

## Knowledge, Attitude and Practice about Foot Care among Adult Diabetic Patients at Prince Abdul-Aziz bin Majid Diabetes Center in Al Madinah City, Saudi Arabia

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### ABSTRACT

**Background:** Diabetic foot refers to various degrees of neurological and vascular abnormalities affecting the foot and the tendency towards deep foot tissue destruction, ulceration and infection.

**Objective:** This study is conducted to assess the level of knowledge and practice about foot care among adult diabetic patients attending Prince Abdul-Aziz ben Majid diabetic center in Al Madinah City, Saudi Arabia 2020.

**Patients and Methods:** A descriptive cross-sectional study. A valid structured questionnaire was used to collect the data of diabetic adult patients attending Diabetics Center Prince Abdul-Aziz bin Majid in Al Madinah city. The statistical analysis was done by using the statistical package for the social sciences (SPSS).

**Results:** 363 participants completed the questionnaire, 57% of them were males and 43% were females. 90.6% of participants scored good knowledge level while 9.4% scored poor knowledge score. 77.1% of participants scored good attitude level while 22.9% scored poor attitude score. 93.7% of participants scored good practice level while 6.3% scored poor practice score. Overall, good knowledge score was significantly associated with occupation of participant ( $P=0.002$ ), duration of diabetes ( $P=0.024$ ), and number of visits to the clinic ( $P=0.020$ ). There was a significant association between good attitude score with educational level of participants ( $P=0.001$ ) but not with other sociodemographic characteristics. A significant association was also found between good practice score with educational level of participants ( $P=0.005$ ).

**Conclusion:** In conclusion, diabetic patients participated in our study showed good scores for knowledge, attitude and practice when compared to previous literature in Saudi Arabia and worldwide.

**Key words:** Attitude, Diabetic patients, Foot Care, Knowledge, Practice.

### INTRODUCTION

World Health Organization described diabetes mellitus (DM) as metabolic disorder of multiple etiology [1]. The world prevalence of diabetes among adults is 6.4%, in 2010, and will increase to 7.7% between 2010 and 2030. [2].

Diabetic foot refers to various degrees of neurological and vascular abnormalities affecting the foot and the tendency towards deep foot tissue destruction, ulceration and infection. Diabetic foot are common throughout the world, which effect the economic consequences of the patients, their families, and society. It is assessed that roughly 15% of the more than 150 million persons having DM globally at particular phase will grow diabetic foot ulcer [3,4].

Improper foot care among diabetic lead to a major basis of indisposition and premature death and diabetic foot complications contribute substantially to health care costs. The prevalence of diabetic foot complications among the diabetic patients overall 3.3% in which foot ulcer 2.05%, gangrene 0.19%, and amputations 1.06% [5,6].

While in other view educating the patient about the complication and the need for proper foot care among diabetic will reduce the risk of complication and lead to improve the quality of life and, consequently, an increased economic burden on the individual and society as a whole [6].

In Saudi Arabia an epidemiological health survey was conducted and showed that the prevalence

of DM in Saudi Arabia is 23.7%, where male to female prevalence were 26.2% and 21.5% respectively [3].

Previous studies show that, the lifetime risk of developing a diabetic foot ulcer among diabetic patients is approximately 15% compared to those who are not diabetic [5].

A descriptive cross-sectional study by *Alshammari et al.* determining the knowledge, attitude, and practice showed that only 76.6% had good knowledge, 11.1% attended an educational classes, 22.0%, were educated by doctor and 10.3% by a nurse where only 47.6% inspect there foot daily [7].

Another cross-sectional hospital-based study conducted between 2011 and 2012 by *Al Odhayani et al.*, in Riyadh hospitals, Saudi Arabia was done to judge the side by side foot care practices among diabetics showed that 64% percent are at high risk for diabetic foot and 7.10% are at low risk only, 42% of total participants have regular foot care the study showed that over 60% of non-traumatic lower limb amputations are due to foot ulcer [5].

One of the advanced centers in Al Madinah City for the treatment and follow-up of diabetics that includes many specialized clinics is Prince Abdul-Aziz bin Majid Diabetes Center. It has an educational clinic unit that aims to change the wrong lifestyle into a healthy lifestyle that helps reduce the complications of the disease.

During our research working time at primary health care center and clinical rotation at diabetic center, we

found increased number of cases of diabetic foot ulcer ending up to gangrene and amputation.

#### **Study objective:**

This study is conducted to assess the level of knowledge attitude and practice about foot care among adult diabetic patient attending Prince Abdul-Aziz bin Majid Diabetic Center in Al Madinah City Saudi Arabia. The study also aims to measure the level of knowledge about foot care among diabetic patients attending a diabetic center in Al Madinah City, Saudi Arabia and to determine the practice of foot care among adult diabetic in this center.

#### **PATIENTS AND METHODOLOGY**

Descriptive cross-sectional study was conducted from 15 April 2021 until 1 January 2022 in Prince Abdul-Aziz bin Majid Diabetics Center. The data were collected through validated structured, translated questionnaire in the Arabic language. A closed type questions, which was a self-interviewing by researcher and nurses cooperation along with barcode that had been attached to reception and which aimed to assess the level of knowledge attitude and practice about foot care among adult diabetic patients.

#### **Study settings:**

The study was conducted in Prince Abdul-Aziz bin Majid Diabetics Center Al Madinah City, Saudi Arabia. Madinah is located in the north-western part of the Kingdom of Saudi Arabia and the center is the only diabetic center serving diabetic in Madinah region.

#### **Study population:**

Diabetic adult patients attending Prince Abdul-Aziz bin Majid Diabetes Center in Al Madinah City, Saudi Arabia.

#### **Inclusion criteria:**

- All adult diabetics type one and type 2 patients who were attending at Prince Abdul-Aziz bin Majid Diabetes Center
- Age is 18 years and above
- At least diagnosed 6/12 month before

#### **Exclusion criteria**

- Very ill patients
- Age less than 18 years
- Diagnosed with diabetes less than 6/12 month

**Sample size:** it was calculated when researcher estimated the total number of patients with diabetes mellitus who attended Prince Abdul-Aziz bin Majid Diabetics Center in Medina City Saudi Arabia. The calculated sample size was 363 diabetic patient.

**Sampling technique:** Researcher used systemic random sampling was conducted.

#### **Study tool:**

Validated structured, translated questionnaire in the Arabic language [8], which was tested for its reliability and validity with a Cronbach's alpha; a closed type questions were developed from the literature review of similar objectives and consent for use of questionnaire was provided through email after contacting the cross-ponding author. The questionnaire assesses demographic date (Age, gender, marital status, education status, occupational, duration of diabetes, rate of visits to diabetic clinic per year) as well as foot care knowledge and practices, and other related variables which was self-interviewing by researcher.

#### **Pilot study:**

The pilot study was done on some diabetic patients to assess the applicability and feasibility of questionnaire and to estimate the time that is consumed to complete the questionnaire. All those diabetics who participated in this pilot study, were excluded from the study.

#### **Ethical consideration:**

**An ethical approval was obtained from Ethics Committee in Prince Abdul-Aziz bin Majid Diabetes Center. Consent was attached to each questionnaire, which stated that the participation in the study is voluntary and confidentiality of participant was granted and no name was needed. The consent was taken from each participant.**

#### **Data entry and analysis**

The statistical analysis was done by using the statistical package for the social sciences (SPSS). Data were presented as frequency and percentage and were analyzed by chi<sup>2</sup> test. Result was significant if p-value was less than 0.05.

#### **RESULTS**

The sociodemographic data of the participants are shown in table 1.

**Table (1): Sociodemographic characteristics of participants (n=363)**

	Parameter	No.	%
<b>Gender</b>	Male	207	57.0
	Female	156	43.0
<b>Age</b>	Less than 20	14	3.9
	20 - 30 years old	57	15.7
	31 - 40 years old	68	18.7
	41 – 50 years old	81	22.3
	51 - 60 years old	72	19.8
	More than 60	71	19.6
<b>Social status</b>	Single	79	21.8
	Married	226	62.3
	Divorced	23	6.3
	Widower	35	9.6
<b>Occupation</b>	Government sector	95	26.2
	Private sector	74	20.4
	Retired	61	16.8
	House wife	76	20.9
	Other	57	15.7
<b>Education level</b>	Illiterate	15	4.1
	Read and write	24	6.6
	Primary	34	9.4
	Preparatory	51	14.0
	Secondary	119	32.8
	University	120	33.1
<b>Duration of disease with diabetes</b>	less than 10 years	161	44.4
	From 11 to 19	120	33.1
	20 years and over	82	22.6
<b>Average number of diabetes clinic visits per year</b>	1-4 times	148	50.7
	5 to 6 times	111	30.6
	7 to 10 times	46	12.7
	11 times and more	22	6.1

Generally, 90.6% of participants scored good knowledge level while 9.4% scored poor knowledge score (Table 2).

**Table (2): Knowledge of participants of about foot care (n=363)**

Parameter	Yes	No
<b>Diabetics may have poor blood flow in the feet</b>	<b>311</b> <b>85.7</b>	<b>52</b> <b>14.3</b>
<b>Diabetic patients may have weak sensation in the feet</b>	<b>324</b> <b>89.3</b>	<b>39</b> <b>10.7</b>
<b>Diabetics may get ulcers on the feet</b>	<b>342</b> <b>94.2</b>	<b>21</b> <b>5.8</b>
<b>Diabetics may get gangrene</b>	<b>339</b> <b>93.4</b>	<b>24</b> <b>6.6</b>
<b>With poor feeling in the feet, you may be more prone to foot ulcers</b>	<b>302</b> <b>83.2</b>	<b>61</b> <b>16.8</b>
<b>With poor blood flow to your feet, you may be more prone to foot ulcers</b>	<b>331</b> <b>91.2</b>	<b>32</b> <b>8.8</b>

Generally, 77.1% of participants scored good attitude level while 22.9% scored poor attitude score (Table 3).

**Table (3): Attitude of participants about foot care (n=363)**

Parameter	Yes	No
Attended an awareness class on how to take care of their feet	276 76.0	87 24.0
Taught how to take care of their feet from a doctor	287 79.1	76 20.9
Taught how to take care of their feet from the nursing staff	263 72.5	100 27.5
Diabetics should examine their feet by themselves	308 84.8	55 15.2
Diabetics can enjoy an ordinary lifetime by regulating blood sugar levels	344 94.8	19 5.2
Nutrition is an important factor in controlling blood sugar levels	354 97.5	9 2.5
Had lesions and scratches on their feet, and what they do if they had wounds and wounds on their feet	129 35.5	234 64.5
Goes to the healthcare centre	67 (18.5)	
Goes to the emergency	32 (8.8)	
Waits for hospital appointment	12 (3.3)	
Uses herbal medicine	10 (2.8)	
Went to the hospital and wished they didn't go	1 (0.3)	

Generally, 340 (93.7%) of participants scored good practice level while 23 (6.3%) scored poor practice score (Table 4).

**Table (4): Practice of participants regarding foot care (n=363)**

	Yes	No
Check their feet daily and look for any new red spots/swelling/wounds	276 76.0	87 24.0
Wash their feet daily	352 97.0	11 3.0
Dry their feet and between the toes after washing them	320 88.2	43 11.8
Use moisturizers to moisturize the feet	303 83.5	60 16.5
Does not walk barefoot	342 94.2	21 5.8
Check shoes before wear them	307 84.6	56 15.4
Check water temperature before taking a shower and washing their feet	331 91.2	32 8.8
Trim toenails straight and file edges	338 93.1	25 6.9

According to table (5), good knowledge score was significantly associated with occupation of participant, duration of diabetes, and number of visits to the clinic. Overall, there was association between good attitude score with educational level of participants only but not with other sociodemographic characteristics. A significant association was found between good practice score with educational level of participants only.

**Table (5): Correlates of knowledge, attitudes, and practices among 368 patients with type 2 diabetes about foot care (n=363)**

		Knowledge		P value	Attitude		P value	Practice		P value
		Good n (%)	Poor n (%)		Good n (%)	Poor n (%)		Good n (%)	Poor n (%)	
Gender	Male	189	18	<b>0.613</b>	164	43	<b>0.247</b>	191	16	<b>0.209</b>
		57.4%	52.9%		58.6%	51.8%		56.2%	69.6%	
	Female	140	16		116	40		149	7	
		42.6%	47.1%		41.4%	48.2%		43.8%	30.4%	
Age	Less than 20	13	1	<b>0.122</b>	11	3	<b>0.461</b>	12	2	<b>0.082</b>
		4.0%	2.9%		3.9%	3.6%		3.5%	8.7%	
	20 - 30 years old	49	8		40	17		55	2	
		14.9%	23.5%		14.3%	20.5%		16.2%	8.7%	
	31 - 40 years old	59	9		50	18		59	9	
		17.9%	26.5%		17.9%	21.7%		17.4%	39.1%	
	41 – 50 years old	79	2		61	20		76	5	
		24.0%	5.9%		21.8%	24.1%		22.4%	21.7%	
	51 - 60 years old	67	5		60	12		69	3	
		20.4%	14.7%		21.4%	14.5%		20.3%	13.0%	
	More than 60	62	9		58	13		69	2	
		18.8%	26.5%		20.7%	15.7%		20.3%	8.7%	
Social status	Single	70	9	<b>0.727</b>	62	17	<b>0.266</b>	75	4	<b>0.517</b>
		21.3%	26.5%		22.1%	20.5%		22.1%	17.4%	
	Married	206	20		168	58		210	16	
		62.6%	58.8%		60.0%	69.9%		61.8%	69.6%	
	Divorced	22	1		21	2		23	0	
		6.7%	2.9%		7.5%	2.4%		6.8%	0.0%	
	Widow	31	4		29	6		32	3	
		9.4%	11.8%		10.4%	7.2%		9.4%	13.0%	
Occupation	Government sector	85	10	<b>0.002</b>	68	27	<b>0.407</b>	89	6	<b>0.379</b>
		25.8%	29.4%		24.3%	32.5%		26.2%	26.1%	
	Private sector	73	1		62	12		67	7	
		22.2%	2.9%		22.1%	14.5%		19.7%	30.4%	
	Retired	58	3		49	12		60	1	
		17.6%	8.8%		17.5%	14.5%		17.6%	4.3%	
	House wife	61	15		58	18		72	4	
		18.5%	44.1%		20.7%	21.7%		21.2%	17.4%	
	Other	52	5		43	14		52	5	
		15.8%	14.7%		15.4%	16.9%		15.3%	21.7%	
Educational levels	Illiterate	11	4	<b>0.286</b>	8	7	<b>0.001</b>	12	3	<b>0.005</b>
		3.3%	11.8%		2.9%	8.4%		3.5%	13.0%	
	Can read and write	21	3		22	2		22	2	
		6.4%	8.8%		7.9%	2.4%		6.5%	8.7%	
	Primary	31	3		32	2		34	0	
		9.4%	8.8%		11.4%	2.4%		10.0%	0.0%	
	Intermediate	47	4		32	19		43	8	
		14.3%	11.8%		11.4%	22.9%		12.6%	34.8%	
	Secondary	108	11		95	24		114	5	
		32.8%	32.4%		33.9%	28.9%		33.5%	21.7%	
	University	111	9		91	29		115	5	
		33.7%	26.5%		32.5%	34.9%		33.8%	21.7%	
Duration of diabetes (year)	Less than 10	149	12	<b>0.024</b>	122	39	<b>0.659</b>	149	12	<b>0.711</b>
		45.3%	35.3%		43.6%	47.0%		43.8%	52.2%	
	11-19	112	8		96	24		113	7	
		34.0%	23.5%		34.3%	28.9%		33.2%	30.4%	
	More than 20	68	14		62	20		78	4	
		20.7%	41.2%		22.1%	24.1%		22.9%	17.4%	
Number of visits to the clinic	1-4 times	169	15	<b>0.020</b>	141	43	<b>0.353</b>	173	11	<b>0.157</b>
		51.4%	44.1%		50.4%	51.8%		50.9%	47.8%	
	5-6 times	104	7		91	20		107	4	
		31.6%	20.6%		32.5%	24.1%		31.5%	17.4%	
	7-10 times	36	10		33	13		40	6	
		10.9%	29.4%		11.8%	15.7%		11.8%	26.1%	
	≥11	20	2		15	7		20	2	
		6.1%	5.9%		5.4%	8.4%		5.9%	8.7%	

## DISCUSSION

Diabetes complications could be avoided or postponed, which is the entire goal of diabetes management. It also saves money and reduces the risk of death and morbidity associated with the health condition. Diabetes management, on the other hand, necessitates a greater commitment on the part of the patients suffering from the condition, in addition to that provided by health workers and caregivers<sup>[9]</sup>. In the event of amputation, the diabetic foot has an impact on the patient's quality of life. However, utilising educational and caring measures, amputation can be avoided<sup>[10]</sup>. Foot ulcers are thought to be the most preventable diabetes complication. Diabetic foot ulcers (DFUs) risk factors are associated with poor practices and knowledge. Diabetic foot care education and practice lowers the incidence of diabetic foot complications and, eventually, amputation. According to the American Diabetes Association, diabetic patients must have annual examinations of their knowledge, abilities, and habits<sup>[11]</sup>.

According to our findings, the majority of participants (90.6 percent) had a good knowledge level, whereas 34 (9.4%) had a bad knowledge level. Patients were aware that they might develop restricted blood flow to their feet (85.7 percent), lack of feeling in their feet (89.3 percent), foot ulcers (94.2 percent), and foot gangrene (93.4 percent). This was greater than previously documented in the literature. According to a research, a good percentage of the participants scored strong knowledge about washing their feet daily (76%), checking their feet daily (73.6%), and the necessity of stockings (73.6%). Wearing slippers at home had the lowest knowledge score (31.2 percent)<sup>[12]</sup>.

On the contrary, other investigations have revealed a poor level of expertise. **Muhammad-Lutfi et al.** conducted a research in Malaysia, the main bulk of people were oblivious that feet ought be cleaned in warm potable water that the temperature should be checked before washing feet, and that applying moisturizer to feet is beneficial<sup>[13]</sup>.

According to **Kafaie et al.** study in Iran, the majority of people are unaware that not washing their feet daily, doing daily foot inspections, cutting their nails with a blade, and not applying moisturizer on their feet are all harmful to their wellbeing. Conversely, afterward participating in a training session, their understanding dramatically increased<sup>[14]</sup>.

Another research found that 46.7 percent of individuals had strong awareness of diabetic foot self-care, 29.3 percent had poor knowledge, and 24% had intermediate understanding<sup>[15]</sup>.

Another study found that the majority of patients have appropriate knowledge regarding diabetes and related foot issues, with a mean knowledge score of (8.576) out of a possible 12 points. Approximately 69.2 percent of patients were aware that diabetics are more prone to develop foot ulcers, 62.5 percent were aware of the danger of decreased blood flow in their feet, and

66.1 percent were aware that smoking would exacerbate poor circulation. 71.4 percent of patients were alert of the hazard of diminished foot sensations, 70.5 percent were conscious of the significance of steady sole examination, and 74.5 percent were attentive of the standing of inner footwear checkup<sup>[16]</sup>.

Our study indicated that (93.7%) of participants scored good practice level while (6.3%) scored poor practice score. (76%) of participants check their feet daily and look for any new red spots/swelling/wounds, majority of the patients wash their feet daily (97%), (88.2%) dry their feet and between the toes after washing them, and (93.1%) trim toenails straight and file edges. This was in line with another research, which found that virtually all participants (95.2%) washed their feet every day, 62.4 percent examined their feet every day, and 61.6 percent clipped their nails straight and across. Wearing slippers at home (23.2%) received the lowest grades for poor practice, while just 34.4% inspected inside shoes before wearing them. Using moisturiser on the feet and between the toes (29.6% for each) is not a common habit<sup>[17]</sup>.

In Saudi Arabia, **Al-Asmary et al.** reported a modest practice score<sup>[18]</sup>.

In another survey, 42.6 percent of people said they practice good diabetic foot self-care, 36.7 percent said they practice moderately, and 20.7 percent said they practice poorly<sup>[19]</sup>.

Additional study found that regardless of increased awareness and optimistic attitude, cases were trailing in the management of diabetes and accompanying foot issues, as only 26.8% of patients performed day-to-day self-foot examinations, while 43.3 percent had not ever checked their feet. Merely 37.9% of cases reported they checked their shoes before wearing them, and only 49 percent said they wore comfortable, closed, and soft footwear. The majority of patients (54%) certainly didn't go outdoor shoeless. Only 32.1 percent of cases wore cotton hits on a steady basis, although 17.9 percent not ever did. Nearby 50.4 percent of cases changed their socks on a day-to-day basis. Merely 29% of cases checked to see whether their shoes/socks had left any markings on their feet, and 27.7% of patients changed their shoes on a regular basis even if there was no injury. Just 27.2 percent of cases carefully dried between their toes next to clean washing their feet with warm water, which accounted for 38.4 percent of the total. The majority of cases (73.7%) trimmed their toenails on a consistent basis, while 30.8 percent used moisturising lotion on a regular basis<sup>[4]</sup>.

**Kheir et al.** found that patients in Qatar have a good habit of inspecting their feet on a frequent basis<sup>[18]</sup>.

According to **Hamidah et al.** from Malaysia, 28.4 percent of individuals newly diagnosed with diabetes adopted appropriate foot care practices<sup>[19]</sup>. Only 10.2 percent of diabetic patients had adequate foot care practices, according to **Desalu et al.** from Nigeria<sup>[20]</sup>.

In our study, good knowledge score was significantly associated with occupation of participant, duration of diabetes, and number of visits to the clinic. There was association between good attitude score with educational level of participants only but not with other sociodemographic characteristics. Also, a significant association was found between good practice score with educational level of participants only. This was similar to a prior study that found a link between certain demographic features of patients and their knowledge and practice of foot care. Level of expertise, residency, marital status, and a history of hospitalisation due to DFU were all found to be predictors of practice in diabetic patients [5]. Patients who received foot care instruction also examined their feet on a frequent basis, according to other research [2].

Patients who are instructed to take care of their feet and whose feet are checked by physicians on a regular basis have better foot care habits [21]. Alternative study originated that where you live has a substantial influence on your knowledge score, with individuals in cities having a considerably higher rate of knowledge score. Both individuals with a low socioeconomic status and those with a high socioeconomic status scored well on knowledge. It was higher in overweight patients, smokers, and those with poor glycemic control ( $P < 0.05$ ). The mainstream of publics in equally high and low socioeconomic rank (48 percent) had a great knowledge score, which could be clarified by the fact that publics in both clusters are further worried around their fitness; the frequency of illnesses is greater in the stumpy group, consequently they more distinguish about the illness; in addition, persons in the high cluster are regularly more apprehensive because they know additional information about the illness [15].

In Saudi Arabia, **Al-Asmary et al.** found that practice score was linked to age, gender, illiteracy, unemployment, and smoking [22]. Studies in Tanzania by **Chiwanga and Njelekela** and India by **George et al.** [23,24] found that education and diabetes interval were the most effective influences that had a substantial influence on knowledge. One more study indicated that diabetes alertness and practices were substantially connected to age (51 years), education, medium income, unemployment, diabetes time > 10 years, household history, managed diabetes mellitus, and education regarding diabetes consequences and diabetic foot upkeep ( $P$  value < 0.05) [18].

## CONCLUSION

In conclusion, diabetic patients participated in our study showed good knowledge, attitude and practice scores when compared to previous literature in Saudi Arabia and worldwide. There is a need for awareness classes and campaigns for diabetic patients to educate them about diabetic foot, diabetic ulcers and other complications. These courses are obligatory to enhance their knowledge and practices, as well as to encourage diabetic patients to have a good attitude regarding diabetic foot upkeep.

## Limitations:

- Shortage of time, difficulties in finding exact sample size.
- Research is self-funding.
- Service: To provide the patients with leaflet that explain the disease and the proper practice of foot care among diabetic.

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## Author Contributions

All the authors contributed evenly with regards to data collecting, analysis, drafting and proofreading the final draft.

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## Conflict of Interest

The authors declare that there are no conflicts of interests.

## Data and materials availability

All data associated with this study are presented in the paper.

## REFERENCES

1. **Unwin N, Alberti G, Aspray T et al. (1998):** Economic globalisation and its effect on health. *BMJ.*, 316(7142): 1401–1402.
2. **Jonathan E, Richard A, Paul Z et al. (2010):** Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes Res Clin Pract.*, 87(1):4-14.
3. **Al Dawish M, Robert A, Braham R et al. (2016):** Diabetes mellitus in Saudi Arabia: A review of the recent literature. *Curr Diabetes Rev.*, 12(4):359-368.
4. **Boulton A (2000):** The diabetic foot: a global view. *Diabetes Metab Res Rev.*, 1:S2-S5.
5. **Al Odhayani A, Al Sayed Tayel S, Al-Madi F (2017):** Foot care practices of diabetic patients in Saudi Arabia. *Saudi J Biol Sci.*, 24(7):1667-1671.
6. **Al-Rubeaan K, Al Derwish M, Ouizi S et al. (2015):** Diabetic foot complications and their risk factors from a large retrospective cohort study. *PLoS One*, 10(5):e0124446.
7. **Alshammari Z, Alsaid L, Parameaswari P (2019):** Attitude and knowledge about foot care among diabetic patients in Riyadh, Saudi Arabia. *J Family Med Prim Care*, 8(6):2089-2094.
8. **Alghamdi K, Al-Gamdi K, Mansuori F et al. (2018):** Knowledge and practices regarding self-foot care among diabetic patients in Al-Madinah–KSA. *Imperial Journal of Interdisciplinary Research*, 3(6):205-209.

9. **Al Zahrani H, Mahdi A (2011):** Foot care knowledge and practice among diabetic patients attending primary health care centers in Jeddah City. *Journal of King Abdulaziz University: Medical Sciences*, 98(282):1-34.
10. **Pourkazemi A, Ghanbari A, Khojamli M et al. (2020):** Diabetic foot care: knowledge and practice. *BMC Endocr Disord.*, 20(1):40-46.
11. **Idongesit L, Adibe O, Okonta J et al. (2014):** Knowledge of self-care among type 2 diabetes patients in two states of Nigeria. *Pharmacy Practice (Internet)*, 12(3):110-116.
12. **Saber H, Daoud A (2018):** Knowledge and practice about the foot care and the prevalence of the neuropathy among a sample of type 2 diabetic patients in Erbil, Iraq. *J Family Med Prim Care.*,7(5):967-974.
13. **Muhammad-Lutfi A, Zaraihah M, Anuar-Ramdhan I (2014):** Knowledge and practice of diabetic foot care in an in- patient setting at a tertiary medical center. *Malays Orthop J.*, 2014;8:22–6.
14. **Kafaie P, Noorbala MT, Soheilikhah S et al. (2012):** Evaluation of patients' education on foot self-care status in diabetic patients. *Iran Red Crescent Med J.*, 14:829–32.
15. **Ahmed S, Badi S, Tahir H et al. (2019):** Knowledge and practice of diabetic foot care in Sudan: A cross sectional survey. *Diabetes & Metabolic Syndrome*, 13(4), 2431–2435.
16. **Shamim M, Alhakbani M, Alqahtani M et al. (2021):** Knowledge, attitude, and practice regarding diabetic foot care among Saudi and non-Saudi diabetic patients in Alkharj. *J Family Med Prim Care*, 10(2):859-864.
17. **Al-Asmary A, Mostafa O, AL-Khalidi Y (2013):** Diabetic patients' knowledge and practice regarding prevention of diabetic foot. *Med J Cairo Univ.*, 81:197–205.
18. **Kheir N, Greer W, Yousif A et al. (2011):** Knowledge, attitude and practices of Qatari patients with type 2 diabetes mellitus. *Int J Pharm Prac.*, 19(3):185–191.
19. **Hamidah H, Santhna L, Ruth Packiavathy R et al. (2012):** Foot care strategy for the newly diagnosed DM type 2 patients with low educational and socio-economic background: a step towards future. *Clin Ter.*, 163(6):473–478.
20. **Desalu O, Salawu F, Jimoh A et al. (2011):** Diabetic foot care: self-reported knowledge and practice among patients attending three tertiary hospital in Nigeria. *Ghana Med J.*, 45(2):60–65.
21. **Kim A, Hongsranagon P (2008):** Preventive behaviors regarding foot ulcers in diabetes type II patients at BMA health center no. 48, Bangkok, Thailand. *J Health Res.*, 22(suppl):21–28.
22. **Bell R, Arcury T, Snively B et al. (2005):** Diabetes foot self-care practices in a rural, triethnic population. *Diabetes Educ.*, 31(1):75–83.
23. **Chiwanga F, Njelekela M (2015):** Diabetic foot: Prevalence, knowledge, and foot self-care practices among diabetic patients in Dar es Salaam, Tanzania – A cross-sectional study. doi: [10.1186/s13047-015-0080-y](https://doi.org/10.1186/s13047-015-0080-y).
24. **George H, Rakesh P, Krishna M et al. (2013):** Foot care knowledge and practices and the prevalence of peripheral neuropathy among people with diabetes attending a secondary care rural hospital in Southern India. *J Family Med Prim Care*, 2(1):27–32.