

Foot care practices among type 2 diabetics attending a primary care military hospital, Taif, Saudi Arabia

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Abstract

Objective: To determine foot care practices among type 2 diabetic patients without previous history of foot problems attending primary care clinics in Prince Mansour Military Community Hospital (PMMCH), Taif, Saudi Arabia. **Methods:** A Cross-sectional descriptive study using a convenient non probability sample was done during August and September 2010. 188 type 2 diabetic patients were questioned using a predesigned questionnaire sheet after reviewing their medical files. Collected data included: socio-demographic features, medical condition, diabetes control and foot care practices, which was later judged using a scoring system to show its quality. **Results:** Among the studied sample: 112/188 (59.6%) were males; mean age was 56.5 years \pm 14.5 SD. Illiteracy was prevalent in 47.9% of them. Poor glycemic control ($HbA_{1c} \geq 7$ mmol) was reported in 75% of the patients. Regular foot checkup has never been performed in 30.3% of the sample, 65.4% never seek medical advice for their foot problems, 61.2% never used special medical shoes and 46.3% never checked inside the shoe before wearing it. Using our scoring system, 63.3% of the studied patients were considered poor in their foot care practices. Educational level was the only factor predicting the level of good foot care practices, those with higher level were found to have better practices ($OR=2.179$, 95% $CI=1.074-4.423$ and $p<0.05$). **Conclusions:** Health education programs integrated in comprehensive foot care clinics are crucial to limit foot complications among the growing number of diabetic patients.

Key words: Foot Care, Practices, Type 2 Diabetes, Primary Care, Military, Saudi Arabia

INTRODUCTION

Diabetes mellitus (DM) is the most common endocrine disease in the world.⁽¹⁾ The number of adults with diabetes in the world increased from 135 million in 1995, to 230 million in 2011, and according to current projections, it is expected to affect 300 million by the year 2025. The increase is anticipated to affect mainly the developing countries where it is estimated to be 170% compared to 42% increase in the developed world.⁽²⁾ Diabetes is a chronic illness that requires continuing

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medical care and ongoing patient self-management education and support to prevent acute complications and to reduce the risk of long-term complications.⁽³⁾ The development and progression of chronic complications of diabetes is closely related to glycaemic control.⁽⁴⁾ Micro and macrovascular pathological lesions can involve various organs and tissues resulting in significant morbidity and mortality.⁽⁵⁾ Foot complications from diabetes are major causes of amputation and its subsequent physical and emotional problems.⁽⁶⁾ Peripheral vessels and nerve disorders may lead to foot ulcers, and superadded infection can cause foot gangrene. This problem is one of the main reasons for admission of diabetic patients to hospitals, and leads to escalating medical expenses worldwide.⁽⁷⁾ In Saudi Arabia and the Arab world, the situation is even worse.⁽⁸⁾

In Saudi Arabia, there has been an 8% increase in the prevalence of diabetes

during the last decade,⁽⁹⁾ and it is estimated that 25% of the Saudi population over the age of 40 are diabetic.⁽¹⁰⁾ With the increased burden of diabetes in Saudi Arabia, the care has shifted from specialist to primary care, with the subsequent establishment of chronic disease clinics at different Primary Healthcare Centers (PHCs) around the Kingdom.⁽¹¹⁾ Among the pioneers in the Kingdom to present a comprehensive foot care program, is at King Abdul-Aziz medical city in Riyadh, where they implemented in 2002 an approach to maintain the health of diabetic patients' feet, thereby resulting in a dramatic reduction in the physical and emotional cost to patients, society, and to the healthcare system.⁽¹⁰⁾ On the other hand, the concept of availability of a professional diabetic foot care clinic integrated within the PHCs is still not widely implemented in Saudi Arabia compared to the burden of the disease in the community.⁽¹¹⁾

Few studies have been done in the Kingdom regarding foot care practices among diabetic patients. Most researchers who tried to clarify the same topic in the developed countries, showed that the majority of patients had inadequate awareness about the proper care to their feet.^(12,13) Increasing the knowledge, awareness and self care of the foot among diabetic patients have been found to be cost effective ways of preventing diabetic foot ulceration especially in developing economies characterized by common illiteracy, inadequate healthcare facilities and lack of skilled healthcare personnel.^(14,15)

The objective of the current study was to determine foot care practices among type 2 diabetic patients without previous history of foot problems attending primary care clinics in Prince Mansour Military Community Hospital (PMMCH), Taif, Saudi Arabia.

Subjects and methods:

Study design: A cross-sectional descriptive study.

Study sample: A convenient non probability

sample of 188 Saudi participants. All participants were already diagnosed with type 2 diabetes. All diabetic patients (males and females) attending the PMMCH primary healthcare clinics for any reason during August and September 2010 and willing to participate in the study were included. Patients with history or current diabetic foot ulcer or amputation were excluded as they may be more attentive of their foot care.

Study setting: Prince Mansour military community hospital. The hospital (100 beds) is the main primary care centre serving the military community in Al-Taif military area, located in the western province of Saudi Arabia. The hospital is a part of a network also including a tertiary care hospital (355 beds), a rehabilitation centre, a general hospital serving Al-Taif military airbase, and a group of primary healthcare centers inside major military units. The served military community is principally formed of military recruits working in Al-Taif area and their family dependents (around 100.000 in 2010). The hospital is also

occasionally serving military individuals temporarily resident in Al-Taif area.

Ethical considerations: Before the study, an approval of the regional research ethics committee in Al-Taif military hospitals was taken. The studied patients were asked to participate after describing to them the study objective, and ensuring that all collected data will be used only for research purposes and to improve the delivered service. Consent was signed by each of them.

Data collection techniques: Data were collected using a pre-designed, healthcare staff administered interview questionnaire, supervised by trained family physicians, and also through reviewing their medical files. The questionnaire included three main sections:

1- Socio-demographic characteristics including their gender, age, educational level, occupation, nature of work, individual monthly income, and type of residence.

2- Medical history including duration of diabetes, medications used, presence and type of complications, history of associated chronic medical conditions and degree of diabetes control using HbA_{1c} as parameter of control where those ≥ 7 mmol were considered poorly controlled.⁽¹⁶⁾ Medical history data were collected to provide a comprehensive picture of the studied sample, it was also included to see if there is a possible correlation with the level of foot care practices.

3- Diabetic foot care practices regarding regular foot check up, drying in between the toes, cutting nails by help of others, testing for water temperature before washing, covering foot injury, checking inside the shoe before wearing it, keeping the foot always moist, wearing special type of shoes, and seeking medical advice for foot problems. These questions were modified after reviewing the American

diabetic association guidelines for diabetic foot care.⁽¹⁷⁾ The questions were translated to Arabic language, validity was ensured after a pilot evaluation.

For the practice section of questions, a scoring system was designed giving the values of 2 to those who are always practicing foot care, 1 to those responded sometimes and value of zero to those who never did the practice. The total practice score was interpreted into 2 categories: Poor practice (<50%) and Good practice (≥50%).

The collected data were reviewed, coded, verified, and statistically analyzed using the statistical package SPSS version 16 (SPSS Inc., Chicago, Illinois, USA). Descriptive and analytical statistics for all studied variables were done. Stepwise logistic regression analysis was used to find the association between the characteristics of the diabetic patients (independent variables) and their level of practice (dependant variable), and a *p*-

value level of <0.05 was considered as statistically significant throughout the study.

RESULTS

Table 1 shows the socio-demographic characteristics of the studied sample; 188 diabetic cases were interviewed: 112 (59.6%) males and 76 (40.4%) females, their mean age was 56.5 years ±14.5SD. Illiteracy was present among 47.9% of them and 18.6% of them had a primary level of education. It was found that 37.8% were retired, 36.2% were housewives and 63.8% had a civilian nature of work (not an active military recruits). Those living in Villas or private houses constituted 58.5%.

Mean duration of diabetes in the studied sample was 11.7 ± 5.4 years. Patients were found to have the following complications: retinal 53.7%, neurological 38.8%, cardiovascular 14.9%, and renal 11.2%. It was noticed that 56.4% of patients had no history of an associated chronic conditions but 16% had hypertension and hyperlipidaemia. Oral

hypoglycemic drugs were used as the only glycemic control ($\text{HbA}_{1c} \geq 7$ mmol) was line of treatment in 48.4% of cases. Poor reported among 75.0% of them (Table 2).

Table 1: Socio-demographic characteristics of the studied diabetic patients:

Socio-demographic characteristics	Total (n=188)	
	No.	%
1- Gender		
Male	112	59.6
Female	76	40.4
2- Age in years		
15 -< 30	9	4.8
30 -< 45	26	13.8
45 -< 60	70	37.2
60 -< 75	62	33.0
≥ 75	21	11.2
Mean age = 56.5 \pm 14.5 SD		
3- Educational level		
Illiterate	90	47.9
Primary	35	18.6
Preparatory	21	11.2
Secondary	22	11.7
University	20	10.6
4- Occupation		
Military	68	36.2
Civilian (family dependents)	120	63.8
5- Job nature		
Retired	71	37.8
Housewife	68	36.2
Office work	22	11.7
Field work	20	10.6
Students	7	3.7
6- Monthly income in Saudi Riyal (S.R)		
Less than 3000	34	18.1
3000 - <6000	20	10.6
6000 or more	49	26.1
Dependent - No specific income	78	41.5
Refused to answer	7	3.7
7- Residence		
Villa / House	110	58.5
Apartments	78	42.5

Table 2: Distribution of the diabetic patients according to their diabetic condition

Variables	Total (n=188)	
	No.	%
1- Diabetic complications		
Retinal complications	101	53.7
Neurological complications	73	38.8
Cardiovascular complications	28	14.9
Renal complications	21	11.2
2- History of associated chronic diseases*		
None	106	56.4
Hypertension	32	17.0
Hyperlipidaemia	20	10.6
Hypertension & hyperlipidaemia	30	16.0
Others‡	32	17.0
3- Medications		
None	9	4.8
Oral hypoglycemic drugs	91	48.4
Insulin	68	36.2
Both insulin and oral hypoglycemic drugs	20	10.6
4- Mean duration of diabetes = 11.7 ± 5.4 years		
5- Glycated Hemoglobin HbA_{1c}		
Good control HbA _{1c} < 7 mmol	47	25.0
Poor control HbA _{1c} ≥ 7 mmol	141	75.0

*The response categories are not mutually exclusive

‡e.g. bronchial asthma, chronic arthritis, renal or hepatic insufficiency..etc.

Table 3 shows the practices of diabetic patients regarding their foot care; regular foot checkup had never been performed in 30.3% of the sample, 65.4% of them never seek medical advice for their foot problems, 61.2% of them never used special shoes suitable for diabetic patients, and 46.3% never checked inside the shoe before wearing it. Cutting their foot nails by the help of others was always performed by 59% of the diabetic patients,

only 44.7% and 42% of patients reported drying between their toes and covering any foot injury, respectively. Based on our scoring system, it was calculated that 63.3% of diabetic patients had poor level of foot care practices and only 36.7% had good practice level regarding their foot care.

By studying the correlations of the level of foot care practices among the studied diabetic patients and all other variables including

gender, age, educational level, income, using HbA_{1c}, it was found that there was no occupation, job nature, medications used, statistical significant association. complications, and degree of diabetes control

Table 3: Foot care practice responses among type 2 diabetic patients

Type of practice	Never		Sometimes		Always		Total	
	No.	%	No.	%	No.	%	No.	%
Regular Foot check up	57	30.3	75	39.9	56	29.8	188	100.0
Drying in between the toes	40	21.3	64	34.0	84	44.7	188	100.0
Cutting nails by help of others	21	11.2	56	29.8	11	5.9	188	100.0
Testing for water temperature before application to foot	29	15.4	95	50.5	64	34.1	188	100.0
Covering foot injury	36	19.1	73	38.9	79	42.0	188	100.0
Checking inside the shoes before wearing it	87	46.3	65	34.6	36	19.1	188	100.0
Keeping the foot always moist	55	29.2	75	39.9	58	30.9	188	100.0
Wearing special type of shoes	115	61.2	47	25.0	26	13.8	188	100.0
Seeking medical advice for foot problems	123	65.4	53	28.2	12	6.4	188	100.0
Calculated level of foot care practices "Total practice score":	Poor practices (<50%)		Good practices (≥50%)				188	100.0
	No.	%	No.	%				
	119	63.3	69	36.7				

Table 4 shows the results of logistic regression analysis of significant factors predicting foot care practices among the studied diabetic patients. It was revealed that the educational level was the only factor that predict the level of good foot care practice, were those with higher level of education were found to have a better practice levels (OR=2.179, 95% confidence interval=1.074-4.423 and $p<0.05$).

Table 4: Logistic regression analysis of significant factors predicting pattern of foot care practices among the studied diabetic patients

Variables	B coefficient	SE of B	P- Value	OR	95 % Confidence interval	
					Lower	Upper
Educational level	0.779	0.361	0.031	2.179	1.074	4.423
Constant	2.461	1.427	-	-	-	-
Model $X^2_{(14)} = 15.3$, $P > 0.001$						

DISCUSSION

The current study evaluated 188 type 2 diabetic patients willing to participate. 59.6% were males, and sample mean age was 56.5 years ± 14.5 SD. Most of similar studies based on type 2 patients showed more or less similar age and sex distribution.^(13,18) Males are more prone to diabetic foot problems in Saudi Arabia, they are less foot aware compared to females, they are on the tradition of wearing slippers making them more prone to trauma and some are heavy smokers being a subject for peripheral vascular diseases.⁽¹⁹⁾

The educational level of the studied sample revealed that most of them are either illiterate (47.9%) or only finished

primary education (18.6%). Logistic regression analysis of significant socio-demographic or medical factors that may affect foot care practices revealed that this low educational level was the only factor that predicted the level of good foot care practices, were those with higher level of education were found to have a better practice level (OR=2.179, 95% confidence interval=1.074-4.423 and $p < 0.05$). The bad effect of low education level on foot practices is also seen by other investigators, Khamesh et al. in Iran found that illiterate patients were least knowledgeable about foot care practices.⁽²⁰⁾ A study done at Baqai Institute of Diabetology and Endocrinology

on 100 diabetic patients, concluded that lack of awareness, low education, poor glycemic control, and duration of diabetes were the main factors causing diabetic foot problems.⁽¹⁰⁾ Somroo et al. in their study done in Liaquat University of Medical Sciences Hospital-Hyderabad, revealed that proper foot care was not related to monthly income or duration of diabetes, but related to educational status, i.e. two thirds of their graduate patients were doing proper foot care. They explained saying that; usually the illiterate people are those who do not have much access to health care services.⁽¹³⁾ This was not the situation in our study, as the study sample (i.e. Saudi military individuals and their family dependants) entertained unlimited access to free medical care, most of them having reasonable monthly income as shown in Table 1, and even 58.5% of them live in villas or private houses.

In the current study, regular foot checkup was never performed in 30.3%,

seeking medical care for foot problems never happened in 65.4%, 61.2% never used special medical shoes and 46.3% never checked inside the shoe before wearing it. It was seen also that 44.7% and 42% of patients had reported drying between their toes and covering any foot injury, respectively. Cutting foot nails by help of others was always performed in 59% of the diabetic patients studied.

Similar poor level of foot care practices or even worse is seen in other studies. In a study on 100 diabetic patients in Pakistan, none of the patients had foot examination by doctors, 60% were never examined by any doctor regularly, only 23% of patients dried their feet after their wash, 27% applied emollients to avoid dryness, 25% checked shoes before wearing it, 24% used to wear the correct type of shoes, 8% used to wear cotton socks, 36% used to walk bare feet and 21% had the habit of self treatment for foot problems e.g. cutting corns and callosities.⁽¹³⁾ Another study

done in Iran on 100 diabetic patients showed that, 60% of the diabetic patients failed to inspect their feet, 42% did not know how to trim their toe nails and 62% used to walk bare feet.⁽²⁰⁾

Our calculations based on a pre-designed scoring system showed that 63.3% of the studied diabetic patients had poor level of foot care practices. The poor level of foot care practices in our study is in agreement with other previous studies.^(21,22,23) This low result seen in this study was even better than what was shown by other researchers. In one study, it was revealed that only 6% of their patients were taking proper foot care.⁽¹³⁾

On the same trend, in a study by Desalu et al.⁽²⁴⁾ in Nigeria, they questioned 352 diabetic patients about their knowledge and practices regarding foot care. They had scores for knowledge and practices that were classified as good if score \geq 70%, satisfactory if score was 50-69% and poor if score was $<$ 50%. Results showed

that only 10.2% of patients had good foot care practices. Majority (78.4%) of patients with poor practices had poor knowledge of foot care. They also showed that illiteracy and low socioeconomic status were significantly associated with poor knowledge and practice of foot care. They concluded that this gap needs to be covered through educational programs to reduce diabetic foot complications.

On the other hand, in a study done in Carolina - United States to assess the foot care practices on 61 diabetic patients, all of them had received foot care education; even then the patients were using improper or no foot care procedures. The study noticed that improper foot care was evident even in those who already had foot ulcers as well as in those who were at high risk.⁽²⁵⁾

Strengths and limitations

The results of the study are an endeavor to show the urgency to start an organized program of health education

targeting all diabetic patients especially illiterate individuals, to improve and sustain their foot care practices. To our knowledge, this study is the first report on foot care practices among type 2 diabetic patients in the Saudi Arabian military community. Although the military community constitutes almost 10% of the general population of Al-Taif area, the limitation was the inability to cover other areas, or to conduct a nationwide study.

CONCLUSION

In conclusion, foot care practices among type 2 diabetic patients enrolled in the study were generally poor, with common high risk behaviors. Educational level was the only factor that predicts the level of good foot care practice; illiterate individuals were underprivileged to perform a good practice. The study alarms healthcare professionals to give more attention educating them to limit diabetic foot complications.

RECOMMENDATIONS

a) Increase the awareness of healthcare

providers by continuous medical education and training, b) health education programs targeting diabetic patients and the general public, c) we reinforce the previous recommendation^(18,26,27) by initiating a nationwide organized multidisciplinary effort, to establish a comprehensive foot care clinics, taking care of all diabetic patients especially those with low educational level, clinics are to be available ideally at the primary healthcare level.

Conflict of interest: none.

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