



Original article

## Knowledge and practice of foot care among Libyan diabetic patients

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### HOW TO CITE THIS

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**Abstract:** Diabetes mellitus is a common and chronic metabolic disorder. Uncontrolled diabetes mellitus leads to body organ damage if not treated properly. Educational intervention is necessary from health-care providers such as pharmacists to prevent or reduce organ damage and complications among the diabetic patients. Several studies have demonstrated the contribution of pharmacists in achieving a better control of diabetes mellitus. Thus, this study intended to assess the knowledge and practice regarding foot care among Libyan diabetic patients in Al-Bayda city. In addition, to determine the association between knowledge and practice regarding diabetic foot care with selected demographic variables. This is a cross sectional study conducted at Diabetes Center Aljabal Al akhdar in Al-Bayda between April and August, 2022. A total of 400 participants with diabetes were enrolled and interviewed by using a self-design questionnaire for knowledge and practice of foot care after taking verbal agreement. Data was analyzed by using SPSS software version 26.0. In this study, 191 subjects were male (47.8%) and 209 subjects (52.3%) were female. On the topic of foot care, 51.8% of the participants stated they did know how to perform correct foot hygiene and 33.5% stated that drying should consist of passing a towel between their toes. Female subjects statistically had more knowledge than male subjects on the right footwear and correct way of nail cutting ( $p < 0.01$  and  $p < 0.001$ , respectively). In relation to practice, the frequency of patients with a good practice was 126 (31.5%) and with poor practice was 274 (68.5%). Evaluating the parameters dry, moisturize and nail cutting, women showed a significant difference in relation to men, with a high significance level in the three parameters. In conclusion, the knowledge and practice of foot care in Libyan patients with diabetes were poor. So, an educational program is recommended to improve the awareness of foot care. Diabetic patients should be provided information about self-care of their feet by health care providers such as pharmacists to prevent and delay onset of foot complications and improve the quality of life.

### Introduction

Diabetes mellitus (DM) is a metabolic disorder characterized by hyperglycemia [1]. Prevalence of DM is increasing every year in most of the countries. According to WHO, it is estimated that there are 88 000 patients with DM in Libya during the year of 2000. By 2030, the incidence of diabetes

globally reaches to 245 000 [2]. Numerous serious complications are caused by uncontrolled diabetes that will increase the morbidity and mortality. These complications are macrovascular such as coronary artery diseases or microvascular like nephropathy, retinopathy, neuropathy and diabetic

foot ulcer, DFU are mentioned [1]. Data reported that 20.0% of the people who have DM are at risk of developing DFU as a result of neuropathy [3]. The prevalence of DFU was 06.3% and estimated in North America (13.0%) while 02.2% in Europe, 07.2% in Africa, 05.5% in Asia and 01.5% in Australia [4]. The prevalence of DFU is assumed to increase in Africa and is associated with increased complications with peripheral vascular disease and neuropathy. These complications increase the risk of amputation and affect the quality of life of DM patients [5]. According to International Diabetic Federation (IDF), the prevalence of amputation worldwide is around 200 000 individuals per year [6]. In the USA, the incidence of amputation arrived to 230 patients each day [7]. In Libya, a previous study designed in Benghazi to assess long term complications among type 2 DM reported 01.1% of patients had their legs amputated below knee [8]. Patients with DFU are 2.5 times at risk of death more than diabetic patients who do not have DFU [9]. Whereas DFU is a combination of different pathological process (neuropathy, hyperglycemia and vascular) that is explained why treating DFU is difficult and expensive because such studies reported that cost to treat DFU is more than twice that of any other chronic ulcer [10]. In the USA, the total cost for treating diabetic foot disease ranges from 09.0 to 13.0 billion dollar [11].

The risk of amputation can be controlled by elevating awareness and adopting care strategies and proper measure, as educating patient about diabetes, frequent foot examination and metabolic control are examples of these measures. Health care providers such as pharmacists have a major role in reducing the incidence of DFU. Indeed, a recent study has demonstrated that pharmacist-led educational intervention has a positive impact on the progression of diabetic complications. The signs and symptoms of DFU were significantly improved in the intervention group as compared with the control group. Understanding the level of knowledge and practice in DM patients is an important to control diabetes and to delay the appearance of its complications. Where poor level of knowledge and practice are related to risk factors of DFUs. Foot care is a key to prevent DFU.

Adequate knowledge and information about foot care will be prepared for individuals with the ability to do good practice in order to prevent DFUs. Foot care practice including exercise, controlling diet, daily foot examination, foot hygiene and correct way of cutting nail. Medical physicians provide foot care with little attention and concentrate on diagnosis and therapeutic measures more than preventive and educational programs. Therefore, this study was aimed and designed to assess the knowledge and practice of foot care among Libyan patients with DM.

### **Materials and methods**

This is a cross sectional study consists of 400 patients with DM at Diabetes Center Aljabal Alakhdar in Al-Bayda from April to August 2022. The self-prepared designed questionnaire divided into three parts where data were collected through direct self-interviews. The three sections are: 1- demographic data included age, gender and education level, 2- five questions about knowledge of diabetic foot care where the scores of knowledge were divided into good knowledge (4 - 5) and poor knowledge (0 - 3) related to patient's answers and 3- eight questions on the practice of diabetic foot care and the scores of practice were divided into good practice (5 and above) while poor practice (4 and below). An ethical approval has been obtained from the ethic committee of Omar Al-Mukhtar University (0012-2022). A verbal agreement with patients was obtained before collecting data and interviewing.

### *Statistical analysis*

Data was analyzed by Statistical Package for Social Science (SPSS) version 26.0 and were presented as frequency and percentage by using descriptive statistics. Relationships between demographic data and knowledge and practice of diabetic foot care obtained by Chi-square test. A value of less than 0.05 was considered significant and less than 0.01 was considered highly significant.

## Results

*Demographic data of the participants:* **Table 1** shows age, gender and level of education of the Libyan participants with DM. With regard to the gender, the ratio of male to female patients was found almost to be similar. The number of male subjects was 191 with a percentage of 47.8% and female subjects was 209 with a percentage of 52.3%. Regarding the age, the majority of the participants ranging from 41 to 60 years old (52.2%) and the lowest group was at the age of  $\leq 20$  years (02.5%) and  $\geq 80$  years old (03.8%). Education level of the participants is presented in **Table 1** which shows that the highest educated group has university degree (30.2%) then the secondary level with a percentage of 24.8%. 23.8% of the participants were illiterate and almost the same (21.2%) of the participants were with basic education.

**Table 1:** Demographic data of the Libyan participants with diabetic mellitus

Variables	Frequency	Percentage
<b>Age, years</b>		
$\leq 20$	10	02.5%
21 - 40	40	10.0%
41 - 60	209	52.2%
61 - 80	126	31.5%
$\geq 81$	15	03.8%
<b>Gender</b>		
Male	191	47.8%
Female	209	52.2%
<b>Education</b>		
Illiterate	95	23.8%
Primary	85	21.2%
Secondary	99	24.8%
Graduate	121	30.2%

*Participant's knowledge about various aspects of foot care:* During the interviews, when investigated on their knowledge regarding foot care (**Table 2**), almost half of the participants (51.8%) stated that they did know how to perform correct foot hygiene while 33.5% stated that drying should consists of passing a towel between their toes. Only 07.5% did not know what a person with diabetes should observe in their feet and 34.0% of the participants answered that comfortable and closed footwear is an ideal. However, in **Table 2**, the response of I do

not know with all the variables was very low and ranging less than 10.0%. The scoring of knowledge was categorized in to yes (have knowledge) and no (have no knowledge). The frequency of patients with yes was 38 (09.5%) and with no was 362 (90.5%).

*Participants practice related to foot care:* In **Table 3**, regarding the response of patients to practice, it can be measured by categorized the scoring of practice of foot care into good and poor practice of foot care. The good practice was define if the correct number of question answers is 5 and above of 8 questions and poor practice if 4 and below of 8 questions. The frequency of patients with a good practice was 126 (31.5%) and poor practice was 274 (68.5%).

*Association between gender, knowledge and practice of foot care:* **Figure 1 and Table 4** show an analysis of knowledge and practice in relation to gender of the participants. The findings showed that female participants statistically had greater knowledge than the males about the right footwear to use, being that 76 women answered comfortable and closed, with a high significant difference between the gender ( $p < 0.01$ ) and female had highly significant additional knowledge about the correct way of nail cutting ( $p < 0.001$ ). Evaluating the parameters for drying, moisturizing and nail cutting, women showed a significant difference in relation to men with highly significance difference of  $p < 0.001$ ,  $p < 0.001$  and  $p < 0.01$ , respectively, being that of the 103 who stated they dried their feet, 73 were women of the 185 who answered they moisturized their feet, 121 were women and of the 367 who nail cutting, 198 were women (**Figure 1 A, B, C and D**).

*Association between education level, knowledge and practice of foot care:* **Table 5** shows the analysis of knowledge and practice data of the participants in relation with education level. The findings indicated that practice of foot drying is highly statistically significant associated with the level of education whereas of 103 practice of foot drying were also highly significant found in the graduated participants ( $p < 0.01$ ).

**Table 2:** Participant's knowledge about various aspects of foot care

Variables	Frequency	Percentage
<b>Correct hygiene</b>		
With warm water and soap	207	51.8%
With cold water and soap	90	22.5%
I did not	103	25.8%
<b>Ideal drying</b>		
With a towel, without drying between toes	128	32.0%
With a towel, drying between toes	134	33.5%
No need to dry	120	30.0%
I do not know	018	04.5%
<b>Observing your feet</b>		
Only when there is tingling and numbness	292	73.0%
No need to observe feet	078	19.5%
I do not know	030	07.5%
<b>Ideal footwear</b>		
Tight	004	01.0%
Loose	074	18.5%
Comfortable and closed	136	34.0%
Comfortable and open	175	43.8%
I do not know	011	02.8%
<b>Correct nail cutting</b>		
Rounded	127	31.8%
Straight	131	32.8%
Either rounded or straight	116	29.0%
I do not know	026	06.5%

**Table 3:** Participant's practice related to foot care

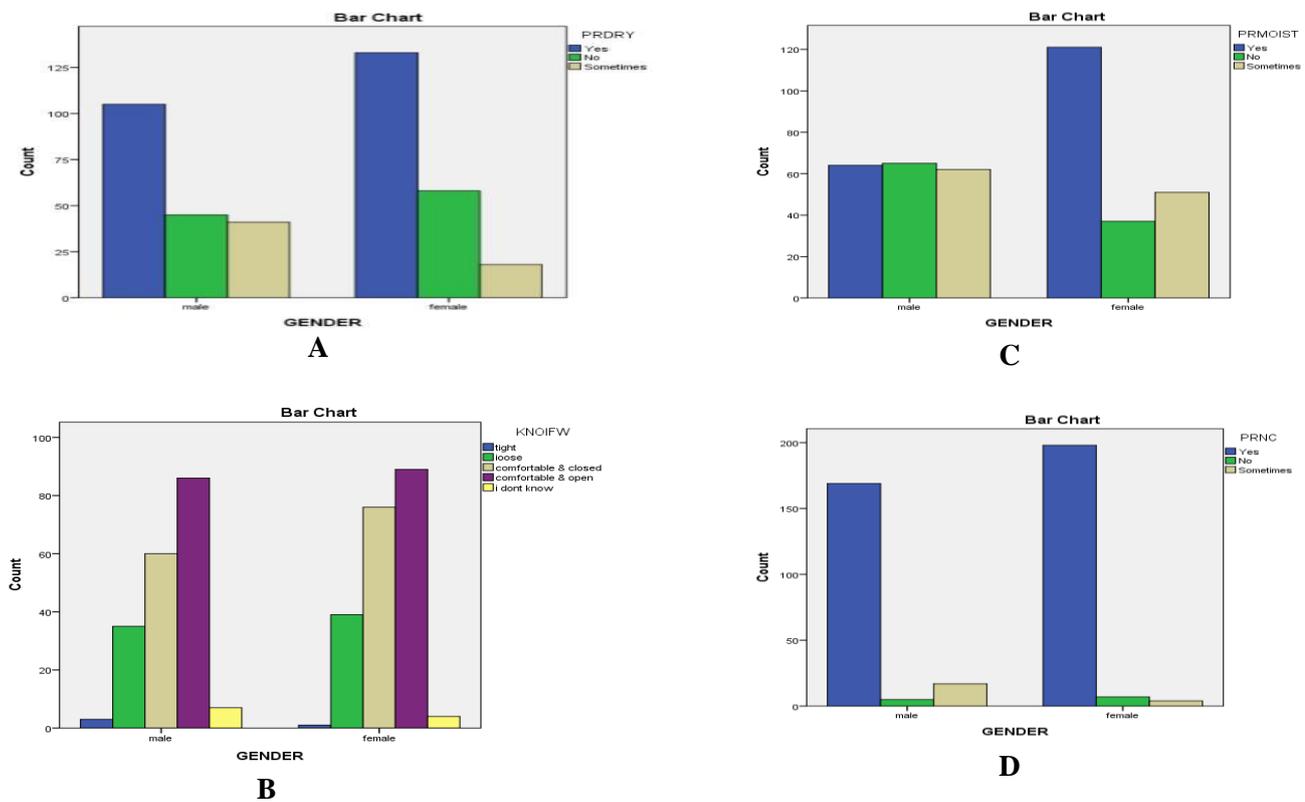
Foot care aspects	Description	Frequency	Percentage
Inspection	Daily	053	13.0%
	Every two days	024	06.0%
	Weekly	084	21.0%
	Not inspected	239	59.7%
Washing	More than one time per day	379	94.7%
	One time per day	012	03.0%
	Not washing regularly	009	02.3%
Drying	Yes	103	25.7%
	No	238	59.5%
	Sometimes	059	14.8%
Moistening	Yes	185	46.3%
	No	102	25.5%
	Sometimes	113	28.2%
Nail cutting	Yes	367	91.8%
	No	012	03.0%
	Sometimes	021	05.2%
Bare foot	Yes	110	27.5%
	No	168	42.0%
	Sometimes	122	30.5%
Wearing socks	Yes	142	35.5%
	No	073	18.2%
	Sometimes	185	46.3%
Wearing diabetic foot	Yes	101	25.2%
	No	263	65.8%
	Sometimes	036	09.0%

**Table 4:** Association between gender, knowledge and practices of foot care

Variables	Male	Female	P value
<b>Nail cutting</b>			
Rounded	070	057	<b>0.001</b>
Straight	040	091	
Either rounded or straight	059	057	
I do not know	015	011	
<b>Foot wear</b>			
Tight	003	001	<b>0.004</b>
Loose	035	039	
Comfortable and closed	060	076	
Comfortable and open	086	089	
I do not know	007	004	
<b>Foot care practice</b>			
Dry	030	073	<b>0.001</b>
Moist	064	121	<b>0.001</b>
Nail cutting	169	198	<b>0.007</b>

**Table 5:** Association between education level, knowledge and practices of foot care

Variable	Illiterate	Primary	Secondary	Graduate	P value
<b>Foot care practice dry</b>	15	24	26	38	<b>0.009</b>



**Figure 1:** Association between gender and knowledge of ideal foot wearing (A), gender and practice of drying (B), gender and practice of foot moistening (C) and gender and practice of nail cutting (D)

## Discussion

This study was designed to assess knowledge and practice of foot care in Libyan diabetic patients. The findings were found in most of the patients indicating lower score of knowledge (90.0%) and practice (70.0%) toward foot care which is similar to previous Malaysian study [12] where the majority of the patients had poor knowledge and practice toward diabetic foot care. Several other studies also are in line with the present study for foot care practice which carried on Thailand [13] and Nepal [14] as well as Saudi Arabia [15]. A good knowledge about foot care can delay the risk of complications which leads to foot ulcers and amputation. In some studies, it was reported higher level of knowledge about foot care [16, 17]. This variation in the findings of the level of knowledge could be attributed to the difference in literacy or educational program and training supplied by health-care providers [17].

To assess the factors that may be related to knowledge of foot care, a significant association between female with knowledge of the correct way of nail cutting and ideal foot wearing was observed. This may related to the fact that women are more caring and observing the appearance of their feet. Also, unlike most women who wear high-heeled shoes, women with DM in the present sample were more aware of importance of wearing comfortable shoes to avoid foot complications, as well as wearing closed shoes, due to women's commitment to the standards of the Islamic society. According to different questions about the knowledge of foot care, the present study showed about half of the participants did know how to perform foot hygiene and according to the practice of daily washing and foot inspection. There is no difference between females and males due to Muslims populations pray five times per day where they have washed their feet before praying and this habit help the patients to inspect their feet daily. Which is similar to the previous studies conducted in Saudi Arabia and Pakistan [18, 19]. Another study conducted in Iraq, the correct measure that the majority of the patients knew and practiced was washing their feet daily [20]. They attributed this practice due to

religious reasons and not to diabetic care. In relation to washing of their feet by warm water, more than half of the participants in this study were aware about this fact that feet should be washed daily by warm water and the temperature of water should be checked before washing. This was inconsistent with the results obtained in Malaysia where the majority of the patients did not checked the temperature of water before washing of their feet [12].

In general, the score of foot care practice was poor in the current study. Thus, about 25.0% of the participants dry between toes after washing and 46.3% moisturizing feet daily. This is similar to the studies in Nigeria [21] who found the level of foot care practice was low and in other study conducted in Malaysia examined 30.0% of diabetic patients who had good foot care practice [22]. These differences in data between the previous studies may be related to study population or in methods of data collection. The present study showed that practice of self-care of feet is highly significantly different among males and females regarding ideal drying, moisturizing and nail cutting. In addition, the practice of foot care more in female than male subjects was found that may be attributed to women take care of their feet more than men where man related to social culture not caring about foot appearance. Woman was more self-care practice with daily routine of foot care like moisturizing and massaging their lower limb which is similar to the previous studies [23, 24]. This is in agreement with Egyptian study where gender had no role in determining the level of knowledge and practice of diabetic foot care [25]. Another study showed that males were usually hesitant to reveal their health problems and ask for a professional care. Males presented a greater deficit in self-care compared to the females [26]. According to age and level of education, there is only one study reported no significant association between age, level of education with knowledge and practice of foot care in Malaysia [12]. This is in agreement with the current study with respect to age of the patient. However, the present finding indicated a significant association between level of education and practice of drying where people with a high

level of education are expected to have more information about DM and its complications meaning that education may lead to awareness of diabetic foot care principles and improved basic information to prevent foot ulceration. According to education level and knowledge of foot care, no significant association was found in the current study which is inconsistent with the previous study in Tanzania reporting low score of knowledge were associated with low educational level [27]. It may be assumed that people did not have enough time or had a heavy work. In addition, community level did not supply good information about DM for patients with different education level. Knowledge and practice of foot care must be available in a diabetic patient where knowledge of importance of foot care without applying it does not achieve the desired outcome. The effect of pharmacist on

diabetic complications is positive in nature and it is specific effect on the diabetic foot which is common complications of DM [28]. Indeed, some predictors of the diabetic foot are improved in the presence of pharmacist during the follow-up. This study was not on the general complications of DM and not on the role of pharmacist but it focuses on the diabetic foot, however, intervention of health care professionals such as pharmacists certainly improve of signs and symptoms belonging to the diabetic foot. The improvement in all the predictors of the diabetic foot started progressing from the first follow-up.

*Conclusion:* The present findings confirm that knowledge and practice of foot care among Libyan diabetic patients are poor, thus, education and training of the patients are highly needed.

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**Author contribution:** ASA & MAM conceived, designed the study, collected data and performed the analysis. ANA, HAA & SAA have contributed in collecting data and contributing in analysis. All authors have drafted and revised the manuscript as well as approved the final version of the manuscript and agreed to be accountable for its contents.

**Conflict of interest:** The authors declare absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

**Ethical issues:** Including plagiarism, informed consent, data fabrication or falsification and double publication or submission have completely been observed by authors.

**Data availability statement:** The raw data that support the findings of this article are available from the corresponding author upon reasonable request.

**Author declarations:** The authors confirm that all relevant ethical guidelines have been followed and any necessary IRB and/or ethics committee approvals have been obtained.

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