Original Article

Sociodemographic disparities in diabetic foot self-care: Critical role of healthcare providers

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ABSTRACT

Background: Foot self-care is an effective measure to prevent diabetic foot, a dreaded complication of diabetes mellitus (DM). This study aimed to assess knowledge and practice of foot self-care among diabetic patients, evaluate the influence of sociodemographic factors, and examine the foot self-care advice the patients reported receiving from healthcare providers.

Materials and Methods: This cross-sectional study was conducted in a tertiary care hospital involving 146 patients with DM. The researcher recorded sociodemographic parameters, knowledge, practice, and advice of foot self-care using a validated structured questionnaire. Statistical analysis was done using SPSS 20.0.

Results: Mean knowledge, practice, and advice scores were 12.15 (±5.57), 5.65 (±2.05) and 2.97 (±2.41) respectively. 62.33% of patients had poor knowledge, 90.41% had poor practice scores, and 65.07% had not received adequate advice and instructions from healthcare providers regarding foot self-care. Knowledge, practice, and advice scores had a significant positive correlation. Education and occupation were substantial predictors of knowledge and advice scores, while age and education significantly predicted practice scores.

Conclusion: Most patients had poor knowledge and practice of foot self-care. The majority reported receiving inadequate advice about foot self-care from healthcare providers. Certain patients (rural, lower education levels, farmer/laborer, single/widowed) had disproportionately low scores for knowledge and practice of foot self-care and advice received from health care providers. The results necessitate community health and awareness programs and wide dissemination of information via mass/media, including targeted/focused efforts to promote diabetes awareness in certain groups of patients. Healthcare providers can significantly impact patients by advising and educating them about foot self-care during every visit.

Keywords: Diabetes mellitus, diabetic foot, foot self-care, knowledge, practice

Introduction

With India emerging as the diabetes capital of the world, the burden of diabetic foot could be enormous and emerge as a significant public health problem. Among the several complications of diabetes mellitus (DM), diabetic foot syndrome is one of the dreaded and most devastating yet preventable complications. The lifetime risk of developing a foot ulcer in a diabetic patient is 15%.[1] Diabetic foot is a cause of significant psychological trauma for patients, in addition to the financial burden

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that ensues. As per estimates, every 20 s, a lower limb is lost due to diabetes, which is the most common cause of nontraumatic lower-limb amputation.[2] With more than 69.2 million diabetics in India, diabetic foot ulcers can be a significant public health concern.[3] However, diabetic foot can be prevented by effective foot self-care routines. This requires that the patient is well informed, has adequate knowledge, and engages in self-care practices regularly over an extended period.[4] Besides peripheral neuropathy and peripheral vascular disease, lack of information and poor foot self-care practices are major contributors of foot problems in diabetic patients. In addition, certain customs and beliefs, such as wearing toe rings and going barefoot, increase the likelihood of diabetic foot in India.

The American Diabetes Association (ADA) recommends an annual assessment of patients' skills and knowledge about self-care.[5] There is limited information on the knowledge and practice of foot self-care among diabetic patients and the impact of sociodemographic factors in this region. In addition, understanding patients' perspectives on whether healthcare providers give adequate advice on foot self-care is essential. Therefore, this hospital-based cross-sectional study aimed to evaluate the knowledge and practice of foot self-care among diabetic patients, the impact of sociodemographic factors, and evaluate the advice on foot self-care received from healthcare professionals by the patients.

Materials and Methods

Ethics

Prior approval for the study was obtained from the Institutional Ethical Committee. Participation was entirely voluntary, and participants were free to withdraw from the study at any time. Written informed consent was taken from all participants prior to their enrolment in the study. The study was conducted in accordance with The Declaration of Helsinki.

This cross-sectional study was conducted in a tertiary care hospital, involving clinically diagnosed DM patients. The ADA guidelines were followed to diagnose diabetic patients.[6] The calculated sample size for the study was 146.[7] Patients were recruited using a simple random sampling technique.

Inclusion criteria

Clinically diagnosed patients of DM aged >18 years of both sexes without diabetic foot or amputated limb or foot ulcer.

Exclusion criteria

Critically ill patients, newly diagnosed patients (<1 month), and patients unable to answer the questions due to their mental state were excluded from the study.

Questionnaire

A structured questionnaire was used to assess the sociodemographic characteristics, knowledge on foot self-care, and participants' foot-related self-care practices. It also assessed advice on foot self-care received from the healthcare providers as reported by the participants. The questionnaire was developed after an extensive literature review in English, translated into the local language, and then back-translated into English.[8-10] Its validity and reliability were assessed, with Cronbach's alpha values of 0.83, 0.70, and 0.84 were obtained for knowledge, practice, and advice, respectively. The questionnaire was administered through face–to–face interviews by the researcher and consisted of four sections.

- The first section was regarding the sociodemographic characteristics of the study participants, that included age, sex, marital status, education, occupation, and residence (Urban/Rural)
- The second section consisted of 20 questions to assess the knowledge about DM and foot self-care [Supplementary Table 1]. The response to questions was scored on a nominal scale: Score 0 – "No" response/Don't know response, score 1 – "Yes" response. The knowledge score ranged from 0 to 20. Seventy-five percent of the maximum score of the questionnaire was used to assess if a person has a good level of knowledge. Scores >15 were considered good and <15 as poor[8]
- The third section consisted of 11 questions to assess the practice of foot self-care [Supplementary Table 2]. The questions were scored on a two-point scale: Score 0 – "No" response, score 1 – "Yes" response. The practice score ranged from 0 to 11. Seventy-five percent of the maximum score of the questionnaire was used to assess if a person has a good practice of foot self-care. Score >8.25 were considered good and <8.25 as poor[8]
- The fourth section of the questionnaire consisted of 6 questions to assess the advice received on foot self-care from healthcare providers as reported by the participants [Supplementary Table 3]. The questions were scored on a two-point scale: Score 0 – "No" response, score 1 – "Yes" response. The advice score ranged from 0 to 6. Seventy-five percent of the maximum score of the questionnaire was used to assess if a person has a good advice score. Score >4.5 was considered good and <4.5 as poor.

The clinical characteristics of the participants like duration of diabetes (years), body mass index (BMI) (kg/m^2), systolic blood pressure (SBP) (mm Hg), diastolic blood pressure (DBP) (mm Hg), pulse rate (PR) (beats/min), fasting blood sugar (FBS) (mg/dl), post-prandial blood sugar (PPBS) (mg/dl), and glycated hemoglobin (HbA1c) (%) were obtained from paper-based records and noted.

Statistical analysis

Statistical analysis was performed using (IBM SPSS Statistics for Windows, Version 20.0; Armonk, NY: IBM Corp). Kolmogorov–Smirnov and Shapiro–Wilk tests assessed the normality of continuous data. Sociodemographic data were summarized using descriptive statistics (frequency, mean, and standard deviation [SD]). Students' *t*-test was used where appropriate, and the Chi-square test examined the association of categorical variables (knowledge, practice, and advice score, categorized as good and poor) with sociodemographic factors. Spearman's rank correlation assessed the correlation between continuous variables that are not normally distributed. Bivariate and multivariate logistic regression analysis assessed the association between the outcome and independent variables, adjusting for potential confounders. The associations are reported as odds ratio (crude odds ratio and adjusted odds ratio [AOR]) with 95% confidence interval (CI). $P \leq 0.05$ is considered statistically significant.

Results

Sociodemographic characteristics of participants

Of the 146 participants, 92 (63.01%) were males and 54 (36.98%) were females. The mean (±SD) age was 56.63 (±12.31) years with no significant difference between men (57.89 ± 12.32) and women (54.5 ± 12.11). The majority, 88 (60.27%), were from urban areas and 58 (39.73%) from rural areas. Regarding education, the majority, 70 (47.9%), had completed schooling, 43 (29.5 %) had university education, and 33 (22.6%) had no formal education. Duration of diabetes ranged from 1 to 30 years with mean (±SD) of 8.88 ± 7.38 years [Table 1].

Clinical characteristics of the participants

Table 2 shows the anthropometric, physiological, and glycemic control parameters of study participants. The mean (±SD) BMI of participants was 25.20 (±5.52) kg/m^2

Table 1: Sociodemographic data of study participants (original)

Characteristics	Gender		Total (*n*=146), *n* (%)
	Male (*n*=92), *n* (%)	Female (*n*=54), *n* (%)	
Age (years), mean±SD	57.89 ± 12.32	54.5 ± 12.11	56.63 ± 12.31
Categories (years)			
<45	10 (10.9)	8 (14.8)	18 (12.3)
45–≤60	38 (41.3)	26 (48.1)	64 (43.8)
≥60	44 (47.8)	20 (37)	64 (43.8)
Residence			
Urban	51 (55.43)	37 (68.52)	88 (60.27)
Rural	41 (44.57)	17 (31.48)	58 (39.73)
Education			
No formal education	15 (16.3)	18 (33.3)	33 (22.6)
Schooling	42 (45.7)	28 (51.9)	70 (47.9)
University	35 (38)	8 (14.8)	43 (29.5)
Occupation			
Employed (Government/private)	17 (18.5)	1 (1.9)	18 (12.2)
Agriculture	20 (21.7)	4 (7.4)	24 (16.4)
Labor	10 (10.9)	7 (13)	17 (11.6)
Self-employed	22 (23.9)	3 (5.6)	25 (17.1)
Retired	23 (25)	-	23 (15.8)
Homemaker	-	39 (72.2)	39 (26.7)
Marital status			
Married	90 (97.82)	48 (88.88)	138 (94.52)
Single	2 (2.17)	2 (3.70)	4 (2.73)
Widowed	0	4 (7.40)	4 (2.73)
Duration of diabetes (years), mean±SD categories	8.43 ± 6.86	9.64 ± 8.21	8.88 ± 7.38
1–≤5	34 (37)	19 (35.2)	53 (36.3)
5–10	21 (22.8)	9 (16.7)	30 (20.5)
≥10	37 (40.2)	26 (48.1)	63 (43.2)

SD - Standard deviation

with no significant differences between men and women ($P = 0.32$). The mean (±SD) PR was 84.28 (±9.68) beats/min, the mean (±SD) SBP was 126.34 (±16.65) mm Hg, mean (±SD) DBP was 80.35 (±8.07) mm Hg with no significant differences between men and women.

The mean (±SD) FBS and PPBS were 173.27 (±76.47) mg/dl and 236.55 (±97.86) mg/dl, respectively, with no significant gender differences ($P = 0.96$; $P = 0.48$). Mean (±SD) HbA1c was 8.55 (±2.59) %, also showing no significant differences between men and women ($P = 0.65$) [Table 2].

Knowledge score, practice score, and advice score

Table 3 depicts the distribution of patients based on knowledge, practice, and advice scores. Poor knowledge of foot self-care was observed in 62.33% of participants, while 37.67% participants had good knowledge. Mean (±SD) knowledge score among participants was 12.15 (±5.57) with no significant gender difference ($P = 0.194$). Regarding practice, 90.41% had poor score while 9.59% had a good score. Mean (±SD) practice score was 5.65 (±2.05), with no significant gender differences ($P = 0.97$). A majority, 65.07% had not received adequate advice on foot self-care, with a mean (±SD) score of 2.97 (±2.41) and no significant gender differences ($P = 0.12$). One hundred and twenty (82.19%) of the patients were aware about diabetes, 94 (64.38%) reported awareness of the complications of diabetes, 91 (62.33%) were aware about the normal blood sugar levels, 100 (68.49%) were aware of the importance of maintaining the normal blood sugar levels, 134 (91.78%) acknowledged that the antidiabetic medications must be taken regularly, and 104 (71.23%) acknowledged the importance of foot selfcare.

Association of knowledge score, practice score, and advice score with sociodemographic variables

Association of knowledge score with sociodemographic variables

Table 4 shows the association of knowledge score with sociodemographic variables. Spearman's rank correlation showed a significant positive correlation between knowledge scores and both age ($P = 0.008$, $r = 0.220$) and duration of diabetes ($P = 0.000$, $r = 0.361$). Chi-square test revealed a significant association between knowledge score and place of residence (χ^2 [1, $N = 146$] $=9.54$, $P = 0.002$), education (χ^2 [1, $N = 146$] $=27.554$, $P = 0.000$), and occupation (χ^2 [1, $N = 146$] $=29.186$, $P = 0.000$). About 77.6% of rural residents had a poor knowledge score compared to urban residents (vs. 52.3%). Knowledge score was not associated with gender and marital status.

Association of practice score with sociodemographic variables

Table 4 shows the association of practice score with sociodemographic variables. Spearman's rank correlation revealed a significant positive correlation between duration of diabetes ($P = 0.000$, $r = 0.308$) and practice score. Chi-square test revealed a significant association between practice score and education (χ^2 [1, $N = 146$] $=12.66$, $P = 0.013$). Practice score was not associated with gender, residence, occupation, or marital status.

Association of advice score with sociodemographic variables

Table 4 shows the association of advice score with sociodemographic variables. Spearman's rank correlation revealed a significant positive correlation between age (*r*

Table 2: Anthropometric, physiological, and glycemic control parameters of study participants

Physiological parameters	Male	Female	Total	*P*
BMI (kg/m^2)	24.81 ± 4.54	25.86 ± 6.88	25.20 ± 5.52	0.32[a]
PR (beats/min)	84.68 ± 10.47	83.61 ± 8.20	84.28 ± 9.68	0.49[a]
SBP (mmHg)	124.84 ± 15.38	128.88 ± 18.48	126.34 ± 16.65	0.18[a]
DBP (mmHg)	81.02 ± 8.14	79.22 ± 7.89	80.35 ± 8.07	0.19[a]
FBS (mg/dL)	173.02 ± 78.32	173.70 ± 73.93	173.27 ± 76.47	0.96[a]
PPBS (mg/dL)	240.68 ± 103.61	229.51 ± 87.67	236.55 ± 97.86	0.48[a]
HbA1c (%)	8.62 ± 2.74	8.43 ± 2.32	8.55 ± 2.59	0.65[a]

[a]Unpaired *t*-test. BMI - Body mass index, PR - Pulse rate, SBP - Systolic blood pressure, DBP - Diastolic blood pressure, FBS - Fasting blood sugar, PPBS - Postprandial blood sugar, HbA1c - Glycated hemoglobin

Table 3: Distribution of patients according to knowledge, practice, and advice scores (original)

Variable	Male (*n*=92)		Female (*n*=54)		Total (*n*=146)	
	Poor, *n* (%)	Good, *n* (%)	Poor, *n* (%)	Good, *n* (%)	Poor, *n* (%)	Good, *n* (%)
Knowledge score	58 (63.04)	34 (36.96)	33 (61.11)	21 (38.89)	91 (62.33)	55 (37.67)
Practice score	84 (91.30)	8 (8.70)	48 (88.89)	6 (11.11)	132 (90.41)	14 (9.59)
Advice score	59 (64.13)	33 (35.87)	36 (66.67)	18 (33.33)	95 (65.07)	51 (34.93)

= 0.311, P = 0.000) and duration of diabetes (r = 0.330, P = 0.000) with advice score. Chi-square test revealed a significant association of advice score with place of residence (χ^2 [1, N = 146] = 7.315, P = 0.007), education (χ^2 [1, N = 146] = 26.594, P = 0.000), and occupation (χ^2 [1, N = 146] = 29.002, P = 0.000). Advice score was not associated with gender and marital status.

Table 4: Association of knowledge, practice, and advice scores with sociodemographic variables

Variables	Knowledge score (*P*)	Practice score (*P*)	Advice score (*P*)
Age	0.008*	0.08	0.000*
Gender	0.816	0.878	0.659
Residence	0.002*	0.691	0.007*
Education	0.000*	0.013*	0.000*
Occupation	0.000*	0.122	0.000*
Marital status	0.766	0.573	0.085
Duration of diabetes	0.000*	0.000*	0.000*

*P<0.05 is considered statistically significant

Bivariate and multivariate regression analysis

Bivariate logistic regression analysis revealed an association of knowledge score with place of residence, education, occupation, and duration of diabetes [Table 5]. In multivariate regression analysis, university education was positively associated, and farming was negatively associated with the knowledge score. All participants doing labor had a poor knowledge score. The logistic regression models yielded large odds ratios and not well-defined CIs. Hence, AORs for this category may not be reliable since they imply a perfect prediction, and hence, these values are not presented in Table 5.

Bivariate logistic regression analysis revealed an association of practice score with education [Table 6]. On multivariate regression analysis, university-level education was positively associated with practice score. All participants engaged in labor, and all those who were single or widowed had poor practice scores. The logistic regression models yielded large odds ratios with poorly-defined CIs. Hence, for these categories, AORs may not be reliable since they imply a

Table 5: Factors associated with knowledge score in patients with diabetes mellitus

Variable	Knowledge score				
	Poor, *n* (%)	Good, *n* (%)	COR (95% CI)	AOR (95% CI)	*P*
Age (years)					
<45	13 (72.2)	5 (27.8)	1	1	
45–60	43 (67.2)	21 (32.8)	0.788 (0.248–2.02)	1.878 (0.410–8.609)	0.417
>60	35 (54.7)	29 (45.3)	0.464 (0.148–1.455)	0.888 (0.179–4.407)	0.884
Gender					
Female	33 (61.1)	21 (38.9)	1	1	
Male	58 (63)	34 (37)	1.086 (0.544–2.168)	7.484 (0.933–60.066)	0.058
Residence					
Rural	45 (77.6)	13 (22.4)	1	1	
Urban	46 (52.3)	42 (47.7)	0.285 (0.133–0.610)	0.952 (0.309–2.930)	0.932
Education					
No formal education	30 (90.9)	3 (9.1)	1	1	
Schooling	45 (64.3)	25 (35.7)	0.180 (0.050–0.650)	0.242 (0.050–1.169)	0.077
University	16 (37.2)	27 (62.8)	0.059 (0.016–0.226)	0.063 (0.011–0.369)	0.002*
Occupation					
Employed	8 (44.4)	10 (55.6)	1	1	
Farming	21 (87.5)	3 (12.5)	8.750 (1.903–40.235)	11.171 (1.441 - 86.615)	0.021*
Labor	17 (100)	0	-	-	-
Self employed	15 (60)	10 (40)	1.875 (0.550–6.393)	3.483 (0.804–15.091)	0.095
Retired	8 (34.8)	15 (65.2)	0.667 (0.188–2.362)	1.034 (0.203–5.259)	0.968
Homemaker	22 (56.4)	17 (43.6)	1.618 (0.525–4.981)	8.920 (0.903–88.145)	0.061
Marital status					
Married	86 (62.3)	52 (37.7)	1	1	
Single	3 (75)	1 (25)	1.814 (0.184–17.899)	7.463 (0.466–119.439)	0.155
Widow	2 (50)	2 (50)	0.605 (0.083–4.423)	0.387 (0.038–3.966)	0.424
Duration of diabetes (years)					
1–≤5	40 (75.5)	13 (24.5)	1	1	
5–≤10	19 (63.3)	11 (36.7)	0.561 (0.213–1.482)	0.874 (0.247–3.096)	0.835
≥10	32 (50.8)	31 (49.2)	0.335 (0.151–0.745)	0.826 (0.293–2.332)	0.718

*P<0.05 is considered statistically significant. COR - Crude odds ratio, AOR - Adjusted OR, CI - Confidence interval

Table 6: Factors associated with practice score in patients with diabetes mellitus (original)

Variable	Practice score				
	Poor, *n* (%)	Good, *n* (%)	COR (95% CI)	AOR (95% CI)	*P*
Age (years)					
<45	15 (83.3)	3 (16.7)	1	1	
45–60	60 (93.7)	4 (6.3)	3.00 (0.60–14.86)	10.79 (1.40–83.02)	0.022*
>60	54 (84.4)	10 (15.6)	1.08 (0.26–4.43)	3.25 (0.40–26.15)	0.27
Gender					
Female	48 (88.9)	6 (11.1)	1	1	
Male	81 (88)	11 (12)	0.92 (0.32–2.64)	Not Estimable	Not Estimable
Residence					
Rural	52 (89.7)	6 (10.3)	1	1	
Urban	77 (87.5)	11 (12.5)	0.83 (0.29–2.39)	3.19 (0.74–13.74)	0.12
Education					
No formal education	32 (97)	1 (3)	1	1	
Schooling	65 (92.9)	5 (7.1)	0.40 (0.04–3.62)	0.44 (0.04–5.34)	0.52
University	32 (74.4)	11 (25.6)	0.09 (0.01–0.74)	0.05 (0.003–0.73)	0.03*
Occupation					
Employed	16 (88.9)	2 (11.1)	1	1	
Farming	23 (95.8)	1 (4.2)	2.87 (0.24–34.46)	7.45 (0.33–167.28)	0.21
Labor	17 (100)	0	-	-	-
Self employed	23 (92)	2 (8)	1.43 (0.18–11.29)	3.02 (0.24–37.26)	0.39
Retired	17 (73.9)	6 (26.1)	0.35 (0.06–2.01)	0.77 (0.09–6.79)	0.81
Homemaker	33 (84.6)	6 (15.4)	0.68 (0.12–3.79)	Not Estimable	Not Estimable
Marital status					
Married	121 (87.7)	17 (12.3)	1	1	
Single	4 (100)	0	-	-	-
Widow	4 (100)	0	-	-	-
Duration of diabetes (years)					
1–≤5	50 (94.3)	3 (5.7)	1	1	
5–≤10	25 (83.3)	5 (16.7)	0.30 (0.06–1.35)	0.13 (0.01–1.01)	0.052
≥10	54 (85.7)	9 (14.3)	0.36 (0.09–1.40)	0.62 (0.11–3.42)	0.58

*$P<0.05$ is considered statistically significant. COR - Crude odds ratio, AOR - Adjusted odds ratio, CI - Confidence interval

perfect prediction, and hence, these values are not presented in Table 6.

Bivariate logistic regression analysis revealed the association of advice score with age, place of residence, education, occupation, marital status, and duration of diabetes [Table 7]. On multivariate regression analysis, farming was negatively associated, and university-level education was positively associated with advice score. All participants engaged in labor, and those who were widowed had poor advice score. The logistic regression models yielded a large odds ratio and not well-defined CIs. For these categories, AORs may not be reliable since they imply a perfect prediction, and hence, the values are not presented in Table 7.

Correlation between knowledge score, practice score, and advice on foot self-care score

There was a statistically significant positive correlation between knowledge and practice score ($P = 0.000, r = 0.826$), advice score and knowledge score ($P = 0.000, r = 0.721$), and advice score and practice score ($P = 0.000, r = 0.591$).

Discussion

Diabetic foot is a preventable complication of DM, and good self-care practices by patients can reduce its occurrence and consequences. Effective foot self-care practices by patients require both knowledge and its translation into practice. The US Centers for Disease Control and Prevention recommends daily foot examinations for diabetic patients, even if there are no current or impending injuries.[11] This study aimed to assess the patients' knowledge and practice of foot self-care and the advice they received on foot self-care from healthcare providers, and the influence of sociodemographic factors.

In this study, most diabetic patients were aware of diabetes, its complications, the normal blood sugar levels, the importance of maintaining the normal blood sugar levels, regular intake of antidiabetic medications, and the significance of foot self-care. Despite this, the FBS, PPBS, and HbA1c remained above the target values for diabetic patients.[12] Factors contributing to poor glycemic control,

Table 7: Factors associated with advice score in patients with diabetes mellitus

Variable	Advice score				
	Poor, *n* (%)	Good, *n* (%)	COR (95% CI)	AOR (95% CI)	*P*
Age (years)					
<45	12 (66.7)	6 (33.3)	1	1	
45–60	48 (75)	16 (25)	1.50 (0.48–4.6)	2.32 (0.51–10.62)	0.28
>60	34 (53.1)	30 (46.9)	0.57 (0.19–1.70)	0.66 (0.13–3.18)	0.60
Gender					
Female	36 (66.7)	18 (33.3)	1	1	
Male	58 (63)	34 (37)	0.85 (0.42–1.73)	3.73 (0.46–30.54)	0.22
Residence					
Rural	45 (77.6)	13 (22.4)	1	1	
Urban	39 (44.3)	49 (55.7)	0.33 (0.15–0.70)	0.81 (0.25–2.59)	0.73
Education					
No formal education	31 (93.9)	2 (6.1)	1	1	
Schooling	45 (64.3)	25 (35.7)	0.12 (0.03–0.53)	0.19 (0.03–1.11)	0.065
University	18 (41.9)	25 (58.1)	0.05 (0.01-0.22)	0.08 (0.01–0.53)	0.009*
Occupation					
Employed	8 (44.4)	10 (55.6)	1	1	
Agriculture	21 (87.5)	3 (12.5)	8.75 (1.90–40.23)	7.99 (1.08-9.19)	0.04*
Labor	17 (100)	0	-	-	-
Self employed	16 (64)	9 (36)	2.22 (0.64–7.66)	3.20 (0.74–13.93)	0.12
Retired	8 (34.8)	15 (65.2)	0.67 (0.19–2.36)	1.27 (0.24–6.67)	0.78
Homemaker	24 (61.5)	15 (38.5)	2.00 (0.64–6.20)	5.69 (0.55–58.07)	0.14
Marital status					
Married	89 (64.5)	49 (35.5)	1	1	
Single	1 (25)	3 (75)	0.18 (0.02–1.81)	0.49 (0.03–7.04)	0.60
Widow	4 (100)	0	-	-	-
Duration of diabetes (years)					
1–≤5	42 (79.2)	11 (20.8)	1	1	
5–≤10	20 (66.7)	10 (33.3)	0.52 (0.19–1.44)	0.94 (0.25–3.53)	0.92
≥10	32 (50.8)	31 (49.2)	0.27 (0.12–0.62)	0.54 (0.19–1.51)	0.24

*$P<0.05$ is considered statistically significant. COR - Crude odds ratio, AOR - Adjusted odds ratio, CI - Confidence interval

such as self-care, adherence to medications and regular follow-up, dietary and lifestyle factors, comorbidities, socioeconomic factors, psychological and behavioural aspects, among others, were not assessed.[13]

In the present study, the majority of the patients had poor knowledge and practice scores. In addition, a significant number of patients received inadequate advice on foot self-care from health professionals. One contributing factor to poor knowledge and practice scores may be insufficient advice and guidance from healthcare providers, as indicated by a positive correlation between advice score and knowledge and practice score. Similar findings were reported by Pourkazemi *et al*.,[8] while some other authors reported good knowledge but poor practices and attitude towards foot self-care.[14,15] The lowest knowledge score was regarding the use of talcum powder between the toes and not applying lotion between the toes. The lowest practice scores involved inspecting the feet using a handheld mirror, avoiding foot soaking, and drying between the toes.

In this study, sociodemographic factors such as age, place of residence, education, occupation, and duration of diabetes were significantly associated with knowledge score. However, education and occupation remained the most significant predictors. Elderly participants and participants with longer duration of diabetes had better knowledge scores, likely due to repeated visits to the diabetic clinic and accumulation of information over several years, and more frequent interactions with their doctors and nurses, which were likely overlooked by diabetic patients who were younger or had diabetes for a shorter period.[15] Participants from rural areas had poor knowledge regarding diabetes, its complications, and the importance of foot self-care, probably due to limited access to information. Similarly, patients with lower education had poor knowledge scores than those with higher education. Higher education likely facilitates better access to information about their condition and better comprehension to the information provided by health professionals and a more proactive attitude towards management of diabetes, including healthier

lifestyle choices.[8,14,16] Studies by Chiwanga and Njelekela also highlighted the influence of education on diabetes related knowledge.[12] Occupation also played a significant role with farmers and manual labor demonstrating poorer knowledge scores. This may be attributed to lower income, poor quality of life, and reduced access to healthcare services and information. In addition, the majority of the farmers live in rural areas, implying further reduced access to health care services and information.[15,17]

Age and education were significant predictors of practice scores. Patients aged 45–60 years had better practice scores compared to other age groups. Patients with university education had higher practice scores, indicating the impact of higher education on the practice of foot self-care. With respect to the duration of diabetes, there is a trend indicating that patients with longer duration of diabetes have better practice scores, although not statistically significant.

Education and occupation were significant predictors of the advice on foot self-care score. Participants with no formal education or with only primary education, as well as those engaged in farming and manual labor, had lower scores on advice about foot self-care.

This study found a significant positive correlation between knowledge and practice scores, with diabetic patients with higher knowledge on foot self-care having better foot self-care practices. In addition, those educated about foot self-care had better knowledge and practice of foot self-care. Previous studies also reported higher knowledge and practice scores among patients who received training or advice on foot self-care.[8,16,18] Effective management of diabetes requires active patient involvement in complex self-care behaviors, including lifestyle modifications (dietary control, regular exercise, and psychosocial coping skills) and medical self-care (medication use and self-monitoring of blood glucose). Essentially, these self-care measures must be sustained for reducing complications and prolonging life. A well-informed person is more likely to engage in self-care practices, offsetting the risk of diabetic foot and other related complications. This emphasizes the value of patient education on various aspects of self-care, from general lifestyle advice to knowledge about the prescribed drugs, routine medical and ophthalmological examinations, foot care, diet, and cardiovascular risk factors (smoking, obesity, etc.).[4]

Strengths and limitations of the study

The study's findings are unique to this region, providing information about the knowledge and practice of foot self-care among diabetic patients. The results guide the development of focused programs for specific population groups with low knowledge and practice of foot self-care. In addition, this study explored the patient's perspective on the advice of foot self-care received from healthcare providers, which was lacking in previous studies, and reiterates the healthcare provider's role in preventing diabetic foot complications. However, an important limitation is that while the study assessed patients' perspectives, their comprehension of the information provided was not evaluated. Moreover, the healthcare provider's perspective was not explored. Furthermore, factors contributing to poor glycemic control (general lifestyle habits, diet, medication, and follow-up compliance) were not evaluated.

Conclusion

The inadequate knowledge, poor practice, and lack of advice on foot self-care in the majority of the participants highlight the need for community health and awareness programs along with the wide dissemination of information via mass/media. Particularly, low scores in some groups of patients (rural, lower education levels, and farmer/laborer) call for targeted efforts to enhance diabetes awareness in these populations. Healthcare professionals play a critical role in preventing diabetic foot complications. They must prioritize patient education, actively engaging with diabetic patients during each visit to reinforce the importance of routine foot care practices. By integrating consistent education into patient care, healthcare providers can significantly improve self-care behaviors and reduce the risk of diabetic foot complications.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work, the author(s) used a large language model to improve language and readability. After using this tool/service, the author(s) reviewed and edited the content as needed and take full responsibility for the content of the publication.

Ethical approval statement

Prior approval for the study was obtained from the Institutional Ethical Committee. Participation was entirely voluntary, and participants were free to withdraw from the study at any time. Written informed consent was taken from all participants prior to their enrolment in the study. The study was conducted in accordance with The Declaration of Helsinki.

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Conflicts of interest
There are no conflicts of interest.

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Supplementary files

Supplementary Table 1: Assessment of knowledge regarding diabetes mellitus and foot self-care

	Yes	No
Do you know about diabetes?		
Do you know about its complications?		
Do you know about normal blood sugar?		
Do you know that uncontrolled diabetes can lead to complications like foot ulcer, infections, and amputation?		
Do you know that antidiabetic medications should be taken regularly to prevent complications?		
Do you know that self-care of the feet is important?		
Do you know that the feet should be washed daily?		
Do you know that lukewarm water should be used to wash the feet daily?		
Do you know that the temperature of the water should be checked before washing the feet?		
Do you know that the feet should be completely dried after washing?		
Do you know that talcum powder should be used to keep the area between the toes dry?		
Do you know that lotion or moisturizing cream should be applied to the feet to prevent dryness of skin?		
Do you know that lotion should not be applied between the toes?		
Do you know that socks should be changed daily?		
Do you know that the toenails should be trimmed straight across?		
Do you know that the feet should be inspected at least once a day?		
Do you know that diabetic patients should wear comfortable shoes?		
Do you know that the inside of the shoes should be inspected for before wearing them?		
Do you know that diabetic patients should not walk barefoot?		
Do you know that diabetic patients should consult a doctor if they observe redness, blisters, cuts, or wound/s on the feet?		

Supplementary Table 2: Assessment of foot self-care practices in diabetic patients

	Yes	No
Do you inspect the feet every day using a handheld mirror?		
Do you inspect your shoes for foreign bodies and torn linings?		
Do you wash the feet daily?		
Do you dry the skin in between the toes after washing the feet?		
Do you soak your feet in water?		
Do you walk barefoot outside the house?		
Do you walk barefoot inside the house?		
Do you use lotion or moisturizing cream on your feet to prevent drying of the skin		
Do you trim your toenails straight across?		
Do you put your feet near the fire?		
Do you use sharp instrument to clean the nails?		

Supplementary Table 3: Assessment of advice received on foot self-care as perceived by the patient

	Yes	No
Were you educated about the complications of diabetes in the feet?		
Were you informed about the importance of foot care?		
Did you receive specific instructions on foot self-care practices (how to take care of the foot)?		
Does your physician examine your feet on your every visit?		
Did your physician tell you to examine your feet daily?		
Were you advised about the appropriate type of footwear to prevent foot injuries?		