ORIGINAL ARTICLE

Knowledge and Practices of Diabetic Patients Regarding Foot Care: A Cross-Sectional Study

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ABSTRACT

Objective: To determine the knowledge & practices of diabetic patients about foot care.

Study Design: A cross-sectional study.

Place and Duration of Study: This study was conducted at Pakistan Ordnance Factories (POF) Hospital, Wah Cantt, Pakistan from 1st June 2024 to 15th August 2024.

Methods: A total of 178 patients were included by by purposive sampling. Data was collected on closed-ended questionnaires. Data was analyzed by SPSS 23. Scores for knowledge and practice were assigned out of a total of 10. Knowledge and practice were categorized as good (> 8), average (5-8), and poor (< 5). Chi-square test of significance was applied to find out the relationship among categorical data at $P \leq 0.05$.

Results: Out of 178 males, 97 (54.5%) were while females were 81 (44.5%). 61 (34.3%), 64 (36%), and 53 (29.8%) had duration of DM less than 5 years, 5-10 years, and more than 10 years, respectively. 80 people (44.9%) were having normal HbA1c during last 6 months while 98 (55.1%) people were having high HbA1c during last 6 months. Knowledge of 36 (20%) patients was good, 74 (42%) average, and 68 (38%) poor. Practice of 14 (8%) patients was good, 95 (53%) average, and 69 (39%) poor. The knowledge of foot care was higher among males (*P*-value 0.016), patients having higher education (*P*-value 0.000), and having normal HbA1c levels (*P*-value 0.041). The practice of foot care was better in subjects having higher educational status (*P*-value 0.014) and in patients having normal HbA1c levels during the last 6 months (*P*-value 0.029).

Conclusion: The knowledge and practice of foot care among diabetics were found to be average. Targeted health education interventions are needed to promote proper foot care and prevent complications.

Keywords: *Awareness, Diabetes Mellitus, Foot Care, Knowledge, Practice.*

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Introduction

Diabetes Mellitus (DM) is a widespread, debilitating disease symbolized by persistently raised blood sugar levels.[1] Presently, it affects nearly 463 million of the global population, and in 2040, this number would likely be 642 million, with the majority in low and middle-income nations.[2,3] There are 33 million people living with type 2 diabetes in Pakistan—the third largest diabetes population globally. An additional 11 million adults in Pakistan have impaired glucose tolerance, while approximately 8.9 million people with diabetes remain undiagnosed.[4] This figure would rise to 115 million by 2025, which places an enormous burden on our health care system.[5] Diabetic foot disease (DFD) is a frequent, debilitating problem. In diabetics, persistent hyperglycemia causes functional changes in the microcirculation and reduced sensation in the lower limbs, leading to tissue damage in the feet.[6] Almost half of the diabetics have some form of DFD, and it is responsible for around 80% of atraumatic leg amputation.[7] Globally, 6.3% of patients with Diabetes have a foot ulcer, and in a multicenter study in Pakistan, 13.9% patients had a foot ulcer.[8,9] DFD can lead to a lower quality of life and early death among

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diabetics. In low/middle-income countries, about 40% of health care expenditure among diabetics is attributed to this complication.[10]

Understanding foot care habits among diabetics is crucial because poor habits can lead to serious complications like ulcers, infections, and amputations, which significantly impact a person's physical and mental well-being and healthcare costs. This study can identify gaps in knowledge and practice, enabling targeted education and interventions to improve outcomes for individuals with diabetes as well as the financial burden on healthcare systems. It can also help empower patients to take control of their foot health by providing them with the knowledge and tools they need to practice proper self-care for better long-term outcomes.

Methods

A cross-sectional study was carried out at POF Hospital, Wah Cantt from 1st June to 15th August 2024. Based on an anticipated prevalence of 86.6%, a 95% confidence level, and a precision of 5%, a sample size of 178 patients [n= z^2pq/d^2, *P*= 86.6%[9], q=100 — *P* q = 100 — 86.6 = 13.4%, z =1.96, d = 5% (0.05) N = $(1.96)^2$ (86.6 x 13.4) / $(5)^2$, N = 178] was determined using purposive sampling. Eligible participants had been diagnosed with Type II Diabetes for more than two years.[9,10] Approval from the Institutional Review Board of the institute was obtained vide letter no. WMC/ERC/IRB/049, dated 2nd May 2024, and the subjects were informed about the study.

A closed-ended questionnaire (pre-tested by conducting a pilot study, Cronbach's Alpha 0.72) was used for data collection. The researchers visited the Outpatient Department of POF Hospital to collect data from 178 patients who fulfilled the inclusion criteria. The researchers filled out the questionnaires by asking questions in Urdu to patients after obtaining their informed consent. The questionnaire consisted of a socio-demographic profile (age, gender, education, income) and disease status. Different questions were asked to appraise the knowledge and practice of patients about foot care. Every question had options of yes or no. “Yes” response to each question was scored 1. “No” response was scored 0 (scores range from 0 – 10 for both knowledge and practice). Knowledge and practices were categorized as Good (> 8), Average (5 - 8), and Poor (< 5).

HbA1c level of< 6.5%[11] during the last 6 months was considered normal. Data was analyzed by SPSS 23. Frequencies (%) were calculated for qualitative variables. Scores for knowledge and practice were assigned out of a total of 10. A chi-square test of significance was applied to examine the relationship among categorical data at $P \leq 0.05$.

Results

The research on diabetic foot care was conducted at POF Hospital, Wah Cantt. The data was collected from 178 patients. Frequency of participants belonging to various sociodemographic categories is shown in Table 1. The frequency of participants in different knowledge and practice categories is shown in Table 2. Responses of subjects to multiple questions about knowledge and practices are given in Table 3 and 4. The knowledge of foot care was significantly better in the male population (Figure.1) in subjects having higher education, more income, and with normal HbA1c levels. (Table-5).

The practice of foot care was significantly higher in the literate population and in subjects having controlled HbA1c level during the last 6 months and in the high-income group. (Table 6). Positive correlation (significant at 0.01 level, 2-tailed) was noted between knowledge and practice.

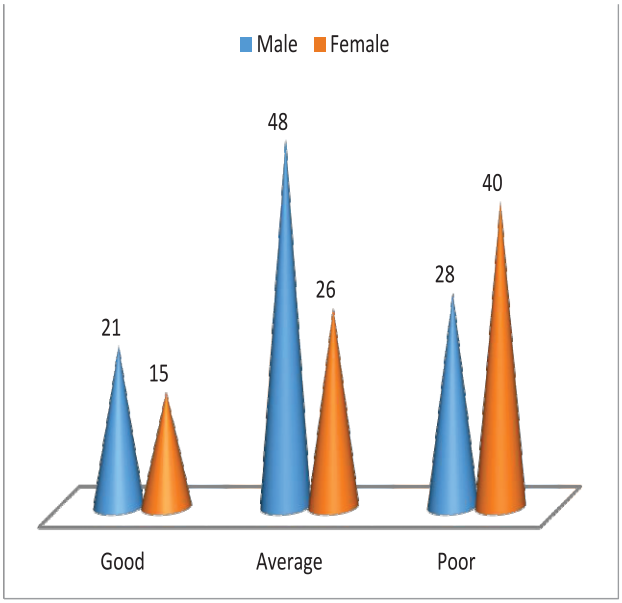

Fig.1: Comparison between knowledge of foot care and gender

Table-1: Sociodemographic profile of participants

Variable	Frequency (%)
Age (Years)	
20-30	5 (2.8%)
30-40	18 (10.1%)
> 40	155 (87.1%)
Gender	
Male	97 (54.5%)
Female	81 (44.5%)
Educational status	
Illiterate	38 (21.3%)
Primary	21 (11.8%)
Matric	32 (18%)
Intermediate	32 (18%)
Higher/University	55 (30.9%)
Monthly Income	
<15000	15 (8.4%)
15000-30000	34 (19.1%)
> 30000	129 (72.5%)
Duration of DM (Years)	
< 5	61 (34.3%)
5 – 10	64 (36%)
> 10	53 (29.8%)
HbA1c during last 6 months	
Normal	80 (44.9%)
High	98 (55.1%)

Table-2: Knowledge and Practice regarding Foot care

	Mean Score	Good	Average	Poor
	Mean ± SD	Frequency (%)	Frequency (%)	Frequency (%)
Knowledge	5.71 ± 2.87	36 (20%)	74 (41.57%)	68 (38.20%)
Practice	5.07 ± 2.18	14 (7.8%)	95 (53.37%)	69 (38.76%)

Table-3: Knowledge of Diabetic patients regarding Foot care

Questions	Frequency (%)	
	Yes	No
Are you educated about foot care?	116 (65.2)	62 (34.8)
Are you aware that: 1. Patients with diabetes have less circulation of blood in their feet?	99 (55.6)	79 (44.4)
2.Patients with diabetes have defective sensations in feet?	116 (65.2)	62 (34.8)
3.Due to defective sensations and blood flow in feet, diabetics are likely to have foot ulcers / gangrene?	140 (78.7)	38 (21.3)
4. Daily inspection of feet is necessary?	102 (57.3)	76 (42.7)
5. Drying of feet after washing is required?	57 (32.0)	121 (68.0)
6. Moisturization of feet can prevent foot ulcer?	91 (51.1)	87 (48.9)
7. Foot ulcers can be avoided by wearing comfortable shoes?	89 (50)	89 (50)
8. Infection of feet can lead to ulcer?	115 (64.6)	63 (35.4)
9. Which method of trimming nails is correct?	Cutting straight 91 (51.1)	Cutting along the edge 87 (48.9)

Table-4: Practices of Diabetic patients regarding Foot care

Questions		Frequency (%)	
		Yes	No
1. Do you: Wash your feet each day?		167 (93.8)	11 (6.2)
2. Apply moisturizing cream on dry areas after washing?		103 (57.9)	75 (42.1)
3. Examine your feet regularly for any damage.		105 (59.0)	73 (41.0)
4. Cut toenails straight regularly?		98 (55.1)	80 (44.9)
5. Examine your feet for any shoe or sock marks?		88 (49.4)	90 (50.6)
6. Consult a podiatrist in case any anomaly is found on the feet?		66 (37.1)	112 (62.9)
7. How frequently do you buy shoes?	0-When shoes are broken 56 (31.5)	1-Once a year 53 (29.8)	2-More than once in a year 69 (38.8)
8. How often do you go for a foot checkup?	0-Never 84 (47.2)	1- Only during illness 75 (42.1)	2- Once in 6 months 19 19 (10.7)

Table-5: Knowledge status with Sociodemographic variables

Variables	Knowledge status				
	Good	Average	Poor	*Chi-square* value	*P*-value
Age (Years)					
20-30	1	2	2		
30-40	6	8	4	3.050	0.54
> 40	29	64	62		
Gender					
Male	21	48	28	8.287	0.016
Female	15	26	40		
Educational status					
Illiterate	2	7	29		
Primary	4	9	8		
Matric	3	14	15	45.700	0.000
Intermediate	7	20	5		
Higher/University	20	24	11		
Duration of DM (Years)					
< 5	9	23	29		
5 – 10	13	32	19	6.248	0.18
> 10	14	19	20		
HbA1c during last 6 months					
Normal	22	34	24	6.392	0.041
High	14	40	44		
Monthly Income					
<15000	1	3	11		
15000-30000	2	15	17	17.384	0.002
> 30000	33	56	40		

Table-6: Practice status with Sociodemographic variables

Variables	Practice status			*Chi square* value	*P*-value
	Good	Average	Poor		
Age (Years)					
20-30	0	4	1	5.300	0.47
30-40	0	11	7		
> 40	14	80	61		
Gender					
Male	8	51	38	0.074	0.96
Female	6	44	31		
Educational status					
Illiterate	0	15	23	19.120	0.029
Primary	2	10	9		
Matric	2	17	13		
Intermediate	2	22	8		
Higher/University	8	31	16		
Duration of DM (Years)					
< 5	2	31	28	5.647	0.22
5 – 10	5	38	21		
> 10	7	26	20		
HbA1c during last 6 months					
Normal	11	41	28	7.052	0.029
High	3	54	41		
Monthly Income					
<15000	0	8	7	19.197	0.001
15000-30000	0	12	22		
> 30000	14	75	40		

Discussion

Diabetic patients are more prone to develop foot ulcers due to microvascular changes and loss of sensations, which, if neglected, can lead to loss of limb and poor quality of life. This impediment can be prevented if patients practice regular foot care. This study was carried out at POF Hospital, Wah Cantt, to determine the knowledge & practices of diabetic patients about foot care.

In this study, 54.5% were males and 44.5% were females. This is comparable to another study in which 49% of participants were females and the rest were males.[12] In our study, about 70% patients had the disease for 5-10 years, and 30% for more than 10 years. Similar to this, in another study conducted in India, 66.6% had illnesses of 5-10 years duration, and 33.3% had problems for more than 10 years.[13]

Regarding knowledge of patients about foot care, 20% had good, 42% average, and 38% had poor knowledge. This observation mirrors the results of another research conducted in Lahore where 29% had good, 40% satisfactory and 31% poor knowledge.[5] In a study conducted in Sudan 47% participants had good, 29% poor and 24% moderate knowledge.[14] In contrast to these, more than two-thirds of patients possessed good knowledge in studies by Tuha, Alsaleh, and Mekonnen; whereas mostly the patients had poor knowledge in research conducted by Pourkazemi and Shaki.[1-3,8,15] The discrepancy in knowledge may be attributed to the difference in the study population. Many factors, including education level, socioeconomic status, cultural beliefs, access to healthcare, and individual experiences with diabetes, may affect their level of knowledge.

In our study 65% were well aware that diabetics have reduced sensations in the lower limbs. Similarly, in a study conducted by Solan73% have knowledge about tingling sensations in lower extremities, and in a study by Kumar, 64% knew that diabetes could reduce sensations.[16,17] Seventy-eight percent had knowledge regarding the development of

ulcers/gangrene. Contrary to this, research conducted in Lahore revealed that 54% of participants had prior knowledge about the development of gangrene, while another study in Moradabad, India, found that 46% had similar knowledge.[10,18] Illiterate individuals living in underserved areas may have limited access to healthcare professionals and resources for foot care education.

55.6% were aware that diabetics have reduced blood flow in the lower limbs. Comparable to other studies conducted in India (38%) and Iran (23%), this study found that a significant portion of participants were aware of the appropriate way to trim nails.[18,1] Results of our study showed that 65% participants had received information on foot care, while research conducted in PIMS Hospital, Islamabad, reported that only 26% patients had received foot care education.[9] This lack of education is probably due to the reason that mostly the patients visiting PIMS are from far-off areas of the country and have limited access to health education facilities. The health care providers are somewhat responsible for not emphasizing self-foot care, as they have to attend a large number of patients daily in a limited time, and to educate each patient individually in the outpatient department is nearly impossible.

About 94% washed their feet daily, comparable results had been evidenced by studies in Lahore, where 86.7% of respondents, and in Karachi, where 98.4% of participants washed their feet daily.[10,17] About 58% patients were using moisturizing lotion. A wide body of evidence supports this; 62% in a study by Solan, 57%in a research carried out in Islamabad, and 60% in a survey by Alsaleh were moisturizing their feet.[16,9,15] Fifty-nine percent of participants agreed to the inspection of their feet daily. Similarly, 54% of respondents in Lucknow, 47.5% in Johannesburg, 68% in Turkey, and 46% in Kuwait inspect their feet daily.[19,20,15] Nearly half of the patients had average practice while only 7.8% had good practice. These results are similar to the findings of a study conducted in Lahore, where 14% respondents had good and 54% had satisfactory practices.[5] The reason for the similarity may be same cultural practices and beliefs of individuals. Contrary to these, many studies had reported better practices; 42.6% in Sudan, 39% in Northeast Ethiopia, 31% in Kuwait, and 59.6% in Ethiopia.[14,8,15,2] Clear and concise communications from healthcare providers about the importance of foot care, including specific instructions for self-care, is crucial for improving the practices.

The knowledge of foot care was significantly better in the male population (*P*-value 0.016) in subjects having higher education (*P*-value 0.000), more income (0.002), and with normal HbA1c levels (*P*-value 0.041). Contrary to this, a study in Sudan exhibited better understanding with increasing age and duration of disease.[14] Iranian females were more knowledgeable than males.[1] In Ethiopia, also educated subjects were well informed about foot care.[2] Healthier practices were observed among the literate population (*P*-value 0.01), in subjects having controlled HbA1c level (*P*-value 0.02), and in the high-income group (*P*-value 0.001). Better practices have been elicited among subjects having good disease control and higher education in a study by Ahmed Safa et al.[14] Also, the patients having better practices were more educated in a survey by Karadag et al.[21] Positive correlations has been noted between knowledge and practice in our research. Similarly, a study by Pourkazemi et al. has noticed a positive association between knowledge and practice of foot care.[1] Lower levels of education are often associated with poorer knowledge and practices regarding foot care, as individuals may lack access to information and may not fully understand the risks associated with poor foot care. Individuals with lower socioeconomic status may face barriers to accessing healthcare, including preventative foot care services, and may have less access to resources like specialized footwear. Addressing these disparities requires a multifaceted approach that includes improving access to healthcare, promoting health literacy, and providing culturally sensitive education and support.

The limitations of this study are that it was conducted at one tertiary care hospital for a short period and only a limited number of patients were included. Some modes of patients' friendly intervention should be planned to impart health education to the patients for enhancing their knowledge and inculcating good practices of foot care. This should be implemented at the domiciliary,

primary, and tertiary care levels. Moreover, strategies should be developed for the prevention of foot ulcers secondary to uncontrolled diabetes to reduce the incidence of gangrene and eventually amputations.

Conclusion

The knowledge and practice of foot care among diabetics was found to be average. Male patients, subjects with higher education and income, and those having reasonable glycemic control exhibit better knowledge and practice. Targeted health education interventions are needed to promote proper foot care and prevent complications.

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RM: Manuscript writing for methodology design and investigation
KW: Writing the original draft, proofreading, and approval for final submission
MR: Conception and design of the work
SSI: Revising, editing, and supervising for intellectual content
SM: Validation of data, interpretation, and write-up of results
SA: Data acquisition, curation, and statistical analysis