspect their foot daily. Being married, having a secondary and university level of education, and being a government employee had significantly better knowledge of diabetic foot compared with their counterparts. There were no significant differences in the attitude toward diabetic foot and diabetic foot care across age groups. Patients with longer duration of diabetes (>5 years) significantly had better practice of diabetic foot care. **Conclusion:** This study revealed a high percentage of the surveyed population with good knowledge and good practice of diabetic foot care, however with a poor attitude toward foot care. There were very few patients who received formal education on diabetic foot and diabetic foot care. There is a need for awareness program for these patients not only to improve their knowledge and practices, but also to motivate patients to have a positive attitude toward diabetic foot care.

Keywords: Attitude, diabetic foot, diabetes mellitus, foot care, knowledge

Introduction

Diabetes mellitus (DM) is a highly prevalent chronic disease. The worldwide prevalence among adults aged 20–79 years was at 6.4% (~285 million adults) in 2010 and was projected to increase to 7.7% (~439 million adults) in 2030.[1] As early as 2014, the worldwide prevalence was already 422 million, which is almost close to the projected prevalence for 2030.[2] There was an observed increase in the prevalence of DM among individuals aged >65 years.[3] Foot ulceration is one of the most common complications of diabetes.[4] The current reported global prevalence of diabetic foot ulcer is 6.3%, higher among males (4.5%), higher among type 2 diabetics (6.4%), and highest in North America compared with other countries.[5] It has been reported that nearly 70% of nontraumatic amputations were implemented due to a diabetic foot.[6] However, most such foot ulcers can be prevented by educating people with diabetes.[7]

Address for correspondence: Dr. Zainab J. Alshammari, Department of Family Medicine, King Saud Medical City, Ulaishah, 7790, Al Imam Abdul Aziz Ibn Muhammed Ibn Saud, Riyadh 12746, Saudi Arabia.
E-mail: zainabalshammari2014@gmail.com

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Saudi Arabia ranks second as the highest country with the highest prevalence of DM in the Middle East and seventh in the world.[8] The World Health Organization (WHO) estimates a 14.4% prevalence of diabetes as of year 2016 (14.7% among males and 13.8% among females), and it constitutes 5% of total deaths for all ages among Saudis.[9] Several studies conducted in Saudi Arabia showed varying prevalence of diabetic foot ulcers from 26.0% to 61.8%.[10,11]

One of the most important aspects of the management of diabetic foot ulcer is proper care and prevention of injuries to the foot. This requires patients to have proper education, awareness of proper care, and management of foot ulcers and knowledge. Studies have shown that only 22.2% of diabetic patients examine their feet only when they experience a problem,[12] whereas some reports showed that 61.8% of diabetic patients had poor diabetic foot care.[13]

A study showed that a large number (>50%) of diabetic patients were found to have poor knowledge of diabetic foot care.[13,14] Those who had a higher level of education and who were less than 65-year old had a significantly better score for previous foot care education.[12] Other studies have shown that only 13.3% of the study participants have good knowledge of diabetic foot care.[15] On the other hand, there were also studies that have shown a high percentage of knowledge (75.0%) on diabetic foot care among diabetics.[16] Patients who received good education on diabetes and diabetic foot care had better knowledge and had favorable attitudes toward diabetic foot care,[11,13,17] and poor knowledge was associated with poor foot care.[14,16,17]

This study was conducted to determine the knowledge, attitude, and practice to diabetic foot care among diabetic patients attending a diabetic clinic in Riyadh, Saudi Arabia.

Materials and Methods

A descriptive cross-sectional study was conducted in the diabetic clinic of tertiary care hospital - King Saud Medical City, Riyadh, Saudi Arabia. All patients diagnosed with Type 1 and Type 2 diabetes aged ≥15 years were recruited randomly to join the study. Patients <15 years were excluded from the study. The minimum required sample size [www.raosoft.com/samplesize] for a target population of 8,000 patients based on 95% confidence level and 5% margin of error was 367. The response rate was 93.4%.

Data collection was done by the investigator using a structured questionnaire in the Arabic language. The set of closed type questions were developed from the literature review of similar objectives[10-17] and were tested for its reliability and validity with a Cronbach's alpha 0.86. The questionnaire contained three parts: (1) demographic profile of the patients, (2) six questions on knowledge and seven questions on attitude toward diabetic foot care, and (3) eight questions on the practice of diabetic foot care. The information was collected by personal interview method using the questionnaire after the informed consent.

This study was approved by the Institutional Review Board [IRBNo.H1RE-01-Aug18-01] of King Saud Medical City, Riyadh, Saudi Arabia.

Statistical analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS) version 23.0 (SPSS Inc., IBM, Armonk, NY, USA). The correct response for assessing knowledge was scored as "1" and patients with total knowledge score of 0–3 were categorized as "poor" knowledge and that of 4–6 as "sufficient/good" knowledge. The positive attitude was given a score of "1" and the patients with total attitude score of 0–4 were grouped as "negative" attitude and score above 4 as "positive" attitude. Those diabetic patients who practiced foot care were provided a score of "1" and those with total practice score of "4 and below" were classified under "poor" practice and that of "5 and above" under "good" practice. Good diabetic foot practice score was categorized as poor practice for total practice score of 4 and below and good practice score for 5 and above.

Categorical variables were reported as frequency (*n*), percentage, and continuous variables as mean ± standard deviation (SD) and range. Significant differences in the frequencies and percentages of categorical variables were analyzed using the Chi-square test and analysis of variance (ANOVA) for continuous variables. A *P* value of <0.05 was considered statistically significant.

Results

In total, 368 diabetic patients were surveyed comprising 111 (30.2%) males and 257 (69.8%) females. Majority of the patients (*n* = 247, 67.1%) were married, and 163 (44.3%) housewives. More than half of the patients (*n* = 217, 58.9%) had diabetes for 6–20 years, and 310 patients (84.2%) visit the diabetic clinic one to five times per year. Table 1 shows the detailed demographic profile of all patients. Table 2 shows the responses of all patients to questions on knowledge, attitude, and practice related to diabetic foot and diabetic foot ulcer.

Knowledge and attitude

Overall, 256 (69.6%) patients knew that they may develop reduced blood flow to their feet, 289 (78.5%) said that they may develop lack of sensation on their feet, 326 (88.6%) replied that they can have foot ulcers, 331 (89.9%) told that they can have foot gangrene, 252 (68.5%) identified that if there will be a loss of sensation in their feet, and 238 (64.7%) recognized that with a reduced blood flow to their feet makes them prone to foot ulcers.

There were 20 (5.4%) patients who had a knowledge score of zero, 10 (2.7%) with a score of 1, 31 (8.4%) with a score of 2, 25 (6.8%) had a score of 3, 62 (16.8%) had a score of 4, 23 (6.3%) had a score of 5, and 197 (53.5%) had a score of 6. Overall, there were 282 (76.6%) patients had a good knowledge on diabetic foot and foot ulcers, whereas 86 (23.4%) patients had a poor knowledge of diabetic foot and foot ulcers. There were only 41 (11.1)

patients who have attended a class on diabetic foot care; however, 81 (22.0%) patients received education on diabetic foot care from a doctor and 38 (10.3%) from a nurse. About 279 (75.8%) patients takes responsibility for self-foot examination, 346 (94.0%) enjoys a normal life, and 357 (97.0%) patients believes that proper nutrition is a way to control blood sugar. There were 53 (14.4%) patients who had sores and cuts on their feet, of which 16 (4.3%) approached a healthcare center for treatment, whereas 6 (1.6%) used herbal medicine for their foot cuts and sores.

Practice

Majority of the patients wash their feet daily (98.4%), trim toenails and file edges (97.0%), protects and keep their feet from hot and cold temperatures (83.2%), does not walk barefoot (79.6%), applies lotion or moisturizer on feet (67.1%), inspects shoes before wearing them (59.8%), and dries feet after washing (54.3%). However, less than half of the patients (47.6%) actually self-inspect their foot daily.

Table 3 shows the association of demographic variables with their knowledge, attitude, and practices toward diabetic foot and foot care.

Table 1: Demographic characteristics of 368 diabetic patients attending the diabetic clinic at King Saud Medical City in Riyadh, Saudi Arabia

Demographic variables	*n*	Percentage
Gender		
Male	111	30.2
Female	257	69.8
Age groups (year)		
15-20	5	1.4
21-30	7	1.9
21-40	26	7.1
41-50	97	26.4
51-60	135	36.7
>60	98	26.6
Marital status		
Single	17	4.6
Married	247	67.1
Divorced	43	11.7
Widowed	61	16.6
Level of education		
Illiterate	103	28.0
Can read and write	53	14.4
Primary	55	14.9
Intermediate	40	10.9
Secondary	54	14.7
University	63	17.1
Occupation		
Government employee	41	11.1
Private employee	33	9.0
Retired	68	18.5
Housewife	163	44.3
Unemployed	56	15.2
Others	7	1.9
Duration of diabetes (year)		
1-5	79	21.5
6-10	105	28.5
11-20	112	30.4
≥21	72	19.6
Number of visits to the diabetes clinic per year		
1-5 times	310	84.2
6-10 times	35	9.5
11-15 times	18	4.9
≥16 times	5	1.4

Table 2: Responses to questions on knowledge, attitude, and practice of diabetic foot and diabetic foot ulcers among 368 patients

Questions	Yes	No
Knowledge	***n* (%)**	***n* (%)**
Knows that diabetic patients may develop reduced blood flow to their feet	256 (69.6)	112 (30.4)
Knows that diabetics may develop lack of sensation on their feet	289 (78.5)	79 (21.5)
Knows that diabetics can develop foot ulcers	326 (88.6)	42 (11.4)
Knows that diabetics can develop foot gangrene	331 (89.9)	37 (10.1)
Knows that with loss of sensation in the feet, makes them prone to foot ulcers	252 (68.5)	116 (31.5)
Knows that reduced blood flow to the feet, makes them prone to foot ulcers	238 (64.7)	130 (35.3)
Attitude		
Attend a class on diabetic foot care	41 (11.1)	327 (88.9)
Have received education on diabetic foot care from a doctor	81 (22.0)	287 (78.0)
Have received education on diabetic foot care from a nurse	38 (10.3)	330 (89.7)
Takes responsibility for self-foot examination	279 (75.8)	89 (24.2)
Enjoys normal life by controlling blood sugar level	346 (94.0)	22 (6.0)
Nutrition is a factor to control blood sugar level	357 (97.0)	11 (3.0)
Had sores and cuts on their feet, and what they do if they had cuts and sores on their feet Goes to the healthcare center Goes to the emergency Waits for hospital appointment Uses herbal medicine	53 (14.4) 16 (4.3) 15 (4.1) 16 (4.3) 6 (1.6)	315 (85.6)
Practice		
Self-inspects their foot daily	175 (47.6)	193 (52.4)
Wash their feet daily	362 (98.4)	6 (1.6)
Dries feet and between toes after washing	200 (54.3)	168 (45.7)
Applies lotion/moisturizer on feet	247 (67.1)	121 (32.9)
Does not walk barefoot	293 (79.6)	75 (20.4)
Inspects shoes before wearing them	220 (59.8)	148 (40.2)
Protects and keep feet away from hot and cold temperature	306 (83.2)	62 (16.8)
Trim toenails straight and file edges	357 (97.0)	11 (3.0)

Table 3: Correlates of knowledge, attitudes, and practices among 368 patients with type 2 diabetes

Demographic variables	Knowledge		*P*	Attitude		*P*	Practice		*P*
	Good n (%)	Poor n (%)		Good n (%)	Poor n (%)		Good n (%)	Poor n (%)	
Age groups (year)									
15-20	3 (60.0)	2 (40.0)	0.805	0	5 (100)	0.075	3 (60.0)	2 (40.0)	0.219
21-30	6 (85.7)	1 (14.3)		3 (42.9)	4 (57.1)		6 (85.7)	1 (14.3)	
31-40	19 (73.1)	7 (26.9)		3 (11.5)	23 (88.5)		19 (73.1)	7 (26.9)	
41-50	78 (80.4)	19 (19.6)		9 (9.3)	88 (90.7)		84 (86.6	13 (13.4)	
51-60	103 (76.3)	32 (23.7)		24 (17.8)	111 (82.2)		104 (77.0)	31 (23.0)	
≥61	73 (74.5)	25 (25.5)		11 (11.2)	87 (88.8)		72 (73.5)	26 (26.5)	
Gender									
Male	92 (82.9)	19 (17.1)	0.063	17 (15.3)	94 (84.7)	0.525	80 (72.1)	31 (27.9)	0.059
Female	190 (73.9)	67 (26.1)		33 (12.8)	224 (87.2)		208 (80.9)	49 (19.1)	
Marital status									
Single	14 (82.4)	3 (17.6)	0.007	4 (23.5)	13 (76.5)	0.145	13 (76.5)	4 (23.5)	0.678
Married	200 (81.0)	47 (19.0)		33 (13.4)	214 (86.6)		194 (78.5)	53 (21.5)	
Divorced	31 (72.1)	12 (27.9)		2 (4.7)	41 (95.3)		36 (83.7)	7 (16.3)	
Widow	37 (60.7)	24 (39.3)		11 (18.0)	50 (82.0)		45 (73.8)	16 (26.2)	
Educational levels									
Illiterate	64 (62.1)	39 (37.9)	<0.001*	13 (12.6)	90 (87.4)	0.122	75 (72.8)	28 (27.2)	0.743
Can read and write	41 (77.4)	12 (22.6)		4 (7.5)	49 (92.5)		43 (81.1)	10 (18.9)	
Primary	40 (72.7)	15 (27.3)		7 (12.7)	48 (87.3)		43 (78.2)	12 (21.8)	
Intermediate	31 (77.5)	9 (22.5)		3 (7.5)	37 (92.5)		32 (80.0)	8 (20.0)	
Secondary	46 (90.7)	(9.3)		8 (14.8)	46 (85.2)		44 (81.5)	10 (18.5)	
University	57 (90.5)	(9.5)		15 (23.8)	48 (76.2)		51 (81.0)	12 (19.0)	
Occupation									
Government employee	38 (92.7)	3 (7.3)	0.014*	8 (19.5)	33 (80.5)	0.419	29 (70.7)	12 (29.3)	0.150
Private company employee	25 (75.8)	8 (24.2)		3 (9.1)	30 (90.9)		27 (81.8)	6 (18.2)	
Retired worker	54 (79.4)	14 (20.6)		13 (19.1)	55 (80.9)		49 (72.1)	19 (27.9)	
Housewife	126 (77.3)	37 (22.7)		17 (10.4)	146 (89.6)		137 (84.0)	26 (16.0)	
Unemployed	34 (60.7)	22 (39.3)		8 (14.3)	48 (85.7)		40 (71.4)	16 (28.6)	
Others	5 (71.4)	2 (28.6)		1 (14.3)	6 (85.7)		6 (85.7)	1 (14.3)	
Duration of diabetes (year)									
1-5	53 (67.1)	26 (32.9)	0.085	6 (7.6)	73 (92.4)	0.059	54 (68.4)	25 (31.6)	0.023*
6-10	87 (82.9)	18 (17.1)		12 (11.4)	93 (88.6)		(85.7)	15 (14.3)	
11-20	88 (78.6)	24 (21.4)		16 (14.3)	96 (85.7)		(81.3)	21 (18.8)	
≥21	54 (75.0)	18 (25.0)		16 (22.2)	456 (77.8)		53 (73.6)	19 (26.4)	
Number of visits to the clinic									
1-5 times	235 (75.8)	75 (24.2)	0.472	37 (11.9)	273 (88.1)	0.010*	243 (78.4)	67 (21.6)	0.453
6-10 times	30 (85.7)	5 (14.3)		6 (17.1)	29 (82.9)		25 (71.4)	10 (28.6)	
11-15 times	14 (77.8)	4 (22.2)		4 (22.2)	14 (77.8)		15 (83.3)	3 (16.7)	
≥16	3 (60.0)	2 (40.0)		3 (60.0)	2 (40.0)		5 (100)	0	

*Significant at 5% level

Knowledge

About 81% of the married patients had a significant adequate knowledge compared with others ($P = 0.007$). Good level of knowledge was seen in 90.7% of the secondary level patients and 90.5% of graduates ($P < 0.001$). The statistically significant 92.7% employees from the government sector also were well aware compared with others. There were no significant differences in the knowledge scores (poor versus good knowledge) across different age groups ($P = 0.805$), gender ($P = 0.063$), duration of diabetes ($P = 0.085$), and number of visits to the diabetic clinic ($P = 0.472$).

Attitude

Overall, there were 318 patients (86.4%) who have poor attitude toward diabetic foot and diabetic foot care. Patients who visited the diabetic clinic >10 times significantly have better attitude toward diabetic foot and diabetic foot care compared with those who have visited the diabetic clinic <10 times ($P = 0.014$). There were no significant differences in the attitude toward diabetic foot and diabetic foot care across age groups ($P = 0.075$), gender ($P = 0.525$), marital status ($P = 0.145$), educational levels ($P = 0.122$), occupation ($P = 0.419$), and duration of diabetes ($P = 0.059$).

Practices

Overall, there were 288 patients (78.3%) who practice good foot care. Patients who have a longer duration of diabetes (>5 years) significantly have better practice of diabetic foot care ($P = 0.023$). There were no significant differences in the practice of diabetic foot care across different age groups ($P = 0.219$), gender ($P = 0.059$), marital status ($P = 0.678$), educational

level ($P = 0.743$), occupation ($P = 0.150$), and number of visits to the diabetic clinic ($P = 0.453$).

Discussion

This study highlights the knowledge, attitudes, and practices to diabetic foot care among diabetic patients attending a diabetic clinic in Riyadh, Saudi Arabia. This study showed that 7–8 in 10 of our diabetic patients who were attending the diabetic clinic had a good knowledge of diabetic foot and foot ulcers. This translates to 2–3 in 10 of our diabetic patients who have a poor knowledge of diabetic foot and foot ulcers. Our rate for good knowledge (76.6%) is much higher than reported by previous studies done in Malaysia (58%),[13] India,[16] and several previous studies conducted in Saudi Arabia by Solan *et al.* (53.6%)[17] and Al-Aboudi *et al.* (13.2%).[18] Three of the four aforementioned[13,16-18] studies had smaller number of population, whereas the study that was conducted by Algshanen *et al.*[14] had 519 patients with an almost similar good knowledge rate of 70%–80% compared with our study. The wide variation in the prevalence rates of good knowledge in these studies might have been affected by the data collection methods that were used. The three studies that reported lower rates of good knowledge[16-18] were self-administered, whereas the other two studies[13,14] were done by interviews (one of which reported an almost similar rate to our study.[14] It has been reported that face-to face interviews yield more motivation from respondents and have the advantage of yielding better and more accurate responses.[18] There are more influencing biases on the responses obtained when using a self-administered questionnaire than using an interview.[19]

This study also is in agreement with other previous studies that patients who have a higher level of education have better knowledge of diabetic foot care.[11,13,17] Illiterate patients require a deeper explanation or interpretation of the questions being asked, which may not be viable in a self-administered questionnaire.[20] It has been suggested that being married translates to the presence of spousal support related to nutrition and dietary control, commitment to treatment and management, and better coping with chronic diseases, such as diabetes, which may explain why our married couples know diabetes foot care more than unmarried patients.[21] Being employed translates to better income and probably better quality of life compared with the unemployed and those with low-income patients. Patients who are employed and educated may have received information on modification and prevention of injuries and may have improved their attitude toward diabetes and diabetic foot care for a healthier lifestyle.[22]

This study also highlights that patients who frequently visit the diabetic clinic has better attitude toward diabetic foot and diabetic foot care. Most of these patients who have better attitude toward diabetic foot and diabetic foot care were patients who had long-standing diabetes of >5 years. Patients who were had visited the diabetic clinic several times may have acquired information through several years of having diabetes or may have spent more time with their doctors and nurses to search and ask for possible explanations that were probably ignored by diabetic patients who had shorter duration of diabetes. Another thing is that physicians and nurses may have spared more time for their patients particularly when such complication as diabetic foot occur among patients with long-standing diabetes. For this reason, physicians and nurses regardless of the duration of diabetes should realize the importance of education and instilling awareness for diabetic complications, such as diabetic foot at the time of diagnosis.[23]

Surprisingly, the practice of diabetic foot care was significantly better among patients who have a longer duration of diabetes (>5 years). Less than half (46.0%) of our patients self-examine their foot daily, and <60% of our patients dries their feet after washing and inspect their shoes before wearing, although this rate is higher compared to previous studies on diabetic foot care practices.[12,24] This study reveals that seven to eight of our patients have a good knowledge and practice of diabetic foot and diabetic foot care. However, a significant majority (86.4%) have poor attitude toward diabetic foot and diabetic foot care but many have poor attitude and practices of diabetic foot and diabetic foot care. This knowledge needs to be translated into good practice and good attitude toward foot care. Very few of our patients have received education on diabetic foot and foot care, and also very few of our patients (4.3%) sought consultation to a healthcare center for their sores and cuts on their feet, plus 1.6% still uses herbal medicines. Probably, the low number of our patients receiving proper education on diabetic foot and diabetic foot ulcer explains the marked gap in knowledge and attitude of our patients. There is a need to reorient and motivate healthcare practitioners not only educating diabetic patients but constantly reminding these patients of the complications of diabetes.[24]

The study design using a questionnaire even it was conducted via face-to-face interview may have served as a limitation to the study. The fact that our questions were designed and answerable by yes or no pattern may have affected the validity of the information obtained. It has been suggested that interviewers strongly prefer to ask one-sided yes/no questions and that respondents usually give agreeing answers to these yes/no questions.[25] Probably, this is the reason why there was a high rate of knowledge and practices among our respondents, since these patients may just have agreed to answer "yes" on several questions pertaining to knowledge and practices. Another limitation of this study is that it was conducted only among patients attending a single diabetic clinic and hence may not be generalizable to the overall diabetic population. Moreover, the study enrolled patients only from one hospital in one region and hence cannot also be generalized to the entire diabetic population of Saudi Arabia.

Conclusion

This study revealed a high percentage of the surveyed population with good knowledge and good practice of diabetic foot and diabetic foot care, however with a corresponding poor attitude

toward foot care. There were very few patients who received formal education on diabetic foot and diabetic foot care. There is a need for awareness program for these patients not only to improve their knowledge and practices but also to motivate patients to have a positive attitude toward diabetic foot care.

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Conflicts of interest

There are no conflicts of interest.

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