

Diabetic Foot Ulcer Prevalence and Associated Factors Among Adult Diabetic Patients in Central India Who Presented to the Clinic an Institutional-based Cross-sectional Study

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Abstract

Diabetes mellitus is a disorder of metabolism that affects almost every system in the body and is characterized by multiple long-term complications. Involvement of the foot and foot ulcers are two of the main complications of diabetes mellitus [1]. There is very limited evidence on the occurrence of diabetic foot ulcers and factors influencing them worldwide [1]. This cross-sectional study was conducted at our center. To investigate the occurrence of diabetic foot ulcers in diabetic patients, systematic random sampling was used to select 140 study participants in this study. To identify factors associated with diabetic foot ulcers A bivariate and multivariable logistic regression model was used. To determine the level of significance, the odds ratio with a 95% confidence interval was computed. Diabetic foot ulcer incidence was 14.1%. Rural residence [AOR = 2.67; 95% CI: 1.44, 5.92], diabetes mellitus type II [AOR = 2.58; 95% CI: 1.23, 6.11], obesity [AOR = 2.66; 95% CI: 1.24, 5.84], overweight [AOR = 2.13; 95% CI: 1.20, 3.12], neuropathy [AOR = 21.69; 95% CI: 8.44, 57.48] Poor foot self-care practices [AOR = 2.53; 95% CI: 1.22, 6.49] were factors associated with diabetic foot ulcers. Diabetic foot ulcer prevalence was on the higher side. Provision of special emphasis for rural residence, promoting foot self-care practice, managing neuropathy, and decreasing excessive weight gain would decrease diabetic foot ulcers.

Keywords: Diabetes • Foot ulcer • Influencing factors • Study • Central India

Introduction

Diabetes mellitus is one of the commonest metabolic disorders affecting the Indian population. There are currently close to 80 million people with diabetes in India, which is often referred to as the 'Diabetes Capital of the World', as it accounts for 17% of the total number of diabetes patients in the world, and this number is expected to increase to 135 million by 2045. Worldwide incidence of diabetes mellitus is increasing; it will grow to up to 366 million. By 2030, this estimation will occur because of increasing life expectancy and changing dietary habits [2,3]. Diabetic foot lesions have significant socioeconomic and health problems that have

adverse effects on the quality of life of the patient and impose a heavy economic burden on the patient's family [4]. None of the complications is more serious and devastating than involvement of the foot than any other complication affecting a person with diabetes. The foot complications are very common in diabetic patients and are considered one of the most expensive diabetes complications to treat [6]. In diabetes mellitus, foot ulcers significantly contribute to morbidity and mortality. Patients with foot ulcers require long-term hospitalization and carry the risk of limb amputation [3,5]. Through careful clinical examination, people at greatest risk of ulceration can easily be identified during the provision of health education about diabetes complications and during follow-up visits [7]. The most important complications of diabetes mellitus are diabetic foot ulcers, neuropathy and Manifestations of complications vary from minor to highly complex, including amputation of limbs and life-threatening infections [9]. In developing countries, diabetic foot ulcers are one of the most feared and common complications of diabetes. They are a major cause of morbidity, disability, and mortality among diabetic patients, and it has been estimated that 15% of all people with diabetes will have an ulcer at some stage of their life [8]. In developed countries, one in every six patients with diabetes will have a foot ulcer during their lifetime. The risk is even higher in developing countries [10,11]. Studies showed that the diabetic foot ulcers severity is the strongest and most significant risk factor for amputation of a limb in diabetes patients [10].

Foot ulcers are one of the long-term complications of diabetic mellitus, with a life-time risk of up to 25%, yet many of the foot ulcers could be prevented [12]. Risk factors associated with the history of foot ulcers in diabetic patients include biologic, metabolic, and extrinsic characteristics that result from the patient's interaction with the environment. Peripheral vascular disease, peripheral neuropathy, and trauma to the foot were also reported as risk factors in the pathophysiology of foot ulcers [11]. The rapid increase of foot ulceration among people with diabetes requires solid epidemiological knowledge based on high-quality health care services and effective preventive measures, which must be carefully adapted to the needs of specific groups [14]. Though preventive strategies have been shown to be cost-effective, diabetic foot ulcers still occur frequently and are a challenge for patients and the health system [13]. Research stipulates that diabetic foot ulceration is affected by several factors, including the age of the patient, educational status, weight of the patient, type of diabetes mellitus, foot self-care habits, and the presence of complicated peripheral neuropathy [10, 12,13,14,15]. However, the determinants are not the same across different socioeconomic and demographic factors, and the progression of the disease of diabetic foot ulcers is not the same. Thus, assessing factors affecting diabetic foot ulceration in different socioeconomic areas is very important to prevent the devastating effects of foot ulcers among diabetes patients. Therefore, this study is directed at assessing diabetic foot ulcers and associated factors among adult diabetic patients attending the diabetic clinic at our center. The findings of this study will help reduce the occurrence of diabetic foot ulceration and its complications in the central India.

Methods

Study Area

This is an institutional based cross-sectional study was conducted from April 1, 2022, to March 30, 2023, at AIW hospital and research center. The hospital is located in Burhanpur. M.P, India. In the hospital, there are twelve different peripheral units that provide outpatient medical services to patients. Nearly 150,000 patients visited the outpatient clinics, and there were more than 11,000 admissions this year. The hospital has one diabetic follow-up clinic, which serves around 4200 diabetic patients annually. This hospital serves as a tertiary general hospital, a teaching institute, and a research center, and it serves as a referral center for more than four million people.

Source Population

Our study includes all diabetes mellitus patients who attend the diabetic follow-up clinic at our center.

Study Population

This study conducted on all diabetes mellitus patients who attend the diabetic follow-up clinic at our hospital during the study period.

Criteria of Inclusion

All patients who were adult have diabetes mellitus attended the diabetic follow-up clinic at our hospital during the study period were included in the study.

Criteria of Exclusion

Diabetic patients were severely ill and had traumatic ulcers due to road traffic accident, and those diabetic patients who were unable to communicate throughout the study period were excluded.

Characteristics of Included Study Patients and Participants as Compared with the Excluded One

The patients who had any diabetic-related ulcers were included rather than including all ulcers in diabetic patients. Type of occurrence of ulcer gives us a better understanding of the complications of diabetes on the peripheral system. As a result, we want to exclude the ulcer that occurred due to road traffic or any other accident.

Study Variables

• Dependent Variables

The presence of diabetic foot ulcers was included in the dependent variable.

• Independent Variables

The independent variables include (1) Clinical factors: fasting blood sugar level, category of diabetes, history of ulceration, comorbidity (additional known disease), peripheral vascular disease, body mass index, regular follow-up to the diabetic clinic, neuropathy, and duration of diabetes mellitus.(2) Behavioral factors: alcohol consumption, smoking cigarettes, and physical activity (3) Sociodemographic variables: age, sex, religion, educational status, ethnicity, marital status, average monthly income, area of residence (4) Foot self-care practice-related factors: characteristics of foot wear, washing of foot, footwear inspection, footwear practice.

Operational Definition

A nontraumatic lesions of partial or full thickness of the skin of the foot (ulceration) in a person who has diabetes mellitus.

• Knowledge about Diabetes

If knowledge assessment questions score a mean of 15.8 and above, they are considered knowledgeable.

• **Foot Self-Care Practices**

Good self-foot care practices are those participants who scored a mean score of 7 or higher from the foot self-care practice assessment questions.

• **Wagner's Classification for Severity of Diabetic Foot Ulcer Assessment**

Following are the grades: Grade 0—no ulcer, but the foot is at risk for ulceration; Grade I—superficial ulceration; Grade II—ulceration with deep infection but without involvement of the bone; Grade III—ulceration with osteomyelitis; Grade IV—localized gangrene; Grade V—gangrene involving the whole foot.

• **Body Mass Index (BMI)**

The body weight of the individual patient is calculated and divided by the square of their height, and we considered a BMI > 30 kg/m² to be obese. BMI ranges from 24.5 to 30 kg/m² (overweight). BMI ranges 18.5–24.5 kg/m² = normal range BMI ranges < 18.5 kg/m² = underweight,

• **Neuropathy**

Neuropathy was diagnosed if the patient had at least one manifestation of the following: vibration from the skin, burning pain, gradual numbness, freezing, muscle weakness, being extremely sensitive to touch, and a lack of coordination.

• **Measurement of Diabetes Mellitus**

Fasting blood sugar levels greater than 125 mg/dl were considered diabetic.

• **Controlled Diabetes Mellitus**

Fasting blood glucose levels between 100 and 125 mg/dl was considered “controlled.”

• **Peripheral Vascular Disease**

Peripheral vascular disease is a disease of the arterial and veins in the peripheral region, which often occurs in patients with diabetes. It was diagnosed if the diabetic patient had at least one of the following manifestations: leg numbness, muscle cramping after movement, painful cramping in their hips, a change in the color of the legs, shiny skin on the leg, or erectile dysfunction. Sores on the toes, feet, or legs that will not heal.

Sampling Procedure and Sample Size Calculation

To calculate the required sample size, a single population proportion formula was used considering the following assumptions: prevalence of diabetic foot ulcers at 12% [23], and a 4% margin of error (absolute level of precision at 95% confidence level) with the assumptions being as follows:

$$n=(z\alpha/2)^2p(1-p)/d^2=(1.96)^2 \cdot 0.12(0.87)/(0.04)^2=127, (1)$$

The required sample size is n, p is the prevalence of adult diabetic foot ulcers (12%), the rate found in recent research at a similar referral hospital in other countries [14], and d is the margin of error of 4. Z is the standardized normal distribution value at the 95% CI: 1.96, and the low design effect was used to increase the sample size. The total sample size was adjusted to be equal to 140 participants. The final sample size was adjusted by using the probability of a 10% nonresponse rate.

• Sampling Procedure

To select the study participants a systematic random sampling technique was used. We pick out the average patient flow at our diabetic follow-up clinic in the study area. Based on the preceding year's data, there were 4200 diabetic patients per year who had diabetic clinic follow-up. Then we split up this total number of patients into twelve months, resulting in an average of 210 diabetic patients per month and an average of 420 patients per two months. A systematic random sampling approach was used in order to obtain the study unit. Since our study period was two months, we contemplated the previous two-month diabetic patient flow as the source population. Then we split up the total required sample size to get the interval, or fraction (K).

$$K=N/n=(420/140=3). (2)$$

We had selected, using the lottery method, from patient one to patient three to start the interview. As a result, a third patient was selected randomly using the lottery method. continued by recruiting every third patient based on their exit sequence. The interview started with the third patient attending the clinic and, after a check-up, reached the required 140 participants, which were fulfilled during the study duration.

Data Collection and Analysis

A structured and pretested questionnaire was collected using a face-to-face interview, a record review, and direct observation of the patient for data collection. The questionnaire was prepared in English and then translated to the local language (Hindi and Marathi), then back to English to maintain its consistency. One MSc nurse and two BSc nurses were involved in the data collection process. One-day training was given for both supervisors and data collectors. All adult diabetes mellitus patients who attended the diabetic follow-up clinic at our center during the study period were included in this study. Diabetic foot ulcers were measured as nontraumatic lesions of partial or full thickness of the skin on the foot of a person who has diabetes mellitus. Data were entered using SPSS statistical software (INFO version 3.5.3) and exported to Descriptive statistics were carried out to characterize the study population using different variables. Bivariate and multiple logistic regressions were both used to identify associated factors. A variable with a value of 0.05 was considered a significant predictor. To control the effects of confounding variables having a value ≤ 0.2 in the bivariate analyses, they were fitted into multiple logistic regression models. Adjusted odds crude and ratio with their 95% CI were calculated to determine the presence of association.

Ethical Considerations

Ethical clearance was acquired from the Ethical Review Committee of our institution. After explaining the purpose of the study, written informed consent was obtained from each participant. Study participants were also well informed that participation was on a voluntary basis and that they could withdraw at any time to ensure participants' confidentiality. Personal identifiers were not included in the written questionnaires.

Results

Sociodemographic Factors

A total of 140 diabetic adult patients who had follow-up for diabetes were involved in the study. We did not include excluded study participants based on exclusion criteria. From the total number of participants involved in the study, 77 (55.0%) were males and 63 (45%) were females. The mean age of participants was 48.9 with SD \pm 14.9 years. Ninety-six (68.5%) were married. As far as education is concerned, 23 (16.4%) had secondary education or above. Fifty (35.7%) participants visited the outpatient department from a rural area. One hundred twenty-four (88.5%) participants were orthodox Indians and Muslims, depending on their religious status (Table 1).

Table 1. Sociodemographic characteristic of informants(respondents) in central India 2023 (n=140).

Variable	Frequency	Percent
Age		
18–27	18	12.8
28–37	15	10.7
38–47	23	16.4
48–57	33	23.5
58–67	31	22.1
>68	20	14.2
Marital status		
Single	26	18.3
Married	96	68.5
Separated	3	2.1
Divorced	7	5
Widowed	9	6.4
Occupation		
Housewife	41	29.2
Merchant	29	20.7
Farmer	31	22.1
Government employed	22	15.7
Daily laborer	16	11.4
Level of education		
Unable to read	69	49.3
Can read and write	36	25.7
Primary education	12	8.6
Secondary education and above	23	16.4
Residence		
Urban	90	64.2
Rural	50	35.7
Monthly income		
< 2,500 INR	33	23.5
2,500–5,000 INR	72	51.5
5000–10,000 INR	29	20.7
>10,000 INR	7	5

Behavioural Factors

In total, nine (6.4%) of the study participants were smokers. Among the smokers, 8 (89%) were daily smokers. Forty-six (32.8%) of the study participants were alcoholics. Among the alcoholics, 27 (58.6%) of the study participants were daily alcoholic drinkers. Out of the total participants, 114 (81.5%) claimed that they engaged in different physical exercises. The type of exercise claimed by about 97(69.28%) study participants was movement during routine working activity. One hundred thirty-nine participants (99.28%) were using shoes for foot issues.

Clinical Factors

Among the total 140 study patients, 127 (90.71%) had regular follow-up at the diabetic clinic of our center, and 85 (60.7%) of them had type II diabetes mellitus. The BMI of the majority of the study participants was between 19 and 24.5 kg/m². The mean fasting blood glucose level among diabetic patients with foot ulcers was 129.57 mg/dl. Fifty-four participants (38.5%) were diabetic for more than 6 years. Fifty-one (36.4) patients had poorly controlled blood glucose levels. Nearly thirty-five (25%) of the participants had other chronic health issues or comorbidity with other diseases, and among these, 25 (71.4%) were hypertensive. Twenty-three (16.4) study participants had sensation loss due to vibration. Peripheral vascular disease was detected in 23 (9.2) participants, and 14 (10%) had peripheral neuropathy. Similarly, 16(11.42%) of the study population had callus (Table2).

Table 2. Clinical factors of respondents in our center in central India , 2023 (n=140).

Variable	Frequency	Percent
Previous history of diabetic foot ulcer		
Yes	12	8.6
No	128	91.4
Diabetic medication currently		
Oral hypoglycaemic	74	53
Insulin	66	47.1
Special prescribed diet		
Yes	137	97.8
No	2	2.1
Duration of DM		
<5 years	78	55.7
6–10 years	54	38.5
11–15 years	8	5.71
Blood glucose level controlled by current medication		
Good controlled	89	63.5
Poorly controlled	51	36.4
Regular follow-up		
Yes	126	90
No	14	10
Category of DM		
Type one	55	39.3
Type two	85	60.7
Additional known disease		

Yes	35	25
No	105	75
Types of additional disease (n = 35)		
Hypertension	25	71.4
Renal disease	8	22.9
Asthma	1	2.85
Heart disease	1	2.85
Callus		
Yes	16	11.42
No	124	88.57
Sensory loss to vibration		
Yes	23	16.42
No	117	83.57
Peripheral vascular disease		
Yes	13	9.3
No	126	90
Neuropathy		
Yes	14	10
No	126	90
Body mass index		
<18	11	7.8
18–24.49	69	49.2
24.5–29.5	33	23.5
>29.5	28	20

Knowledge of DM and Practice of Foot Self-Care

Eighty-five (60.71%) participants were aware of diabetes, and the remaining were not aware. Regarding diabetic foot self-care practice and awareness, good foot self-care knowledge was observed among 51 (36.4%) participants, and the remaining 89 (63%) study participants were poorly practicing foot self-care.

Prevalence of Diabetic Foot Ulcer

Among 140 study participants in the diabetic clinic of our center, nineteen (13.5%) patients had developed foot ulcers (Figure 1).

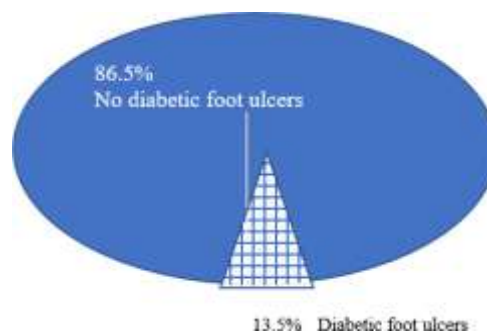


Figure 1. Prevalence of foot ulcers in diabetic patients in our centre central India (n=140) March 2023.

Factors Associated with Diabetic Foot Ulcer

The types of diabetes mellitus [AOR = 2.58; 95% CI: 1.32, 6.95], residence [AOR = 2.57; 95% CI: 1.42, 5.93], obesity [AOR = 2.65; 95% CI: 1.23, 6.43], overweight [AOR = 2.13; 95% CI: 1.16, 3.12], and neuropathy [AOR = 21.73; 95% CI: 8.41, 57.43] foot self-care practice [AOR = 2.54; 95% CI: 1.22, 6.54] were found to be significantly associated with diabetic foot ulceration in multivariable logistic regression analysis.

Participants in the study who lived in rural areas were 2.58 times more likely to develop diabetic foot ulcers than those who lived in urban areas [AOR = 2.58; 95% CI: 1.43, 5.95]. Diabetic patients with type II DM were 2.58 times more likely to develop diabetic foot ulceration than those who had type I DM [AOR = 2.58; 95% CI: 1.32, 6.95]. compared to diabetic patients with a normal weight Overweight diabetic patients were 2.12 times more likely to develop diabetic foot ulcers [AOR = 2.13; 95% CI: 1.16, 3.12]. compared to diabetic patients with a normal body mass index Obese diabetic patients were 2.65 times more likely to develop diabetic foot ulcers [AOR = 2.65; 95% CI: 1.23, 6.43]. In addition, those diabetic patients who had practiced foot self-care were less prone to foot ulceration than those who had not practiced foot self-care; they were 2.52 times more likely to develop diabetic foot ulcers [AOR = 2.54; 95% CI: 1.22, 6.54]. Further, those diabetic patients with neuropathy were 21.7 times more likely to develop diabetic foot ulcers as compared to those diabetic patients without neuropathy [AOR = 21.73; 95% CI: 8.41, 57.43]. (Table 3).

Table 3. Bivariate and multivariate analysis of associated factors with foot ulcers among diabetic adult patients in Central India Diabetic Clinic, 2023 (n=140).

Variables	DM foot ulcer		COR (95% CI)	AOR (95% CI)
	Yes	No		
<i>Sex</i>				
Male	13	63	2.20 (1.16, 4.64)	**
Female	6	58	1	
<i>Educational status</i>				
Unable to read and write	11	57	4.27 (1.23, 14.81)	**
Able to read and write	7	30	4.92 (1.34, 18.12)	**
Formal education	2	36	1	
<i>Residence</i>				
Urban	7	83	1	1
Rural	12	38	3.79 (1.86, 7.74)	2.57 (1.42, 5.93)
<i>Current smoking</i>				
Yes	4	5	6.16 (2.26, 16.82)	**

No	15	116	1	
<i>Previous history of smoking</i>				
Yes	5	5	7.17 (2.69, 19.10)	**
No	14	116	1	
<i>Currently drink alcohol</i>				
Yes	9	37	1.83 (0.91, 3.66)	**
No	10	84	1	
<i>History of alcoholic drink</i>				
Yes	9	38	1.83 (0.91, 3.66)	**
No	10	83	1	
<i>Physical activity</i>				
Yes	11	104	1	
No	9	16	4.28 (2.05, 8.94)	**
<i>Previous history of diabetic foot ulcer</i>				
Yes	4	8	3.75 (1.48, 9.51)	**
No	15	113	1	
<i>Specially prescribed diet</i>				
Yes	18	119	1	
No	2	1	6.8 (1.32, 35.0)	**
<i>Regular follow-up</i>				
Yes	9	65	1	
No	10	4	32.4 (12.5, 83.7)	**
<i>Type of diabetes mellitus</i>				
Type one	3	52	1	1
Type two	15	70	3.31 (1.40, 7.80)	2.58 (1.22, 6.45)
<i>Callus of foot</i>				
Yes	9	7	17.54 (7.52, 40.89)	**
No	9	115	1	
<i>Peripheral vascular disease</i>				
Yes	8	6	15.21 (6.29, 36.80)	**
No	11	115	1	
<i>Neuropathy</i>				
Yes	10	4	32.36 (12.52, 83.66)	21.76 (8.43, 57.47)

No	9	117	1	1
<i>Body mass index</i>				
<24.5	7	72	1	1
24.5–29.5	9	39	2.36 (1.11, 4.10)	2.12 (1.15,3.10)
>29.5	3	10	3.06 (1.06, 8.89)	2.65 (1.25, 5.83)
<i>Knowledge on diabetes mellitus</i>				
Not knowledgeable	12	43	3.47 (1.69, 7.12)	**
Knowledgeable	7	78	1	
<i>Foot self-care practice</i>				
Good practice	3	48	1	1
Poor practice	16	73	3.53 (1.42, 8.77)	2.52 (1.21,6.53)

Discussion

Our study result showed that the prevalence of diabetic foot ulcers among the study group who attended diabetic clinic follow-up was 13.5% (95% CI: 9.3, 17.2). This finding is in line with the studies done with diabetic patients in Mekele, Ethiopia (12%), [16]. Arbaminch, Ethiopia (14.8%), and [18]. However, our study finding was lower than a couple of the studies conducted in Addis Ababa, Ethiopia, and Nigeria, which found diabetic foot ulcer prevalence to be 31.1% and 41.1%, respectively [8,16].

This difference might be due to a variation in sample size, sociocultural differences and a discrepancy in the geographical location of the studies, or among the study participants. On the other hand, if we compare the findings of this study with those of a study conducted in Kenya, the findings of the current study are higher. The Kenyan study suggested the prevalence of diabetic foot ulcers among diabetic patients was 4.6% [5]. The possible explanation for our study difference could be due to knowledge of diabetes mellitus and the difference in health-seeking behaviour practices between the two study populations. difference in lack of knowledge-related diabetic foot self-care practice, this difference can also be due to the fact that diabetic patients who lived in rural areas were 2.577 times more likely to develop diabetic foot ulcers than diabetic patients who lived in urban areas [AOR = 2.58; 95% CI: 1.42, 5.94]. Our study findings are in line with the studies conducted in Ethiopia by Arbaminch, Ethiopia by Mekele, and Colombia [13,16, 18, 23]. Diabetic patients who live in rural areas of India often spend most of their time outdoors and in farm areas and may be subjected to trauma or rodent bites on their feet. Any type of trauma or bite to the feet of patients with diabetes can cause the development of ulceration due to the poor wound healing process and the non-availability of health care services for it. Another possible cause might be that those diabetic patients who belonged to rural areas had poor awareness about foot self-care practices and personal hygiene and often they walk with bare feet. This may expose their feet to damage and lead to the development of foot ulcers. The findings of this study suggested that diabetic patients who are overweight were 2.1 times more likely to develop foot ulcers as compared to those whose weight was normal [AOR = 2.13; 95% CI: 1.16, 3.12].

Further, the diabetic patients who were obese were 2.66 times more likely to develop diabetic foot ulcers as compared to those who were not obese [AOR = 2.66; 95% CI: 1.26, 5.84]. This is in accordance with the studies conducted in Malaysia, Ethiopia,

Kenya, and [9, 13, 15, 16, 18, 23]. The possible reason for foot ulceration could be due to the presence of higher foot pressure in those heavily weighed patients, and a higher BMI (body mass index) in diabetic patients, as well as overweight and obesity, might decrease the normal circulation of blood at the lower extremities; as a result, this might lead to ulceration of the foot.

The diabetes mellitus, and its type was one of the strongest predictors of diabetic foot ulcer occurrence. In comparison to Type I DM Those diabetic patients who had type II diabetes mellitus were 2.59 times more likely to develop diabetic foot ulceration [AOR = 2.59; 95% CI: 1.23, 6.46]. This finding is in accordance with the studies conducted in Nigeria, Egypt, and Asia [2, 19, 24], which indicated that type II diabetes mellitus was significantly associated with the occurrence of diabetic foot ulcers. peripheral neuropathy, mechanical changes in the conformation of the bony architecture of the foot atherosclerotic peripheral arterial disease could be the possible explanation in type II diabetic patients; there are related complications of the disease, such as, and as a result, the patient may have less consumption of oxygen, less tissue epithelization, nutrient transportation, and cell detoxification resulting in ulceration in the extremities.

Neuropathy was another variable factor that had a strong association with foot ulceration in diabetic patients. as compared to diabetic patients without neuropathy. Diabetic patients who had neuropathy were 21.8 times more likely to develop diabetic foot ulcers. AOR = 21.77; 95% CI: 8.44, 57.48]. These outcomes are consistent with the studies conducted in Jordan [15, 21]. Diabetic patients with high blood glucose levels are exposed to neuropathy and microvascular complications, and the occurrence of neuropathy itself may increase the risk for foot ulceration due to increased shearing forces and pressure load. In addition to this, those diabetes patients who have chronic diabetes in the early postpartum period and use combined hormonal contraceptive methods may have an effect on the risk of deep venous thrombosis, which increases the risk of neuropathy and may aggravate the occurrence of diabetic foot ulcers [21,22].

The ulceration of diabetic foot was strongly influenced by a lack of foot self-care practice. Compared to diabetic patients who had practiced foot self-care. Diabetic patients who had not practiced foot self-care were 2.53 times more likely to develop diabetic foot ulcers [AOR = 2.53; 95% CI: 1.22, 6.54]. This finding is nearly similar to the studies conducted in Mekele, Ethiopia, Arbaminch, Ethiopia, Kenya, and India [13,16,18]. Regularly practicing foot self-care could reduce the development of diabetic foot ulceration. the benefits of washing and drying their own feet regularly, daily evaluation of their foot status, improved circulation, and early treatment of any abnormality that may occur on the foot.

Conclusion

Among the diabetic patients, the prevalence of diabetic foot ulcers in our area, central India, was found to be high. Neuropathy, residence, types of diabetes, higher BMI (overweight and obesity), and foot self-care practices were factors significantly associated with diabetic foot ulcers. The health care providers are endorsed to intensify preventive measures in the reduction of foot ulcer incidence through promoting foot self-care practice, giving special importance during follow-up of patients who came from rural areas, educating the patient to reduce overweight or avoid weight gain, and managing the neuropathy rigorously in order to decrease the occurrence of diabetic foot ulcer.

Limitation of the Study

There might be reporting bias or recall bias regarding the contributing factors, such as exercise frequency and alcohol use. Further, the cross-sectional nature of the study does not confirm a definitive cause-and-effect relationship. The duration of diabetes as measured in this study might not reflect the true duration because the time between diagnosis and actual diabetes onset might precede the diagnosis of type II diabetes.

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Conflicts of interest

The author declares that he has no competing interests related to this study.

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