

## Original Research Article

# Diabetic foot self-care: awareness and practice among type 2 diabetic patients in primary healthcare centers, Dubai Health Authority

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## ABSTRACT

**Background:** Diabetic foot disease is the most common complication of diabetes mellitus. With appropriate management, approximately 49-85% of diabetic foot complications can be prevented. This study was carried out due to lack of population-based studies on foot self-care in the U.A.E. The aim of this study is to assess the awareness and practice of foot self-care in patients with type 2 diabetes and study the factors affecting foot self-care.

**Methods:** A cross-sectional study was conducted amongst patients of type-2 diabetes attending the diabetic clinics in primary healthcare centers under Dubai Health Authority. 488 participants were interviewed on a pre-tested structured questionnaire. The cumulative score of awareness and practice was classified into poor (<50 percentile), average (50-75 percentile) and good (>75 percentile).

**Results:** 47% participants had an overall poor awareness and 46% had an overall poor practice of foot self-care. Compliance of medications to avoid complications had the highest awareness (83%) and practice (91%). Avoiding moisturizing between toes had the least awareness (40%) and practice (38%). Awareness was better in 59% of UAE nationals and 74% of postgraduates. Practice was better in 60% of males and 73% of participants with uncontrolled HbA1c. Participants who received prior information had better awareness (55%). Participants receiving information from Dubai Diabetes Centre (DDC) had better awareness (66%) and practice of foot self-care (66%).

**Conclusions:** Almost half of the diabetic patients attending primary healthcare centers in Dubai have limited awareness and practice regarding diabetic foot self-care.

**Keywords:** Diabetes, Awareness, Practice, Foot self-care, Primary healthcare, Diabetic foot

## INTRODUCTION

According to International Diabetes Federation (IDF), approximately 425 million people worldwide suffer from diabetes.<sup>1</sup> 1.6 million deaths per year are directly attributed to it.<sup>2</sup>

Currently 39 million people in the MENA region suffer with diabetes.<sup>1</sup> This region also has the second highest

rate of increase in diabetes globally, where the number of people with diabetes is predicted to increase by 96.2% in 2035.<sup>3</sup> 15% of the U.A.E adult population are categorized as patients of type-2 diabetes mellitus (DM).<sup>1</sup> Trends in 2015 also indicate that the prevalence of diabetes in the UAE is rising at a faster rate than both the MENA region and the rest of the world. This becomes a burden in terms of costs of treatment and affects the management of the impending complications as well.<sup>4</sup>

Among the complications of diabetes, the most common is diabetic foot disease. It results in deteriorating conditions such as diabetic neuropathy and foot ulcers causing a potentially devastating sequelae of mortality and morbidity.<sup>5</sup> Fortunately, diabetic foot complications are also the most preventable if appropriate measures are taken.<sup>6</sup>

Patient education is the most effective way to reduce the complications of diabetes. Since the patient is the primary foot care taker, good awareness and practice of foot self-care is essential to reduce the incidence of diabetic foot disease.<sup>7-13</sup>

Since there is a lack of population-based studies available on awareness and practice of diabetic foot self-care in the U.A.E, this study was conducted to determine the awareness and practice of foot self-care in diabetics and study the factors affecting it.

## METHODS

### Study design and setting

A cross sectional study was conducted in the diabetic clinics in primary healthcare centers (PHC) under Dubai Health Authority (DHA) from May 2017 to December 2017.

### Sample size and procedure

The sample size was calculated to be 488 using the computer program Epi-info version 7.1. It was calculated on 10500 diabetic patients registered in PHC, 30.7% estimated poor knowledge (ref), 95% confidence interval and 4% degree of precision.

### Inclusion criteria

Inclusion criteria were type-2 DM (minimum one year duration); patients attending diabetic clinics in PHC in Dubai; all genders; all nationalities.

### Exclusion criteria

Exclusion criteria were type-1 DM patients; hearing/cognitive impairment; gestational diabetes.

### Data collection plan

The respondents were interviewed on a pre-tested structured questionnaire after their written informed consent. It was validated in both English and Arabic.

The questionnaire included questions on demographics, diabetes related questions, source of information regarding foot self-care and 19 questions on awareness and practice of foot self-care derived from foot care practices advised by American Diabetic Association

(ADA), Summary of Diabetes Self-Care Activities (SDSCA) and John Hopkins Medical review.

Each response for awareness and practice to foot care question was scored either 1 or 0 depending on yes or no respectively. The cumulative score was then classified into:

- Poor (<50 percentile)
- Average (50-75 percentile)
- Good (>75 percentile)

Data was analysed via Microsoft Excel, 2016 and SPSS software

## RESULTS

In this study, 52.5% of the participants were females and 47.5% were males. UAE nationals were 61.3% (Table 1).

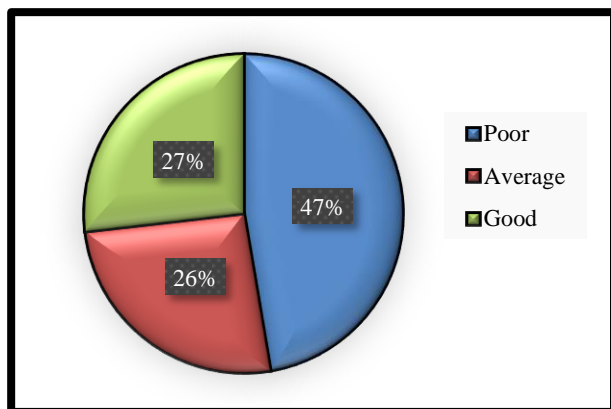
**Table 1: Distribution of participants according to background characteristics.**

Characteristics	Number (%)
<b>Age (in years)</b>	
18 –<40	50 (10.25)
40 –60	258 (53)
>60	180 (36.89)
<b>Gender</b>	
Male	232 (47.54)
Female	256 (52.45)
<b>Nationality</b>	
UAE National	299 (61.27)
Non- UAE national	189 (38.72)
<b>Marital status</b>	
Single	31 (6.35)
Married	426 (87.30)
Divorced/widowed	31 (6.35)
<b>Level of Education</b>	
Illiterate/ Primary	145 (29.71)
High school	169 (34.63)
Graduate	151 (30.94)
Postgraduate	23 (4.71)
<b>Occupational Status</b>	
Unskilled	25 (5.12)
Unemployed/retired	284 (58.20)
Student	5 (1.02)
Skilled	102 (20.90)
Professional	72 (14.75)

More than half of the sample (60.9%) received previous information on foot self-care, of which 90.6% received from PHC and 2% received it from Dubai Diabetes Centre (DDC). Only 43.9% had controlled HbA1c level while 60.9% suffered from diabetic foot complications (Table 2).

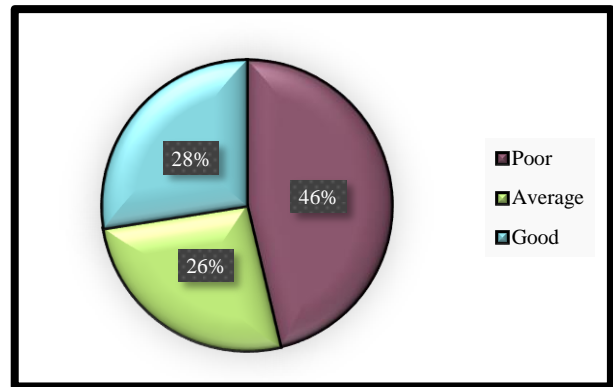
**Table 2: Distribution of participants according to diabetes related factors.**

Diabetes related factors	Number (%)
<b>Duration of diabetes (in years)</b>	
1 – 5	144 (29.51)
6 – 10	157 (32.17)
≥11	187 (38.32)
<b>Types of diabetic medications</b>	
None	7 (1.43)
Oral Medication	378 (77.46)
Insulin	103 (21.11)
<b>Family history of diabetes</b>	
No	188 (38.52)
Yes	300 (61.47)
<b>Compliance to medications</b>	
Yes	444 (90.98)
No	44 (9.02)
<b>Reception of foot self-care information</b>	
Yes	301 (61.68)
No	187 (38.32)
<b>Source of foot-care information</b>	
Dubai Diabetes Centre	7 (2.32)
Primary Healthcare Centre	273 (90.70)
Other healthcare facilities	9 (2.99)
Others	12 (3.99)
<b>Hypertension</b>	
No	233 (47.74)
Yes	255 (52.25)
<b>Hyperlipidaemia</b>	
No	204 (41.80)
Yes	284 (58.19)
<b>HbA1c levels</b>	
<7	214 (43.86)
7–9.5	252 (51.63)
>9.5	22(4.51)
<b>Foot complication</b>	
Yes	297 (60.9)
No	191 (39.1)



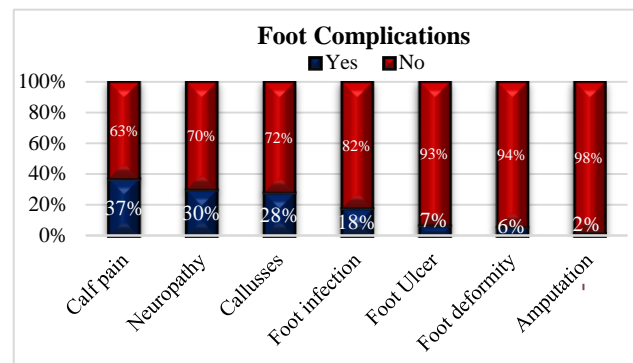
**Figure 1: Distribution of participants according to level of awareness of foot self-care.**

The overall awareness of foot self-care was found to be poor in 47%, average in 26% and good in only 27% of the participants (Figure 1).



**Figure 2: Distribution of participants according to level of practice of foot self-care.**

The overall practice of foot self-care was found to be poor in 46%, average in 26% and good in only 28% of the participants (Figure 2).



**Figure 3: Distribution of participants according to history of foot complications.**

Almost 36.7% reported to have calf pain while walking and 2.3% were found to have a history of foot amputation (Figure 3).

It was found that 83.0% were aware of the importance of compliance of medications to avoid complications and 91.0% practiced it. Participants were least aware of the importance of avoiding moisturizing between toes (40.0%) and only 37.9% practiced it (Table 3).

Participants who received previous information on foot self-care had better awareness than those who did not by 7%. It was also observed that 59.2% of UAE nationals had better level of awareness when compared to 42.3% of the non-UAE nationals (Table 4).

Men had a significant better level of practice than women by 12.0%. Almost 60% of the unskilled participants were found to have good levels of practice as compared to

33.3% of participants with skilled jobs. 51.5% who received previous information were found to have poor levels of practice than those who did not. Patients receiving information from Dubai Diabetes Centre had better level of practice than those receiving from PHC by

20%. Average to good levels of practice was seen in 72.8% of participants with an uncontrolled HbA1c and 58.2% of those who have had foot complications (Table 5).

**Table 3: Distribution of participants according to awareness and practice of foot self-care measures.**

Foot self-care measures	Awareness (%)	Practice (%)
Compliance of medications	405 (82.99)	444 (90.98)
Proper fitting shoes	371 (76.02)	361 (73.97)
Consultation on cuts	336 (68.85)	293 (60.04)
Consultation on inflammation	337 (69.05)	273 (55.94)
Specific foot care	322 (65.98)	293 (60.04)
Checking foot wear	322 (65.98)	298 (61.06)
Drying feet	317 (64.95)	323 (66.18)
Avoid smoking	312 (63.93)	278 (56.96)
Daily changing of socks	312 (63.93)	292 (59.83)
Trimming toenails	312 (63.93)	312 (63.93)
Annual feet exam	312 (63.93)	298 (61.06)
Avoid walking barefoot	307 (62.90)	298 (61.06)
Check water temperature	303 (62.09)	274 (56.14)
Drying between toes	298 (61.06)	293 (60.04)
Using warm water	293 (60.04)	298 (61.06)
Moisturizing feet	283 (57.99)	254 (52.04)
Daily foot inspection	278 (56.96)	244 (50.00)
Avoid soaking feet in water	259 (53.07)	215 (44.05)
Avoid moisturizing between toes	195 (39.95)	185 (37.90)

**Table 4: Distribution of participants according to level of awareness in relation to different variables.**

Variables	Awareness levels			P value	
	Poor%	Average%	Good%		
Nationality	Non-UAE national	57.7	20.1	22.2	0.001
	UAE national	40.8	29.4	29.8	
Level of education	Illiterate/primary	44.8	28.3	26.9	0.015
	High school	51.5	24.3	24.3	
	Graduate	48.3	27.2	24.5	
	Postgraduate	26.1	13.0	60.9	
Compliance of medications	Yes	45.5	26.6	27.9	0.034
	No	65.9	18.2	15.9	
Reception of information	Yes	44.2	23.6	32.2	0.003
	No	52.4	29.4	18.2	
Source of information	PHC*	44.0	23.8	32.2	0.028
	DDC**	28.6	14.3	57.1	
	Other healthcare facilities	33.3	33.3	33.3	
	Others	66.7	16.7	16.7	
Hyperlipidaemia	Yes	48.6	28.9	22.5	0.025
	No	45.6	21.6	32.8	
Foot complication	Yes	53.9	25.3	20.9	0.000
	No	37.2	26.7	36.1	

\*Primary Healthcare Centres; \*\*Dubai Diabetes Centre

**Table 5: Distribution of participants according to level of practice in relation to different variables.**

Variables		Practice Level			P value
		Poor%	Average%	Good%	
<b>Gender</b>	Female	52.0	24.2	23.8	0.028
	Male	40.1	28.4	31.5	
<b>Marital status</b>	Single	45.2	45.2	9.7	0.039
	Married	46.7	25.4	27.9	
	Divorced/ widowed	41.9	19.4	38.7	
<b>Occupation</b>	Unskilled	32.0	8.0	60.0	0.001
	Unemployed/retired	47.2	30.3	22.5	
	Student	20.0	60.0	20.0	
	Skilled	44.1	22.5	33.3	
	Professional	52.8	19.4	27.8	
<b>Types of diabetic medication</b>	None	28.6	0.0	71.4	0.027
	Oral	47.1	24.9	28.0	
	Insulin	44.7	33.0	22.3	
<b>Compliance of medication</b>	Yes	48.2	26.6	25.2	0.002
	No	27.3	22.7	50.0	
<b>Reception of information</b>	Yes	51.5	25.2	23.3	0.007
	No	38.0	27.8	34.2	
<b>Source of information</b>	PHC*	53.1	23.1	23.8	0.016
	DDC**	28.6	57.1	14.3	
	Other healthcare facilities	44.4	33.3	22.2	
	Others	33.3	50.0	16.7	
<b>Hyperlipidaemia</b>	Yes	47.5	29.6	22.9	0.016
	No	44.6	21.6	33.8	
<b>HbA1c</b>	Controlled <7	54.7	23.4	22.0	0.009
	Semi-controlled 7 – 9.5	40.9	28.6	30.6	
	Uncontrolled >9.5	27.3	27.3	45.5	
<b>Foot complication</b>	Yes	41.8	31.3	26.9	0.004
	No	53.4	18.3	28.3	

\*Primary Healthcare Centres; \*\*Dubai Diabetes Centre.

## DISCUSSION

The level of awareness and practice of foot self-care was found to be poor in several studies conducted worldwide.<sup>14-18</sup> Our study shows a similar result wherein almost half of the participants had an overall poor awareness (47%) and poor practice (46%). The level of awareness and practice is similar to each other, which is in concordance with studies conducted on foot care practice in Nigeria and India.<sup>16,19</sup> This outcome can be explained by lack of awareness regarding prevention of diabetic foot disease and its major complications, including lower limb amputation.

The specific measures of foot self-care that received the worst responses were daily foot inspection, avoiding soaking feet in water and avoiding moisturizing between the toes, which had the least score of them all. These results were also seen in studies conducted on knowledge and practice of diabetic foot self-care in Malaysia and Nigeria.<sup>5,16</sup> The deficiency in the knowledge and therefore the practice may be due to poor communication between the doctors and patients. It can also be attributed

to lack of proper counselling by the doctors and nurses due to a busy clinic schedule.

An important finding of our study was that approximately half of the patients with poor levels of awareness of foot self-care had a low level of education. Studies conducted in Nigeria, Pakistan, India, and Tanzania concluded that low awareness scores were common with poor formal education.<sup>16,17,20,21</sup> The knowledge of appropriate foot care is positively influenced by patient education which in turn reduces the risk of foot ulceration and amputation in high-risk diabetics.<sup>22</sup> This association can be attributed to the ability of the educated patients to read and comprehend educational supportive materials as well as the use of technology to obtain more information about their disease.

Poor practice scores were found in patients of high socioeconomic level when compared to those of low socioeconomic level. This difference is because participants of high socioeconomic level are busy with their daily life routine. Furthermore, diabetic foot is one of the main complications of DM of higher

socioeconomic impact, characterized by foot lesions and finally leg amputation in majority of the cases.<sup>17</sup> However, diabetic foot care studies conducted in Saudi Arabia and in Italy, found better practice levels in patients of higher socioeconomic level.<sup>14,23</sup>

A positive association was discovered between nationality and the level of awareness of foot care. U.A.E. nationals had a higher overall awareness than non-U.A.E. nationals.

Men had a higher score in terms of practice than females by approximately 12%. This is in concordance with a study conducted in Durban, South Africa.<sup>7</sup>

Our study showed that participants who received previous information on foot self-care had better awareness but poor practice. This could be due to the patients' attitude towards the disease. Significant association was also found between the source of information on foot care and awareness and practice level. The level of awareness and practice was higher for those who acquired information from Dubai Diabetic Centre when compared to primary healthcare centres. This can be explained by the focused approach of Dubai Diabetes Centre towards diabetic complications and its management.

Practice levels were found to be better in patients with higher HbA1c levels and those using insulin therapy. Studies conducted in Taiwan and Iran on assessment of risk factors, found these to be important risk factors for diabetic complications.<sup>24,25</sup> More than 60% of our participants with high HbA1c were found to have a history of foot complication/s. It is found that patients practice foot care measures when they experience the complications and are aware that these are preventable. Studies conducted on prevention of foot ulcers in India and another study conducted in China on knowledge and practice of foot care reveal similar results.<sup>19,26</sup>

A study conducted in the U.S.A. found that foot self-care practices were better in patients with duration of diabetes more than or equal to 10 years.<sup>27</sup> Such a significant relation was not found in this study. Similarly, there is no significant association found between awareness and practice level with age or family history of diabetes. Similar results were found in other studies conducted worldwide.<sup>5,7,16,18</sup>

## CONCLUSION

Almost half of our patients attending primary healthcare centres in Dubai have limited awareness and practice regarding diabetic foot self-care. This is mainly observed in Non-U.A.E. nationals and in females. This calls for a collaboration of the authorities to augment the patients' education and replicate such surveys to monitor the improvement.

## Recommendations

- Educating patients using internationally approved guidelines for foot self-care including prevention and control of diabetic comorbidities.
- Educating the patients at an early stage beginning from pre-diabetes with focus on high risk patients.
- Increasing consultation time specific for educating the patients on diabetic foot self-care and ensuring its practice.
- All electronic and printed media in various languages must be engaged to enhance the public awareness of diabetes and its complications.
- Providing group counselling and peer support groups on diabetic foot self-care at health facilities so that patients can share knowledge of diabetic foot care.
- Collaborating with other healthcare providers such as podiatrists, diabetic educators and specialized centres such as diabetic centres.
- Implementing regular clinical audits to ensure standards of care for diabetic patients.
- Similar researches also assessing the attitude of patients should be conducted in the U.A.E. on a larger scale.

## Limitations

The sample predominantly consisted of patients attending the primary health care centers in Dubai, thus the sample does not represent the actual population of the U.A.E.

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