Original Article

Diabetic Foot Care: Knowledge and Practices among Diabetic Patients at a Teaching Hospital in Lahore Pakistan

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Abstract

Background: Diabetic foot ulcers affect 19–34% of diabetic patients and significantly impair quality of life through pain, limited mobility, work loss and reduced social functioning in addition to limb amputation. Despite need for preventive care, poor awareness among patients and lack of routine foot examination contribute to worsened outcomes.

Objective: To assess the knowledge and practices related to diabetic foot care among diabetic patients.

Methods: This cross-sectional study was conducted at Department of Medicine, Chaudhary Muhammad Akram Teaching and Research Hospital, from April to July 2025. After ethical approval and informed consent, 155 diabetic patients, of both genders, were enrolled using non-probability consecutive sampling technique. Patients with history of foot or limb surgery, amputation, gangrene, steroid use, malignancy, pregnancy or postpartum, or pre-existing psychiatric disorders were excluded. Diabetes mellitus was defined as HbA1c ≥6.5%, or two random blood glucose readings ≥200 mg/dL, or a documented history of diabetes or use of anti-diabetic medications. After collecting demographic data, a structured questionnaire adapted from previously published literature was used: the knowledge domain comprised 12 true/false questions; the practice domain included 8 questions rated on a 3-point Likert scale: never, sometimes and always.

Results: Mean knowledge score was 7.8±2.4 while mean practices score was 9.3±2.7. One-way ANOVA revealed that none of the patient variables were significantly associated with knowledge scores. However, family income ($p=0.038$) and ischemic heart disease ($p=0.018$) showed statistical associations with practice scores. Spearman's rank correlation revealed a positive association between knowledge and practice scores ($\rho=0.691$, $p<0.001$).

Conclusions: Although most patients had good knowledge about foot care, optimal practices were deficient. To improve foot care behaviors, patient education and tailored interventions should be undertaken to decrease risk of foot ulcers.

Keywords: Foot care, Diabetes Mellitus, Knowledge, Diabetic Foot, Practices

Received: 14-08-2025 Revision: 17-09-2025 Accepted: 20-10-2025

How to cite: Butt NI, Bashir A, Waris B, Ammar H, Khizar I, Aslam M, et al. Diabetic Foot Care: Knowledge and Practices among Diabetic Patients at a Teaching Hospital in Lahore Pakistan. Avicenna J Health Sci. 2025;02(03): 99-105

Introduction

A common chronic illness, Diabetes Mellitus (DM) is on the rise globally, especially in resource-limited developing countries including Pakistan. According to the International Diabetes Federation (IDF), more than 11% of the global population has diabetes, with over a quarter unaware of their condition.[1,2] Furthermore, almost 81% diabetics are in low- and middle-income countries such as Pakistan.[1,2]. It has been projected that global diabetes burden will increase to 642.8 million adults aged 20 and 79 by 2030 and 783.7 million by 2045.[2,3] The term "diabetic foot" encompasses complications including nerve damage, poor blood flow, Charcot foot, ulcers and infections like osteomyelitis, ultimately resulting in amputation.[4,5] Affecting 19–34% of diabetic patients during their lifetime, diabetic foot ulcers lead to significant poor life quality by causing limited mobility, pain, loss of productivity and reduced social functioning.[6] The risk of losing a lower limb is 25 times higher for people with diabetes than for those without. These foot complications add up to about 16.8 million years lived with disability (YLDs) around the world every year, 12.9 million years from neuropathy, 2.5 million due to foot ulcers and 1.5 million from amputations.[7,8] Optimal controls of blood pressure, blood glucose and cholesterol help prevent or delay the development of these complications. In spite of the need for preventative care, patients remain essentially unaware regarding foot care, and do not routinely examine their feet.[9,10] These

deficits result in delays in diagnosis and bad outcomes. Although some information about awareness of diabetic foot care in Pakistan is available but there is a gap, and need to further investigate the awareness on knowledge and practices pertaining to diabetes foot care among diabetic patients, specifically in an urban setting like Lahore.[11,12] This study was therefore designed to fill this regional gap so that future educational and preventive strategies may be planned. The objective of present study was to assess the knowledge and practices of diabetic patients regarding foot care.

Methods

This cross-sectional questionnaire-based study was carried out at the Department of Medicine, Chaudhary Muhammad Akram Teaching and Research Hospital, Azra Naheed Medical College, Superior University Lahore Pakistan from April to July 2025. Ethical approval for the study was obtained from the Institutional Ethical Review Committee of Azra Naheed Medical College, Superior University, dated March 20, 2025. Informed consent was obtained from all participants prior to inclusion in the study. A total of 155 participants with diabetes mellitus, of both genders, were enrolled using a non-probability consecutive sampling technique. Patients with a history of foot or limb surgery, amputation, gangrene, steroid use, malignancy, pregnancy or postpartum status, or pre-existing psychiatric disorders were excluded to minimize potential bias. Diabetes mellitus was defined as per standard diagnostic criteria: HbA1c ≥6.5%, or two random blood glucose readings ≥200 mg/dL, or a documented history of diabetes or use of anti-hyperglycemic medications. Diabetic retinopathy was diagnosed based on the presence of microaneurysms, hard exudates, macular edema or neovascularization observed during a fundoscopic examination. Neuropathy was identified through clinical symptoms such as pain, paresthesia or sensory loss in a glove-and-stocking distribution. Ischemic heart disease was diagnosed based on a history of acute myocardial infarction or unstable angina. Chronic kidney disease (CKD) was defined by an estimated glomerular filtration rate (eGFR) <60 mL/min/1.73 m² along with sonographic evidence such as shrunken kidneys, cortical thinning or increased cortical echogenicity. Hypertension was defined as a blood pressure >140/90 mm Hg on two separate occasions, ambulatory blood pressure readings >140/90 mm Hg at least 15 days apart, or a documented history of antihypertensive medication use.

To assess diabetic foot care knowledge and practices, a structured questionnaire was adapted from previously published literature.[3,10] The knowledge domain consisted of 12 true/false questions, scored as '1' for a correct response and '0' for an incorrect response. The maximum score for knowledge domain was 12. The practice domain compromised of 8 questions which were rated on a 3-point Likert scale, and graded as "always" (2), "sometimes" (1) and "never" (0). The maximum score for practice domain was 16. Furthermore, patient data consisting of gender, age, marital status, educational level, monthly family income, diabetes duration diabetes control, HbA1c level and the presence/absence of complications (neuropathy, retinopathy, CKD, ischemic heart disease and hypertension) were also recorded.

All data were analyzed using SPSS version 23.0. Descriptive statistics, including mean and standard deviation, were used for continuous variables, while frequencies and percentages were used for categorical variables. The association between patient characteristics and diabetic foot care knowledge and practice scores was evaluated using one-way ANOVA, with a p-value ≤0.05 considered statistically significant. Spearman's rank correlation coefficient was used to determine the relationship between knowledge and practice scores.

Results

A total of 155 diabetic patients were included in this study with a female preponderance (101, 65.2%) as demonstrated in Table 1. Mean age was 57.9±10.1 years with 83 (53.5%) patients aged 57 years or older. Majority of patients were married (148, 95.4%) and 122 (78.7%) had monthly family income of more than PKR 50,000. Mean duration of diabetes was 9.7±6.4 years with 86 (54.5%) patients having diabetes for 8 years or more. Mean HbA1c (%) level was 9.7±2.7 with 78 (50.3%) patients having poor diabetes control. With regards to diabetes treatment, 76 (49.0%) patients were using oral anti-diabetes agents, 25 (16.1%) patients were on injectable insulin therapy while 37 (23.8%) patients were on a combination of oral agents and injectable insulin as shown in Table 1. Retinopathy was present in 92 (59.7%) patients, hypertension in 94 (60.7%) patients, neuropathy in 71

(45.8%) patients, ischemic heart disease in 70 (45.2%) patients, and chronic kidney disease in 17 (10.9%) patients. A positive family history of diabetes was reported by 112 (72.2%) patients.

Table 1: *Demographic and Clinical Variables (N=155)*

Demographic and clinical variables		Frequency (n)	Percent (%)
Age	≤56 years	72	46.5
	≥57 years	83	53.5
Gender	Female	101	65.2
	Male	54	34.8
Marital Status	Married	148	95.4
	Unmarried	07	4.6
Education	Illiterate	21	67
	0-5 years	4	12
	≥5 years	6	19
Family Income	≤50,000 PKR/month	33	21.3
	>50,000 PKR/month	122	78.7
Duration of Diabetes	≤7 years	69	44.5
	≥8 years	86	54.5
Diabetes Control	Good	77	49.7
	Poor	78	50.3
Diabetes Treatment	None	06	3.9
	Lifestyle Modification	11	7.1
	Oral Agents	76	49.0
	Injectable Insulin	25	16.2
	Oral plus injectable	37	23.8
Retinopathy	Present	92	59.7
	Absent	63	40.6
Neuropathy	Present	71	45.8
	Absent	86	55.4
Ischemic Heart Disease	Present	70	45.2
	Absent	85	54.8
Chronic Kidney Disease	Present	17	10.9
	Absent	138	89.1
Hypertension	Present	94	60.7
	Absent	61	39.3
Family History of Diabetes	Present	112	72.2
	Absent	43	27.8

With regards to knowledge of diabetes foot care, 111 (71.6%) reported washing their feet daily with lukewarm water and mild soap. Just over half (82, 52.9%), dried their feet thoroughly, especially between the toes as compared to 73 (47.1%) who did not. A majority, 109 (70.3%), checked their feet daily for cuts, blisters, swelling, or redness as depicted in Table 2. Only 23 (14.8%) used a mirror or asked for help to see the bottoms of their feet. Toenail care was relatively well practiced, with 124 (80.0%) trimming their toenails straight across and 118 (76.1%) avoiding cutting the corners too deeply. Most participants (129, 83.2%), wore properly fitted shoes to prevent foot injuries, and 114 (73.5%) avoided walking barefoot even indoors. Knowledge of warning signs of serious foot problems was reported by 113 (72.9%) patients, but only 80 (51.6%) sought medical advice immediately upon noticing foot problems. A large majority, (128, 82.5%), avoided using sharp objects like blades or scissors to remove calluses or corns. However, only 71 (45.8%), applied moisturizer to their feet while avoiding the areas between the toes as demonstrated in Table 2.

Table 2: *Knowledge of Diabetes Foot Care (N=155)*

Question regarding knowledge of diabetes foot care	Patient Response	
	Yes n (%)	No n (%)
Do you wash your feet daily with lukewarm water and mild soap?	111 (71.6%)	44 (28.4%)
Do you dry your feet thoroughly, especially between the toes?	82 (52.9%)	73 (47.1%)
Do you check your feet daily for cuts, blisters, swelling, or redness?	109 (70.3%)	46 (29.7%)
Do you use a mirror or ask someone for help if you cannot see the bottom of your feet?	23 (14.8%)	132 (85.2%)
Do you trim your toenails straight across to prevent ingrown nails?	124 (80.0%)	31 (20.0%)
Do you avoid cutting the corners of your toenails too deep?	118 (76.1%)	37 (23.9%)
Do you always wear properly fitted shoes to prevent foot injuries?	129 (83.2%)	26 (16.8%)
Do you avoid walking barefoot, even indoors?	114 (73.5%)	41 (26.5%)
Do you know the warning signs of a serious foot problem (e.g., pain, swelling, open wounds, infection)?	113 (72.9%)	42 (27.1%)
Do you seek medical advice immediately if you notice any foot problems?	80 (51.6%)	75 (48.4%)
Do you avoid using sharp objects like blades or scissors to remove calluses or corns?	128 (82.5%)	27 (17.5%)
Do you apply moisturizer to your feet but avoid putting it between the toes?	71 (45.8%)	84 (54.2%)

With regards to diabetes foot care practices, 100 (64.5%) reported inspecting their feet daily, while 6 (3.9%) sometimes did, and 49 (31.6%) never inspected their feet daily. Proper washing and drying of the feet every day was practiced always by 68 (43.9%) patients as shown in Table 3. Only 24 (15.5%) always wore cotton socks and changed them daily while a

majority (81, 52.3%) never followed this practice. Avoidance of tight shoes or shoes causing pressure points was reported always by 107 (69.0%) patients. Checking the inside of shoes before wearing was done always by 95 (61.3%) patients. Avoiding exposure of feet to extreme temperatures such as hot water, heating pads, or cold surfaces was always practiced by 99 (63.9%) patients as depicted in Table 3. Regular visits to healthcare providers for foot checkups were reported always by 128 (82.5%) patients. However, only 21 (13.5%) always avoided applying antiseptics or home remedies to foot wounds without consulting a doctor, 44 (28.4%) did so sometimes, and a majority of 90 (58.1%) never followed this precaution.

Table 3: *Practices of Diabetes Foot Care (N=155)*

Question regarding practices of diabetes foot care	Patient Response		
	Always n (%)	Sometimes n (%)	Never n (%)
Do you inspect your feet daily?	100 (64.5%)	06 (3.9%)	49 (31.6%)
Do you wash and dry your feet properly every day?	68 (43.9%)	11 (7.1%)	76 (49.0%)
Do you wear cotton socks and change them daily?	24 (15.5%)	50 (32.2%)	81 (52.3%)
Do you avoid tight shoes or shoes that cause pressure points?	107 (69.0%)	14 (9.0%)	34 (22.0%)
Do you check the inside of your shoes before wearing them?	95 (61.3%)	26 (16.8%)	34 (21.9%)
Do you avoid exposing your feet to extreme temperatures (e.g., hot water, heating pads, cold surfaces)?	99 (63.9%)	14 (9.0%)	42 (27.1%)
Do you visit a healthcare provider regularly for foot checkups?	128 (82.5%)	27 (17.5%)	0 (0.0%)
Do you avoid applying antiseptics or home remedies to foot wounds without consulting a doctor?	21 (13.5%)	44 (28.4%)	90 (58.1%)

Mean knowledge score was 7.8±2.4 while mean practices score was 9.3±2.7. The one-way ANOVA conducted to examine the association between various demographic and clinical variables revealed that none of the variables were significantly associated with knowledge scores as shown in Table 4. However, family income (p=0.038) and ischemic heart disease (p=0.018) showed statistically significant associations with practice scores. Spearman's rank correlation revealed a positive association between knowledge and practice scores related to diabetic foot care (ρ=0.691, p<0.001) indicating that participants with higher knowledge levels tended to engage in better foot care practices.

Table 4: *One-way ANOVA Comparing Mean Knowledge and Practices Score Across Demographic and Clinical Variables*

Demographic and clinical variables	p-value	
	Knowledge	Practices
Age	0.693	0.739
Gender	0.117	0.079
Marital Status	0.364	0.339
Education	0.288	0.066
Family Income	0.279	0.038*
Duration of Diabetes	0.283	0.218
Diabetes Control	0.246	0.232
Diabetes Treatment	0.309	0.682
Retinopathy	0.920	0.630
Neuropathy	0.283	0.172
Ischemic Heart Disease	0.092	0.018*
Chronic Kidney Disease	0.399	0.174
Hypertension	0.114	0.296
Family History of Diabetes	0.549	0.945

Discussion

The present study evaluated the knowledge and practices of diabetes foot care among 155 patients, presenting important results that reflect both the strengths and deficiencies in self-care behaviour. Most of the patients were female (65.2%) and middle aged or older to be a mean age of 57.9 years, and over half had been diabetic for 8 years or more. The marked prevalence of diabetes complications such as retinopathy (59.7%), neuropathy (45.8%) hypertension (60.7%) and IHD (45.2%), indicates the vulnerability of this population to diabetic foot and its complications. It is important to evaluate the knowledge and practices of the patient, as it is vital for effective control of diabetes.[13] In North India, Ahmad et al. found that 60.5% of diabetic patients have poor knowledge and 79.0% have inadequate practices.[14] Jackson et al. in their study noted that 79.5% of patients had over 70% knowledge about self-care in diabetes.[15] In a study performed in Malaysia, it was seen that 58% had poor knowledge related to foot care and 61.8% had poor associated practices.[16] Our study demonstrated general good knowledge relating to primary foot care. For example the majority of patients (71.6%) reported that they washed their feet regularly, preferably daily with

lukewarm water and mild soap, and wore well fitting shoes (83.2%). However some significant areas of knowledge were lacking. For example only 14.8% had used a mirror or sought assistance to inspect the plantar aspects of their feet, which would have delayed the detection of any ulcerative or infective process. Although nearly three out of four patients recognized the danger signals indicating serious foot problems, only about half (51.6%) got the necessary medical attention immediately, indicating that there seems to be a gap between the knowledge acquired and its implement for timely action. Nawaz et al in their earlier study carried out in Lahore, reported that 86.5% of the participants had poor knowledge and awareness regarding foot care whereas 57.6% had incompetent / inadequate foot care practices.[17]

Foot care practices showed similar trends of knowledge. Although 64.5% of patients inspected their feet every day, fewer showed a continuous habit of washing and drying their feet properly (43.9%) and changing of cotton socks every day (15.5%) in our study. Encouragingly, most patients (82.5%) regularly attended health centers for foot inspections, thus showing good attention to medical services. However, a majority of patients in our study did not avoid applying antiseptics or home remedies without medical consultation, a risky behavior that may increase infection risk. Numerous studies have pointed to the tendency for inadequate foot-care practice in diabetic patients.[3,18] A study by Muzzammil et al. conducted in Karachi Sindh, showed that 39.53% had poor knowledge of diabetic foot-care and 36.82% had poor practices.[19] A recent study from Iran has shown that 84.8% of participants demonstrated poor knowledge and 49.6% showed poor foot-care practices.[10] Kheir et al. observed poor practice of regular foot inspection in Qatar.[20] In Malaysia Hamidah et al. found that only 28.4% of newly diagnosed cases had adequate foot-care practice habits.[21] In this respect Desalu et al. in Nigeria noted that just 10.2% of patients had shown proper foot-care practice.[22] Comparison with the present study is limited in value, owing to differences in the ethnic races and population studied, study tools and the means of study used and the methods of assessment as well. Our study identified an association of foot care practices with family income, as well as IHD, indicating the economic or health status affects self care behaviors. These results highlight an educational deficit among patients. A significant positive correlation between knowledge and practice was reported by Pourkazemi et al. with factors including residence, knowledge level, marital status and previous hospital admission for diabetic foot were identified as predictors of practice scores.[10] This may be related to the restricted access to health care, insufficient infrastructure and a lack of trained personnel available for education.[23,24,25] These findings highlight a critical gap in patient education regarding diabetic foot care in addition to underscoring the importance of instructing patients in a comprehensive manner: they must receive information, but they also need to modify their behavior.[23,24,25] The roles of healthcare providers in education about foot care and the emphasis on early reporting of foot problems can reduce morbidity associated with diabetes, minimize complications such as diabetic foot ulcers or amputations, ultimately leading to enhanced quality of life and diabetes control. [26,27,28]

Several limitations should be considered when interpreting the findings of our study. Firstly, causality cannot be inferred between demographic or clinical variables and knowledge or practices on foot care due to the cross-sectional design used in our study. Secondly, the data was based on self-reported questionnaires which may result in bias by recall and social desirability; hence an overestimation of the degree of compliance with recommended foot care practice by patients. Thirdly, generalization of our findings to other populations or regions with different socioeconomic and cultural contexts cannot be ensured because samples were drawn from a single healthcare setting. Besides, educational levels were low in a significant portion of the sample which may have influenced both the understanding and reporting of foot care behaviors. Lastly, behavioral and psychological factors including patient motivation, health literacy or access to foot care resources were not appraised. Such factors would have further elaborated the barriers to achieving optimal foot care.

Conclusion

Even though the knowledge of foot care among diabetics who participated in our study was found to be good, proper practices were very low. Monthly family income and ischemic heart disease independently influenced foot care practices. To increase adherence to foot care practices, targeted educational programmes and structured intervene-

tions are needed to reduce risk of complications especially foot ulcers.

Ethical Approval: The Institutional Ethical Review Board, Azra Naheed Medical College, The Superior University approved this study.

Conflict of Interest / Disclosure: Nil.

Funding Source: Nil.

Authors' Contribution:

NIB: Conception and design; acquisition, analysis and interpretation of data; manuscript writing, critical revisions for important intellectual content

AB: Acquisition of data; manuscript writing.

BW: Conception and design; acquisition, analysis and interpretation of data; manuscript writing.

HA: Conception and design; acquisition of data; manuscript writing.

IK: Acquisition of data; manuscript review and revisions.

MA: Acquisition of data; manuscript review and revisions.

MAQ: Conception and design; analysis and interpretation of data; manuscript review, final approval of the version to be published

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