

Knowledge and Practice on Diabetic Foot Self-Care and Its Associated Factors Among Diabetic Patients at Asella Referral and Teaching Hospital, Arsi University, Southeast Ethiopia

Zena D ^{*}1, Kebede A¹, Getachew E², Ferede A ², Akale M¹ and Bekele M²

¹Department of Internal Medicine, College of Health Science, Arsi University, Asella, Ethiopia

²Department of Public Health, College of Health Science, Arsi University, Asella, Ethiopia

***Correspondence:** Dawit Zena, Department of Internal Medicine, College of Health Science, Arsi University, Asella, Ethiopia

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Abstract

Background: Diabetic foot ulcer (DFU) is a major complication that can lead to infection, amputation, and death. The risk of DFUs can be reduced through foot self-care, patient education, and proper preventative measures. In Ethiopia, diabetes is among the real health challenges. Despite the fact that poor foot self-care is an important risk factor for foot ulcers, data on the level of knowledge and practice on diabetic foot self-care and its associated factors were limited in this study area. The study aimed to assess the level of knowledge and practice of diabetic foot self-care and its associated factors among diabetic patients.

Methods: A cross-sectional study was conducted at a tertiary care hospital in southeast Ethiopia. A total of 352 study subjects were recruited using a convenience sampling method. Logistic regression analysis was used to identify factors associated with diabetic foot self-care knowledge and practice. A p-value of < 0.05 was used to declare a significant association.

Results: A total of 140 (39.8%) and 142 (40.3%) participants had good foot self-care knowledge and good foot self-care practice, respectively. Being male (AOR = 1.987, 95% CI: 1.14-3.48, $P < 0.05$), urban residence (AOR = 1.814, 95% CI: 1.03-3.21, $P < 0.05$), not educated and completed primary education (AOR = 0.362, 95% CI: 0.17-0.76, $P < 0.01$ and AOR = 0.393, 95% CI: 0.19-0.83, $P < 0.05$), history of previous foot ulcer (AOR = 2.57, 95% CI: 1.43-4.61, $P < 0.01$), family history of diabetes (AOR = 2.664, 95% CI: 1.52-4.66, $P < 0.01$), and receiving foot care advice/education (AOR = 2.10, 95% CI: 1.25-3.54, $P < 0.01$) were predictors of good diabetic foot self-care knowledge. Low monthly income (≤ 1500 Ethiopian Birr) (AOR = 0.265, 95% CI: 0.09-0.80, $P < 0.05$), not educated and completed primary education (AOR = 0.318, 95% CI: 0.15-0.67, $P < 0.01$ and AOR = 0.383, 95% CI: 0.18-0.81, $P < 0.05$), history of previous foot ulcer (AOR = 1.987, 95% CI: 1.11-3.56, $P < 0.05$), receiving foot care advice/education (AOR = 2.115, 95% CI: 1.26-3.56, $P < 0.01$), and having good foot self-care knowledge (AOR = 1.786, 95% CI: 1.06-3.02, $P < 0.05$) were predictors of good diabetic foot self-care practice.

Conclusion: *The study found that the level of diabetic foot self-care knowledge and practice was low. To enhance care and outcomes, efforts should focus on increasing education, particularly for vulnerable groups like women, rural residents, those with lower income, and lower educational levels.*

Keywords: diabetic foot care, diabetes, knowledge, practice, southeast Ethiopia

Abbreviations: AOR: adjusted odd ratio; DFU: diabetic foot ulcer; DM: diabetes mellitus; NAFFC: Nottingham Assessment of Functional Foot Care; ETB: Ethiopian Birr

Introduction

Diabetes mellitus (DM) is defined as a group of metabolic disorders that share the phenotype of hyperglycemia [1, 2]. It remains one of the major health problems globally, despite much being known about the disease. The rising prevalence is related to multifactorial issues, including environmental, socioeconomic, and genetic factors. Diabetes is the leading cause of renal failure, blindness, and non-traumatic lower limb amputation. It is also one of the major causes of mortality in many countries [1, 2].

According to the International Working Group on the Diabetic Foot, a diabetic foot ulcer (DFU) is one of the most devastating complications, which is defined as a full-thickness wound penetrating through the dermis (the deep vascular and collagenous inner layer of the skin). It can also be characterized as an ulcerated foot that is accompanied by neuropathy and/or peripheral vascular disease of the lower limb in a diabetic patient [1–3]. DFU was found to affect 10–15% of diabetics. It occurs as a result of long duration of diabetes, poor metabolic control, foot deformities, older age, peripheral vasculopathy, and poor knowledge of diabetics [4–6]. Usually, untreated foot ulcers do not heal and may become infected [4]. DFU is a major public health problem and one of the leading causes of morbidities, lower limb amputations, and even death among diabetics [7].

The challenges of diabetes self-management are overwhelming, despite new treatments and technology that have aided in controlling the disease. Patient self-management has a significant role in controlling diabetic complications [1, 2]. Self-management behaviors include doing regular exercise, maintaining a healthy diet, daily foot examination, monitoring of blood glucose, and adherence to medications [1–3].

Complicated DFUs could lead to foot amputation. It is important to assess the possible risk factors of foot ulcers for all diabetic patients. These risk factors include walking barefoot, wearing inappropriate footwear, poor foot hygiene, and a delay in seeking health care. Patients having good knowledge and practice of foot self-care could avoid those risk factors to prevent foot ulcers [8].

A good level of patients' knowledge of self-foot care is important in preventing foot ulcers and amputations in diabetic patients [9]. According to studies conducted in different parts of the world, 15–66% of diabetic patients had good knowledge of diabetic foot self-care [9–13]. About 20–61% of diabetic patients had good practice on diabetic foot self-care [9, 14–18].

Previous history of foot ulcer, being female, receiving foot care advice, and more than 5 years duration of diabetes were factors associated with having good knowledge on foot self-care [19–21]. More than 5 years duration of diabetes, good knowledge level, and receiving foot care advice were factors associated with having good practice on foot self-care [6, 18, 20–22]. On the contrary, lack of formal education, being single and divorced, being male, low socioeconomic status, and not receiving foot care advice were factors associated with poor knowledge and practice of diabetic foot self-care [16–19, 23, 24].

There was limited data on the level of knowledge and practice of diabetic foot self-care in the study setting, which necessitated conducting this research. The findings of this study could contribute to the well-being of diabetic patients with better foot self-care knowledge and practice in the prevention of foot ulcers. Future researchers could benefit from this study because it would provide them with the baseline facts to compare their study results as necessary. The study results could imply to stakeholders that emphasizing the increase in knowledge and practice on diabetic foot self-care would be a cost-effective way of preventing diabetic foot ulceration and its devastating complications for diabetic patients. In addition to limited data on diabetic patients' knowledge and practices regarding foot self-care in the study area, the investigator noted that many communities in the study area walk barefoot and that the majority of them are farmers. Therefore, this study aimed to assess the level of knowledge and practice on diabetic foot self-care and associated factors among diabetic patients attending Asella referral and teaching hospital, southeast Ethiopia.

Materials and Methods

Study settings

An institution-based cross-sectional study was conducted between December 1, 2023, and March 31, 2024, at Arsi University Asella referral and teaching hospital, which is located in Arsi zone of Oromia, about 175 km southeast of the capital city of Ethiopia, Addis Ababa. The hospital serves 3.5 million people [25]. The diabetic clinic is a unit under the medical follow-up clinic. It provides health care services for diabetic patients. The clinic was run by internal medicine specialists, internal medicine residents, and nurses.

Source population

Adult patients who had follow-up at the medical follow-up clinic, Asella referral and teaching hospital, Arsi University.

Study population

Adult diabetic patients having follow-up at the diabetic clinic in Asella referral and teaching hospital, Arsi University.

Study subjects

Adult diabetic patients attending follow-up at the diabetic clinic in Asella referral and teaching hospital, Arsi University, and had at least one visit before the study period.

Inclusion and exclusion criteria

Inclusion criteria: Diabetic patients 18 years old or above, who had at least one visit to the diabetic clinic before the study period. It was expected that every new diabetic patient would receive diabetic foot care education during the first visit. So, study participants should have at least one prior visit to be assessed on their foot self-care knowledge and practice in this study.

Exclusion criteria: Patients who were seriously ill and could not give consent or communicate; and patients who refused to participate in the study.

Study variables

Dependent variables: Diabetic foot self-care knowledge and practice (good/poor).

Independent variables: Sociodemographic variables - age, sex, marital status, level of education, occupation, place of residence, and economic status. Clinical and healthcare system-related variables - type of DM, duration of DM, previous history of DFU, family history of DM, diabetic foot care education, type of medication/treatment taken, and diabetic foot examination by physician.

Sample size and sampling procedure

The required sample size was calculated by using a single population proportion formula, taking a research conducted in Northwest Ethiopia that revealed 56.2% of the patients have good knowledge on foot care among diabetic patients [13], and by considering a 5% margin of error and a 95% confidence level. A convenience sampling method was used to recruit 352 study participants. The reason for using the convenience sampling method was that diabetic patients were appointed every 3 months in the study setting. It was difficult to find the calculated sample size of study participants with the probability sampling method during the data collection period.

Data collection instrument and procedures

Data were collected through an investigator-administered, pre-tested questionnaire. The questionnaire was prepared in English and translated into the local languages (Amharic and Afan Oromo) for data collection, and then re-translated back to English while maintaining its consistency. A pre-test was done on 5% of the sample size to check for the consistency and reliability of the questionnaire. Patients were interviewed face-to-face to obtain data. Foot self-care knowledge and practice were assessed with validated tools. The knowledge score is adapted from similar studies done before and from diabetic foot care education recommended by the American College of Foot and Ankle Surgeons [13, 18, 26, 27]. On the other hand, the diabetic foot self-care practice questionnaire is adapted from the validated instrument of the Nottingham Assessment of Functional Foot Care (NAFFC), revised in 2015 [28–30]. The study used only 16 items out of the 26 questions of the 2015 revised NAFFC since the socioeconomic status of participants in the study area is different. A questionnaire containing the 16 items used in this study has previously been published in a study conducted in a similar setting in Ethiopia [18]. A higher total score indicates better foot care behavior; a score of < 50% suggests that further evaluation of foot care is needed [13, 18, 30]. One supervisor (internal medicine resident) and three data collectors (general practitioners) participated in the data collection process. The quality of the data was ensured through the training and supervision of data collectors.

Data processing and analysis

Before data entry, questionnaires were checked for completeness. The data was entered using Epi-Data 7.1 and exported to SPSS version 26 for analysis. The result of the descriptive statistics was expressed in percentages and frequencies. Binary logistic regression was used first to analyze the association between dependent and independent variables. Variables with a p-value less than 0.25 in bivariate analysis were included in the multivariable binary logistic regression model. The Hosmer-Lemeshow test confirmed that the model had a good fit ($p > 0.05$). The strength of association between independent and dependent variables was measured using odds ratios (OR) and 95% confidence intervals (CI) with a significant level ($P\text{-value} < 0.05$).

Patient and public involvement statement

Patients or the public were not involved in the design, conduct, reporting, or dissemination plans of this research.

Ethical consideration

Ethical approval was obtained from the College of Health Science, Arsi University Ethical Review Committee (Approval No. A/CHS/RC/54/2023). All methods were performed in accordance with the Declaration of Helsinki. Study subjects were recruited only after written informed consent was obtained. All data obtained was treated confidentially.

Operational definitions

Good foot self-care knowledge: Patients scored $\geq 70\%$ on knowledge questionnaires [13, 18, 27].

Good foot self-care practice: This included a total practice score of $\geq 50\%$ (≥ 24) out of 48 maximum scores [18, 28–30].

Diabetic foot self-care: Ability of the patient to perform self-care activities that help the feet to be healthy [31].

Results

Sociodemographic characteristics

A total of 352 adult diabetic patients who have been on follow-up at the diabetic clinic were included in this study. The response rate was 100%. The mean age of the respondents was 52 ± 15.8 years, ranging from 19 to 88 years. Most lived in urban areas, 225 (63.9%). 166 study participants (47.2%) earn a monthly income of 1500–3000 Ethiopian Birr (ETB). A total of 117 (33.2%) had no formal education, and 96 (27.3%) had primary education. 112 (31.8%) were housewives, and 88 (25%) were farmers. Regarding marital status, most of the study participants, 260 (79.3%), were married (Table 1).

Variables	Frequency	Percentage
Sex		
Male	207	58.8
Female	145	41.2
Residency		
Urban	225	63.9
Rural	127	36.1
Age		
18–24 years	21	6.0
25–34 years	32	9.1
35–44 years	46	13.1
45–54 years	81	23.0
> 54 years	172	48.9
Monthly income		
≤1500 ETB	49	13.9
1501–3000 ETB	166	47.2
3000–6000 ETB	97	27.6
> 6000 ETB	40	11.4
Educational status		
Uneducated	117	33.2
Primary education (1–8)	96	27.3
Secondary education (9–12)	68	19.3
College and above	71	20.2
Occupation		
Employed	46	13.1
Merchant	38	10.8
Housewife	112	31.8
Farmer	88	25.0
Retired	39	11.1
Students	22	6.3
Others	7	2.0
Marital status		
Single	36	10.2
Married	260	73.9
Divorced	15	4.3

Widowed	41	11.6
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Table 1: Socio-demographic characteristics of study participants on knowledge and practice on diabetic foot self-care and its associated factors among diabetic patients at Asella referral and teaching hospital, southeast Ethiopia.

Clinical and healthcare system-related characteristics

The majority of respondents, 252 (71.6%), had type 2 diabetes. Regarding treatment taking, 152 (43.2%) used insulin only. A total of 270 (76.7%) did not have a previous DFU. 258 (73.3%) reported no family history of diabetes. 200 (56.8%) had received education on foot care. Only 109 (31%) had their feet examined by healthcare providers. The other finding on duration of stay with the disease showed the minimum and maximum durations were 3 months and 20 years, respectively. The majority of respondents, 142 (40.3%), have had diabetes for less than 5 years, followed by 5–10 years, which accounts for 106 (30.1%). The mean duration of diabetes from first diagnosis was 1.9 ($\pm$ 0.896) years SD (Table 2).

Variables	Frequency	Percentage
Types of diabetes		
Type 1	117	33.2
Type 2	235	66.8
When was your diabetes first diagnosed?		
< 5 years	142	40.3
5-10 years	106	30.1
> 10 years	104	29.5
Types of treatment being taken		
Oral hypoglycemic	146	41.5
Insulin	152	43.2
Combination of insulin and oral	54	15.3
Previous history of DFU		
Yes	79	22.4
No	273	77.6
Family history of diabetes		
Yes	94	26.7
No	258	73.3
Received advice/education on foot care		
Yes	200	56.8
No	152	43.2
Doctor or another health professional ever examined your feet		
Yes	109	31.0
No	243	69.0

Table 2: Clinical and healthcare system related characteristics of study participants on knowledge and practice on diabetic foot self-care and its associated factors among diabetic patients at Asella referral and teaching hospital, southeast Ethiopia.

Diabetic foot self-care knowledge

In this study, the mean knowledge assessment score was 9.4 ± 2.8 out of the maximum possible score of 15. The minimum and maximum scores were 1 and 15, respectively. A total of 140 (39.8%) participants had good knowledge of diabetic foot self-care. The majority of respondents, 238 (67.6%), were aware that feet should be inspected properly. Most, 300 (85.2%), knew feet should be dried after washing, though 236 (67%) did not know water temperature should be checked first. 191 (54.3%) knew how to apply lotion to dry skin. Avoiding barefoot walking was widely known by 330 (93.8%). Most, 289 (82.1%), knew to wear appropriate and comfortable shoes. Seeking guidance when buying new shoes was known by 60 (17%). Inspecting footwear was commonly known by 319 (90.6%). Cutting toenails

properly was known by 326 (92.6%). Home removal of calluses/warts was correctly identified as risky by 155 (44%) participants. If finding redness between toes, 221 (62.8%) knew to seek treatment (Table 3).

Knowledge of diabetic foot self-care	Frequency	Percentage
Aware that the foot should be inspected/checked every night		
No	114	32.4
Yes	238	67.6
Know which part should be checked		
No	133	37.8
Yes	219	62.2
Aware of what should be looked for in the foot		
No	139	39.5
Yes	213	60.5
Know before cleaning the legs should the temperature of water be checked		
No	236	67.0
Yes	116	33.0
Feet should be completely dried after washing		
No	52	14.8
Yes	300	85.2
If you feel skin dry and rough should lotion or cream be applied on it or not		
No	161	45.7
Yes	191	54.3
For DM patient lotion not to be applied in the interdigital spaces		
No	207	58.8
Yes	145	41.2
Diabetic should patient avoid walking bare foot		
No	22	6.3
Yes	330	93.8
Wear comfortable shoes and avoid pointed toed shoe		
No	63	17.9
Yes	289	82.1
Diabetic patient should receive advice/guidance when buy new shoes		
No	292	83.0
Yes	60	17.0
Inspect the inside of your footwear for objects to torn lining before you put on		
No	33	9.4
Yes	319	90.6
Know how frequent socks should be changed		
No	147	41.8
Yes	205	58.2
Know toenail should be cut straight across		
No	26	7.4
Yes	326	92.6
Avoid removal of a callus or a wart by yourself at home		
No	197	56.0
Yes	155	44.0
If you found redness/bleeding between your toes your toes do you know what the first things you do/		

No	131	37.2
Yes	221	62.8

Table 3: Frequency distribution of patients' knowledge about diabetic foot self-care among diabetic patients at Asella referral and teaching hospital, southeast Ethiopia. DM: diabetes mellitus.

Diabetic foot self-care practice

The mean practice score was 31.5 ± 5.3 . The minimum and maximum scores were 16 and 42 out of 48, respectively. Overall, 142 (40.3%) patients had good foot self-care practice. The most common foot care practices were inspecting feet, with 233 (66.2%) doing this sometimes, and checking feet before putting shoes on, with 172 (48.9%) doing this often. 182 (51.7%) often checked that their feet were dry after washing. Toe nail cutting was done about monthly by 225 (63.9%). Going barefoot outside was rarely or never done, with 331 (94%) reporting they never did this. Moisturizing feet was also less common, with 163 (46.3%) never doing it. However, 155 (44%) reported washing feet daily. Wearing sandals or slippers was sometimes done by 221 (62.8%). Putting feet near fire was generally avoided, with 267 (75.9%) patients never doing this. Over half, 198 (56.3%), never put dressings on wounds (Table 4).

Practice of diabetic foot care	Often N (%)	Sometimes N (%)	Rarely N (%)	Never N (%)
Examine /inspect your feet/	54 (15.3)	233 (66.2)	19 (5.4)	46 (13.1)
Check your before you put them on	172 (48.9)	153 (43.5)	8 (2.3)	19 (5.4)
Check your shoes when you take them off	164 (46.6)	153 (43.5)	8 (2.3)	27 (7.7)
Wash your feet	155 (44.0)	170 (48.3)	0	27 (7.7)
Check your feet are dry after washing	182 (51.7)	120 (34.1)	36 (10.2)	14 (4.0)
Dry between your toes	122 (34.7)	110 (31.3)	100 (28.4)	20 (5.7)
Use moisturizing cream on your feet	42 (11.9)	123 (34.9)	24 (6.8)	163 (46.3)
Put moisturizing cream between your toes	20 (5.7)	40 (11.4)	24 (6.8)	268 (76.1)
How often you cut toenails	47 (13.4)	225 (63.9)	77 (21.9)	3 (0.9)
Wear sandals/slippers	76 (21.6)	221 (62.8)	20 (5.7)	35 (9.9)
Wear shoes without socks/stocking/ tights	45 (12.8)	130 (36.9)	7 (2.0)	170 (48.3)
Change your socks/stocking/tights	104 (29.5)	176 (50.0)	0	45 (12.8)
Walk around the house in bare feet	14 (4.0)	42 (11.9)	16 (4.5)	280 (79.5)
Walk outside the house in bare feet	1 (0.3)	15 (4.3)	5 (1.4)	331 (94.0)
Put your feet near the fire?	37 (10.5)	44 (12.5)	4 (1.1)	267 (75.9)
Put a dry dressing on blisters, cut or burn when you get one?	49 (13.9)	59 (16.8)	46 (13.1)	198 (56.3)

Table 4: Frequency distribution of patients' practice on diabetic foot self-care among diabetic patients at Asella referral and teaching hospital, southeast Ethiopia. N: frequency.

Factors associated with good knowledge of diabetic foot self-care

This study utilized binary logistic regression analysis to identify factors associated with good knowledge of diabetic foot self-care among diabetic patients. Variables with a p-value less than 0.25 in bivariate analysis were included in the multivariable model. The Hosmer-Lemeshow test confirmed that the model had a good fit ($p > 0.05$). Being male (AOR = 1.987, 95% CI: 1.14-3.48, $P < 0.05$), urban residence (AOR = 1.814, 95% CI: 1.03-3.21, $P < 0.05$), not educated and completed primary education (AOR = 0.362, 95% CI: 0.17-0.76, $P < 0.01$ and AOR = 0.393, 95% CI: 0.19-0.83, $P < 0.05$), history of previous foot ulcer (AOR = 2.57, 95% CI: 1.43-4.61, $P < 0.01$), family history of diabetes (AOR = 2.664, 95% CI: 1.52-4.66, $P < 0.01$), and receiving foot care advice/education (AOR = 2.10, 95% CI: 1.25-3.54, $P < 0.01$) were the predictors of good knowledge on diabetic foot self-care (Table 5).

Factors	Knowledge of diabetic foot self-care		COR [95% C.I]	AOR [95% C.I]
	Poor	Good		
Sex				
Male	108	99	2.325 [1.48-3.66]**	1.987 [1.14-3.48]**
Female	104	41	1	1
Age				
≤24 Years	11	10	1.390 [0.56-3.45]	0.483 [0.66-1.35]*
25–34 years	17	15	1.349 [0.63-2.88]	1.905 [0.67-5.44]*
35–44 years	29	17	0.897 [0.46-1.76]	0.774 [0.33-1.80]*
45–54 Years	51	30	0.900 [0.52-1.55]	0.974 [0.51-1.88]*
> 54 years	104	68	1	1
Monthly income				
≤1500 ETB	33	16	0.323 [0.14-0.77]*	0.621 [0.21-0.82]*
1501–3000 ETB	113	53	0.313 [0.15-0.64]**	0.762 [0.33-1.77]*
3000–6000 ETB	50	47	0.627 [0.30-1.32]	0.854 [0.37-1.97]*
> 6000 ETB	16	24		1
Residency				
Urban	125	103	1.938 [1.22-3.08]**	1.814[1.03-3.21]**
Rural	87	37	1	1
Educational status				
Uneducated	87	30	0.212 [0.11-0.40]**	0.362 [0.17-0.76]***
Primary education (1–8)	64	32	0.307 [0.16-0.58]**	0.393 [0.19-0.83]**
Secondary education (9–12)	34	34	0.614 [0.31-1.21]	0.729 [0.34-1.58]*
College and above	27	44	1	1
Types of diabetes				
Type 1	70	47	1.025 [0.65-1.61]	1.747[0.80-3.81]*
Type 2	142	93	1	1
Types of treatment taking				
Oral hypoglycemic	91	55	1.209 [0.63-2.33]	1.217 [0.57-2.61]*
Insulin	85	67	1.576 [0.82-3.02]	2.266 [0.94-5.48]*
Both (oral and insulin)	36	18	1	1
Previous history of DFU				
Yes	31	48	3.046 [1.82-5.11]**	2.570 [1.43-4.61]***
No	181	92	1	1
Family history of diabetes				
Yes	42	52	2.392 [1.48-3.87]**	2.664 [1.52-4.66]***
No	170	88	1	1
Received advice/education on foot care				
Yes	101	99	2.654 [1.69-4.17]**	2.100 [1.25-3.54]***
No	111	41	1	1

Table 5: Multivariable binary logistic regression for factors associated with good knowledge on diabetic foot self-care, diabetic patients in Asella referral and teaching hospital, Southeast Ethiopia. *0.05 < P < 0.25; **P < 0.05; ***P < 0.01. COR: crude odds ratio; AOR: adjusted odds ratio; DFU: diabetic foot ulcer; ETB: Ethiopian Birr; Edu: education.

Factors associated with good practice on diabetic foot self-care

This binary logistic regression analysis assessed factors associated with good practice on diabetic foot self-care among diabetic patients. Variables with a p-value less than 0.25 in bivariate analysis were included in the multivariable model. The Hosmer-Lemeshow test confirmed that the model had a good fit ($p > 0.05$). Low monthly income (≤ 1500 ETB) (AOR = 0.265, 95% CI: 0.09-0.80, $P < 0.05$), not educated and completed primary education (AOR = 0.318, 95% CI: 0.15-0.67, $P < 0.01$ and AOR = 0.383, 95% CI: 0.18-0.81, $P < 0.05$), history of previous foot ulcer (AOR = 1.987, 95% CI: 1.11-3.56, $P < 0.05$), receiving foot care advice/education (AOR = 2.115, 95% CI: 1.26-3.56, $P < 0.01$), and having good knowledge on foot self-care (AOR = 1.786, 95% CI: 1.06-3.02, $P < 0.05$) were the predictors of good practice on diabetic foot self-care (Table 6).

Factors	Practice of diabetic foot self-care		COR [95% C.I]	AOR [95% C.I]
	Poor	Good		
Sex				
Male	106	101	2.417 [1.54-3.80]**	1.473 [0.85-2.54]*
Female	104	41	1	1
Age				
≤24 Years	14	7	0.765 [0.29-1.99]	0.805 [0.21-3.07]*
25-34 years	19	13	1.046 [0.49-2.26]	0.904 [0.32-2.59]*
35-44 years	27	19	1.076 [0.56-2.09]	0.817 [0.36-1.86]*
45-54 Years	46	35	1.164 [0.68-1.99]	1.231 [0.65-2.33]*
>54 years	104	68	1	1
Monthly income				
≤1500 ETB	37	12	0.139 [0.05-0.36]**	0.265 [0.09-0.80]**
1501-3000 ETB	110	56	0.218 [0.10-0.46]**	0.434 [0.18-1.03]*
3000 -6000 ETB	51	46	0.387 [0.18-0.85]*	0.467 [0.20-1.11]*
>6000 ETB	12	28	1	1
Residency				
Urban	129	99	1.446 [0.92-2.27]	0.966 [0.55-1.69]*
Rural	81	43	1	1
Educational status				
Uneducated	87	30	0.176 [0.09-0.34]**	0.318 [0.15-0.67]***
Primary education (1-8)	64	32	0.255 [0.13-0.49]**	0.383 [0.18-0.81]**
Secondary edu.(9-12)	35	33	0.481 [0.24-0.95]*	0.61 [0.28-1.32]*
College and above	24	47	1	1
Types of diabetes				
Type 1	68	49	1.100 [0.70-1.73]	1.427 [0.67-3.02]*
Type 2	142	93	1	1
Types of treatment taking				
Oral hypoglycemic	85	61	1.435 [0.75-2.76]	1.260 [0.60-2.66]*
Insulin	89	63	1.416 [0.74-2.72]	1.106 [0.46-2.65]*
Both (Oral and Insulin)	36	18	1	1
Previous history of DFU				
Yes	33	46	2.570 [1.54-4.29]**	1.987 [1.11- 3.56]**
No	177	96	1	1
Family history of diabetes				
Yes	48	46	1.617 [1.00-2.61]*	1.277 [0.73-2.23]*

No	162	96	1	1
Received advice/ education on foot care				
Yes	99	101	2.762 [1.76-4.34]**	2.115 [1.26-3.56]***
No	111	41	1	1
Knowledge				
Poor	150	62	1	1
Good	60	80	3.226 [2.06-5.04]**	1.786 [1.06-3.02]**

Table 6: Multivariable binary logistic regression for factors associated with good practice on diabetic foot self-care, diabetic patients in Asella referral and teaching hospital, Southeast Ethiopia. *0.05 < P < 0.25; **P < 0.05; ***P < 0.01. COR: crude odds ratio; AOR: adjusted odds ratio; DFU: diabetic foot ulcer; ETB: Ethiopian Birr; Edu: education.

Discussion

A total of 352 diabetic patients were included in the study. This study found that 39.8% of participants had good knowledge of diabetic foot self-care. This was consistent with a study done in Nigeria that revealed 30.1% of patients had good knowledge of diabetic foot care [16]. The level of knowledge in this study was higher than studies conducted in Iran (15.2%) [14] and South Africa (24.2%) [12], and it was much lower than studies conducted in India (60.8%) [10] and Brazil (50.6%) [32]. The low knowledge level on diabetic foot self-care in developing countries could be explained by economic, cultural, and social issues, poor health care facilities, and inadequate community awareness. This study also found that 40.3% of participants had good diabetic foot self-care practice. This was consistent with studies conducted in Sudan (41.5%) [11], Iran (50.4%) [14], and northwest Ethiopia (53.0%) [13]. The level of practice on foot self-care in this study was higher than a study conducted in Nigeria (10.2%) [16], and lower than studies done in Brazil (57.4%) [32] and India (62.75%) [10]. These evidences underscore insufficient foot care knowledge and practices as a widespread public health threat globally, especially in developing countries, requiring urgent action.

This study found that males had two times higher odds of having good foot self-care knowledge compared to females (AOR = 1.987, 95% CI: 1.14-3.48, P < 0.05). This gender disparity aligns with evidence from the study done in the United Arab Emirates, indicating poorer knowledge among women [19] and highlights the need to actively target women for foot care education to promote health equity. Gender gaps could stem from broader social inequities in access to resources, restrictions on activities, or a lack of autonomy in seeking healthcare. Culturally appropriate education programs may help overcome these barriers.

Urban residents have higher odds of good knowledge compared to their rural counterparts (AOR = 1.814, 95% CI: 1.03-3.21, P < 0.05). This was in line with a study conducted in Iran that revealed rural patients had poorer knowledge of foot self-care [14]. The possible explanation is that rural populations likely have limited access to diabetes self-management education programs and resources. This may be attributed to reduced access to healthcare services and diabetes education programs in rural areas. Outreach programs in rural communities could help bridge this gap.

Those who were uneducated had 63.8% lower odds (AOR = 0.362, 95% CI: 0.17-0.76, P < 0.01) while completed primary education groups had 60.7% lower odds of good knowledge (AOR = 0.393, 95% CI: 0.19-0.83, P < 0.05) compared to patients who attained college and above. This was consistent with studies conducted in India, Nigeria, and Sudan [16, 23, 33]. This highlights the need for simplified education approaches tailored to varying literacy levels. For instance, pictorial materials, demonstrations, and interactive discussions may be more effective for those with minimal schooling compared to traditional written instructions.

Patients with previous DFUs were 2.5 times more likely to have good knowledge on foot self-care (AOR = 2.57, 95% CI: 1.43-4.61, P < 0.01). It was expected that an adverse event like a previous ulcer would prompt patients to improve their foot care knowledge and practices to prevent recurrence. Having experienced foot complications may increase perceptions of personal risk and prompt information-seeking behaviors. Patients with a family history of diabetes were 2.7 times more likely to have good knowledge on foot self-care (AOR = 2.664, 95% CI: 1.52-4.66, P < 0.01). This was supported by other studies [33, 34]. This could be due to a family history of diabetes, which may raise disease

risk awareness and knowledge retention. Having a close relative with diabetes makes individuals more aware of the condition and motivates them to gain knowledge even before their diagnosis. The findings of this study revealed that receiving foot care advice or education doubled the odds of having good knowledge (AOR = 2.1, 95% CI: 1.25-3.54, $P < 0.01$), which was supported by previously conducted studies [21, 24, 35, 36]. It was expected that having diabetic foot care education would improve self-care knowledge.

This study found that patients with low monthly income had 73.5% lower odds of good practices on foot self-care (AOR = 0.265, 95% CI: 0.09-0.80, $P < 0.05$). This was in line with studies conducted in South Africa and Nigeria [12, 16]. This could be due to out-of-pocket costs for recommended footwear and supplies, and healthcare may act as a financial barrier. Targeted social support programs, like foot care vouchers or lending libraries for equipment, could help address these barriers.

Lower educational attainment predicted reduced odds of having good foot self-care practices in our study. Uneducated patients had 68.2% lower odds (AOR = 0.318, 95% CI: 0.15-0.67, $P < 0.01$), while those who attained primary education had 61.7% lower odds of good practice (AOR = 0.383, 95% CI: 0.18-0.81, $P < 0.05$) compared to patients who attained college and above. This was consistent with studies that revealed patients with lower educational levels had lower self-care practice [12, 16]. The possible explanation would be that limited health literacy regarding self-care essentials may underlie the education-practice link. Simplified educational approaches using demonstrations and teach-back rather than complex verbal instructions could enable optimal practices among those with minimal schooling.

The findings of this study revealed that patients having a history of a previous foot ulcer had increased odds of good foot self-care practices by 2 times (AOR = 1.987, 95% CI: 1.11-3.56, $P < 0.05$). This was in line with a study conducted in Tanzania [24]. This could be due to personal experience of foot complications, which likely motivates preventive behaviors of patients. Peer mentoring models engaging ulcer patients in education may resonate with high-risk groups. Our study also found that receiving foot care advice/education doubled the odds of good practice (AOR = 2.115, 95% CI: 1.26-3.56, $P < 0.01$), which was supported by studies that revealed the benefits of patient education for good practice [16, 24]. This highlights the need for regular, high-quality counseling on self-care essentials for diabetic patients by healthcare providers. Patients with good foot care knowledge had 1.8 times higher odds of good practices (AOR = 1.786, 95% CI: 1.06-3.02, $P < 0.05$). This knowledge-practice link was supported by a study conducted in Nigeria [16]. This could be because knowledge likely builds a crucial foundation for diabetic foot self-care practice.

Conclusion

The study found that diabetic foot self-care knowledge and practice were low. Being male, living in urban areas, having a history of previous foot ulcer, having a family history of diabetes, and receiving advice or education on foot self-care were predictors of good knowledge on foot self-care among diabetic patients. Likewise, history of previous foot ulcer, receiving foot self-care advice/education, and having good self-care knowledge were predictors of good practice on diabetic foot self-care.

Recommendation

To enhance care and outcomes, efforts should focus on increasing education, particularly for vulnerable groups like women, rural residents, those with lower income, and lower education level, to boost knowledge and practice and provide targeted advice on the importance of diabetic foot self-care, especially for those without prior foot problems. Diabetic foot self-care education should be integrated into primary care services and chronic disease management programs, which could help to address those gaps and needs.

Ethics Approval and Consent to Participate

Ethical approval was obtained from the College of Health Science, Arsi University Ethical Review Committee (approval No. A/CHS/RC/54/2023). All methods were performed in accordance with the Declaration of Helsinki. Study subjects were recruited only after informed written consent was obtained.

Consent for Publication

Written informed consent for publication was obtained from study subjects.

Availability of Data and Materials

All data generated and analyzed are included in this research article.

Conflicts of Interest

The authors declare no conflict of interest.

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Authors Contributions

Zena D contributed to the conception, design, data collection, analysis, writing, and review of the manuscript. The guarantor of the study is Zena D - accepts full responsibility for the finished work, had access to the data, and controlled the decision to publish. Kebede A contributed to the conception, design, data collection, analysis, writing, and review of the manuscript. Getachew E, Ferede A, Akale M, and Bekele M contributed to conception, design, analysis, and review of the manuscript. All authors read and approved the final manuscript and approved its submission for publication.

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