Available online at www.elixirpublishers.com (Elixir International Journal)

Nursing

Elixir Nursing 161(2021) 55823-55829

ISSN: 2229-712X

A Cross-Sectional Study on the Prevalence of Diabetic Foot Ulcer And Associated Factors among Diabetic Clinic Attendees at Public Hospitals of Wolaita and Goffa Zones, South Ethiopia, 2021

Dawit Simion Bilate[1], Yohannes Ayalew Bekele[2], Ketema Bizuwork[2] and Teshome Habte Wurjine[*, 2]

[1]Wolaita Sodo University, College of Health Science, School of Nursing and Midwifery.

[2]Addis Ababa University, College of Health Sciences, School of Nursing and Midwifery, P.O. Box: 5657, Addis Ababa, Ethiopia.

ARTICLE INFO

Article history:

Received: 12 November 2021;

Received in revised form:

6 December 2021;

Accepted: 16 December 2021;

Keywords

Diabetes,

Mellitus,

Prevalence,

Diabetic Foot Ulcer,

Associated Factors.

ABSTRACT

Diabetic foot ulcer is one of chronic complications of diabetes which has more than 25% lifetime risk and it is the leading cause of non-traumatic lower limb amputation. This study aimed to explore the prevalence and associated factors among diabetic follow-up clinic attendees. A total of 261 study subjects were involved with a 100 % response rate. The mean age of the respondents was 51.13 + 12.581 years. The majority 176(67.4%) of the study subjects were males and most 159 61%) of the respondents were urban residents and the prevalence of diabetic foot ulcer was found to be 22.6%. Statistical analysis of the finding indicates poor foot care AOR 3.93295%CI (1.113,16.468, peripheral neuropathy AOR 6.223 95%CI (1.309,29.59), duration of diabetes ≥10 years AOR 5.463 95%CI (2.603,28.013), HbA1c level ≥7.0mg/dl AOR 68.404 95 CI (13.523,346.015), and overweight AOR 17.389 95%CI (2.979,101.505) had a statistically significant association with a diabetic foot ulcer. This study indicates a high prevalence rate of diabetic foot-ulcer and recommended to focus on the implementation of patient education in regard to prevention methods and in-service training for health care workers as part of capacity building.

1. Introduction

1.1. Background

Diabetes mellitus is one of the metabolic disorders characterized by elevated blood glucose which is caused by genetic and environmental factors that destruct beta cells of the pancreas and or decrease tissue resistance towards insulin[1]. It is known for its devastating acute and chronic complications[2]. Diabetic foot ulcer is one of the major complications of diabetes Mellitus with an estimated lifetime risk of 10-25% among diabetic patients[3].

Diabetes and related complications are becoming the main concern of the world health contributing to a major cause of morbidity and mortality[1]. Diabetic foot ulcer and other lower extremity complications are by far very common, complex, and has a significant economic impact on the patient as well as the medical coast of countries[2]. A diabetic foot ulcer is defined as a localized wound of the skin and/or underlying tissue below the uncle in people with diabetes mellitus irrespective of duration[3]. Diabetic neuropathy, trauma, and concomitant peripheral vascular disease are considered as some of the causes of DFU [4]. The lifetime incidence of a foot ulcer is estimated to be 19% to 34% among people with diabetes[2]. Diabetic foot ulcer (DFU), peripheral vascular disease (PVD), and peripheral neuropathy (PN) are the leading cause of lower extremity amputation in patients with diabetes mellitus[5].

The pathophysiology of DFU heavily relies on a triad of neuropathy, trauma with secondary infection, and arterial occlusive disease. The intrinsic muscle atrophy produced by peripheral neuropathy leads to anatomical changes of the hammertoe on the plantar surface of the foot at the metatarsal heads[4]. Diabetic peripheral neuropathy (DPN) is the single most important risk factor for the development of DFU [6]. Arterial occlusion due to hyperglycemia and associated changes in glucose metabolism, perfusion of the foot below the level become inadequate to maintain skin integrity and result in ischemic ulcer or gangrene [4].

A systemic review and meta-analysis on the global epidemiology of diabetic foot ulceration in 2017 revealed that the prevalence of global DFU was 6.3% which was higher in males (4.5%) than females (3.5%)[7]. Another study conducted to assess the prevalence of foot ulcers on 6992 diabetic patients using ICD-9 diagnosis code from health plan administrative data indicated that 205(2.9%) had DFU and 101 (1.4%) had lower extremity amputations[8].

A descriptive cross-sectional study conducted in southwest Iran among 605 diabetic patients shows that 39 (6.4%) of diabetic patients developed foot ulcers[9].

A systemic review and meta-analysis conducted to assess the prevalence, characteristics, and outcome of DFU in Africa in 2018 identified that the prevalence of DFU in Africa was 13% and approximately 15% undergo lower extremity amputation[10]. A cross-sectional study conducted in Egypt to assess the prevalence and associated factors among adult diabetic Mellites patients aged 18 years and above show that the prevalence of DFU was 14.8% with 6.1% active ulcer and 8.7% previous history of foot ulcer[11].

Tele: +251911436150

E-mail address: teshome.habte@aau.edu.et

According to the systemic review and meta-analysis conducted in Ethiopia, the prevalence of DFU was found to be 12.98 with the highest magnitude in Addis Ababa [1]. An institution-based Cross-sectional study conducted among diabetic patients attending diabetic follow-up clinics at Amahara regional state shows that the prevalence of diabetic retinopathy, foot ulcer, and nephropathy were 25.5%, 21.2%, and 11.4% respectively [12]. A similar study conducted at the University of Gonder referral hospital revealed that the prevalence of DFU was 13.6%[13].

According to a cross-sectional study conducted in Jeddah Saudi Arabia insulin use, longer diabetic duration and non-Saudi nationality were associated with a higher prevalence of foot ulcer and the study also show Patients with DPN had 3.21 times higher odds of foot complications than those without the condition, and patients with Peripheral arterial disease had nearly 3-fold higher odds of foot complications than those without the condition [14].

A study conducted by Ahvaz southwest Iran identified that patients with decreased 10gm of monofilament sensation had nine times more chance of developing DFU than patients with normal sensation. The study also addressed that abnormal ankle-brachial index (ABI) increases the odds of Diabetic foot ulcer (DFU) by 6 folds. Furthermore, the study illustrated that long time effect of diabetes mellitus, illiteracy, and increased Body mass index (BMI) were significantly associated with foot ulcers[9].

According to cross-sectional research conducted on diabetic patients attending the diabetic follow up clinic of Gonder referral hospital north Ethiopia, patients living in a rural area are 2.57 times more likely to develop foot ulcers than urban residents. The study also identified obesity, poor self-care practice and neuropathy increased the risk of DFU by two, three, and twenty-two times respectively[15]

A similar study conducted at Arbaminch hospital south Ethiopia revealed that rural residence mean arterial blood pressure greater than 90 mm hg and duration of diabetes for more than 10 years Were independently increased the risk of developing diabetic foot ulcer by four, five, and eight times respectively[16]. It is obviously clear that many studies conducted in the western world on the prevalence and impact of diabetic foot ulcer and associated factors, few have been done in sub-Saharan Africa particularly in Ethiopia and also it is the main indicator of health care service quality and patient treatment management as the result maximize patient satisfaction and also this finding used as a base line information for other researcher in the study area. Therefore, this study aimed to evaluate prevalence and its associated factors of diabetic foot ulcers among diabetic patients attending follow-up clinics at public hospitals of Goff and Wolaita zones south, Ethiopia.

1.2. Research Questions

1. What is the prevalence of prevalence of diabetic foot ulcer among attendees of Diabetic clinic?
2. What are the factors associated with Diabetic foot ulcer among diabetic patients at public hospitals of Goff and Wolaita zones south, Ethiopia?

1.3. Conceptual Framework

This conceptual framework is developed after a critical review of different literature , foot care guidelines, and global diabetic reports that adopted toward the sociodemographic characteristics of the study population [1, 5, 13].. This conceptual frame work in ***Figure 1*** below indicates that the relationship between DFU and the possible influential factors like socio-demographic factors, behavioral factors, clinical factors, and diabetes-related factors.

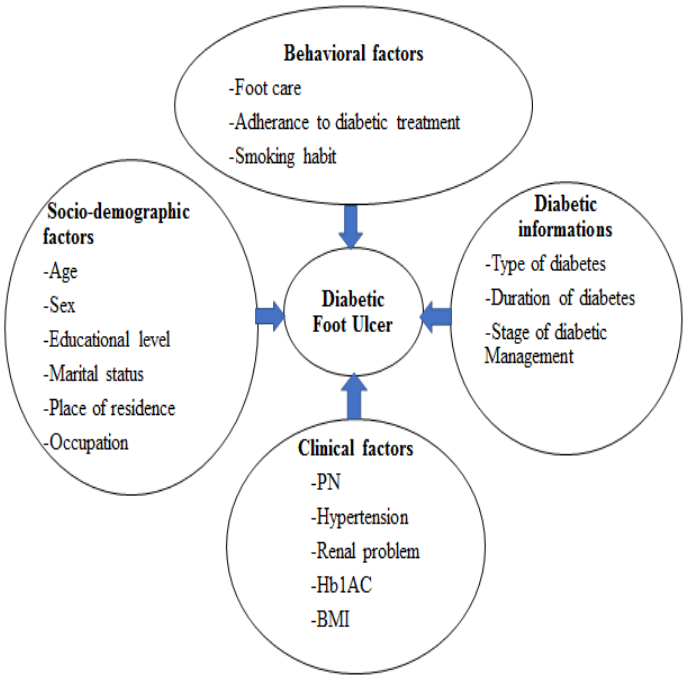

Figure 1. A conceptual frame work used for the assessment of diabetic foot ulcer and associated factors among diabetic patients attending diabetic clinic at public hospitals of Goffa and Wolaita zones, 2021.

2. Methods and Materials

2.1. Study Design, Area and Period

An institutional based cross-sectional study design was conducted at public hospital of Wolaita and Goffa Zones, Southern Nations, Nationalities, and Peoples' Regional state of Ethiopia. The zones "Wolaita and Goffa" are found to be 312 and 415 km far from Addis Ababa respectively. According to the population projection of Ethiopia 2019, the total population of Wolaita and Goffa were 2,044,079 and 964,3632 respectively. In the two zone only five hospitals have Diabetic follow-up centers and three of them were randomly selected to be included in this study namely: Otona referral hospital, Sawula general hospital and Christian hospital were involved. From these five hospitals have separate diabetic follow up clinic. The study was conducted from March 10-30/2021.

2.2. Population

Diabetic patients attending diabetic clinics at selected public hospitals of Wolaita and Goffa zones were the study population. Sample population were randomly selected diabetic patients who fulfil the inclusion criteria and attending diabetic clinics from randomly selected public hospitals in the zones.

2.3. Eligibility

The study includes all diabetic patients who attend two or more visit (follow-up) at randomly selected public study hospitals were considered to be included in the study.

2.4. Variable of the Study

Dependent Variable: Presence of diabetic foot ulcer.

Independent Variable:

- ***Sociodemographic variables***: sex, age, marital status, religion, place of residence and educational status and occupation
- ***Clinical factors:*** peripheral vascular disease (PVD), peripheral neuropathy (PN), hypertension, renal problem, fasting blood sugar level, Body mass Index (BMI.

- ***Diabetic information***: type of diabetes, duration of diabetes, stage of diabetic management
- ***Behavioral factors***: adherence to treatment, smoking and alcohol consumption

2.5. Sample Size determination

Sample size was calculated using a single population proportion formula. In consideration of the following assumption: standard normal distribution with a confidence interval (CI) of 95%(Z=1.96), the tolerable margin of error (d=0.05), and anticipated proportion of diabetic foot ulcer, 12.98 % (p) taken from a previous meta-analysis study[1] and a design effect of 1.5 since cluster sampling technique used. There are 1752 diabetic patients attending in five public hospitals of wolaita and Goffa zones according to the existing annual reports of the institution 2012 E.C.

$$n = \frac{(Z\alpha/2)^2 p(1-p)}{d^2} = \frac{(1.96)^2 0.13(1-0.13)}{(0.05)^2} = 174$$

Since the total population is less than 10,000, a correction formula is used

$$nf = \frac{no}{1+\frac{no}{N}} = \frac{174}{1+\frac{174}{1752}} = 158$$

By adding a 10% non-response rate the sample size was =174

And considering the design effect of 1.5 since the cluster sampling technique is used, the total sample size. 1.5*174=261

Where:

- ✓ n=sample size
- ✓ P= prevalence 12.98% [1]
- ✓ Za/2= standard normal distribution with 95% confidence interval is 1.96
- ✓ d=margin of error 5% and
- ✓ nf= final sample size

2.6. Sampling Procedures

There are five hospitals which have diabetic follow up clinic in Wolaita and Goffa zones. Out of these, three public hospitals namely; Otona referral hospital, Sawula general hospital and Christian hospital were selected by using the lottery method. The number of study subjects are proportionally allocated (based on the mean number of diabetic patients attending diabetic clinics monthly in each selected hospital). Average number of diabetic patients attending diabetic clinic of Otona referral hospital, Sawula general hospital and Christian hospital were 1320(39.7%), 1082(32.6%) and 916(27.6) respectively. Therefore, the study subjects were allocated for Otona referral hospital, Sawula general hospital and Christian hospital were 104,84 and 73 respectively. With a total sample size of 261 study subjects allocated.

2.7. Operational Definition

Diabetic foot ulcer: A localized wound of the skin or underlying tissue below the uncle in patient with diabetes mellitus[1], observed by data collectors during data collection period.

Good adherence: patients who have scored all of the described adherence components[5]

Good Foot care: patients who have scored a mean of the described foot care components[1]

Body Mass Index (BMI): An individual patient body weight divided to the square of their height; Range of BMI considered for this study were: < 18.5 kg/m2= underweight, 18.5–4.5 kg/m2= normal range, 24.5 to 30 kg/m2= overweight and > 30 kg/m2= obese [8].

Peripheral Neuropathy: The patent who had a clinical manifestation of: sensitive to touch, muscle weakness, lack of coordination, burning pain, gradual numbness and freezing on the lower limb [9].

2.8. Data Collection Tool and Data Quality Assurance

Data was collected by using a structured questionnaire**.** The questionnaire was adapted from different literature review [1,5,6] the content of data collection tool includes four parts. Part -I: Socio-demographic factors, Part-II: history of diabetic Mellitus, Part- III: behavioral factors, and part-IV: Clinical factors. The questionnaire was reviewed and consulted to senior expert on diabetes mellitus and to ensure the quality of the questionnaire pretest was done on 5% of the total population at Areka hospital and any error found during the pretest was corrected and modification was made into the final version of the data collection format. To maintain consistency of the tool the questionnaire first translated from English to Amharic by language expert then back to English. Training was given to data collectors and supervisors for two days before the actual data collection All completed data collection forms was examined for completeness and consistency during data management, storage, cleaning, and analysis.

2.9. Data Collection Procedure

Data was collected by six nurses were are oriented about diabetic foot ulcer screening and content od entire data collection tool. Those patients who attend the diabetic clinic and fulfill the inclusion criteria had undergone screening for diabetic foot ulcer and be interviewed. Clinical factors like PVD, PN, hypertension, renal problem, and BMI was collected from patient documents.

2.10. Data Processing and Analysis

The collected data were cleaned and checked for any missing and inconsistency by Epi data v4.6.02, and then exported to SPSS version 20 for further analysis. Descriptive statistics was performed to identify the distribution of socio-demographic characteristics of the study participants. Besides, Bivariate logistic regression was used to assess the association between dependent and independent variables. To control confounding effect those variables having p-value < 0.05 in Bivariate logistic regression were enter into multivariate logistic regression. Then those variables having a p-value <0.05 are considered as having a significant independent association.

3. Result

3.1. Socio demographic characteristics of respondents

A total of 261 study subjects were interviewed with 100% response rate. The mean age of the respondents was 51.13 ± 12.581 years. Majority 176(67.4%) of the study subjects were males and most 159(61%) of the respondents were urban residents. Protestant religion took the first place by 96(37%) whereas 214(82%) of the participants of the study were married. half of the respondents 129(49.4%) had educational level of collage and above and government employment was the primary occupation of the respondents.

3.2. Diabetic related characteristics of respondents

Type two diabetes mellitus is the most common type that accounts 186 (71.3%) and 203(77.8%) of the respondents were diagnosed for diabetes mellitus less than 10 years.

One hundred sixty (61.3%) were currently taking oral hypoglycemic agent as shown in ***Table 1*** below most of the diabetic patient were treating with oral hypogamic drugs among the participants.

Table 1. Diabetic related characteristic at public hospitals of Wolaita and Goffa Zones, South Ethiopia march 2021, N=261.

Variable	Frequency	Percent
Type of diagnosis		
Type one	75	28.7
Type two	186	71.3
Place of diagnosis		
Public health institution	236	90.4
Private health institution	25	9.6
Type of diabetic medication		
Insulin alone	74	28.4
Oral anti diabetic drug	160	61.3
Both injectable and oral antidiabetic agent	25	9.6
Life style modification	2	0.8
Duration of diabetes		
< 10 years	203	77.8
>= 10 years	58	22.2

3.3. Prevalence of Diabetic Foot Ulcer

From a total of 261 study participants of attending diabetic follow-up clinics at public hospitals of Goffa and Wolita Zones, South Ethiopia were 59 (22.6%) patients had developed foot ulcer as shown in ***figure2*** below. And about 41(69.5%) of them were type two diabetic patients and 60% of patients had hypertension Three fourth of patients with diabetic foot ulcer were adhered to diabetic treatment where as 60% them had diabetic peripheral neuropathy.

3.4. Behavior related characteristics of respondents

Regarding treatment, adherence to majority of respondents that accounts 238(91.2%) had good adherence to their treatment specifically taking medication, attending follow up and checking blood glucose level regularly. likewise, most of the respondents inspect their foot daily, bath feet with warm non- water, moisturize feet, cut nails carefully.

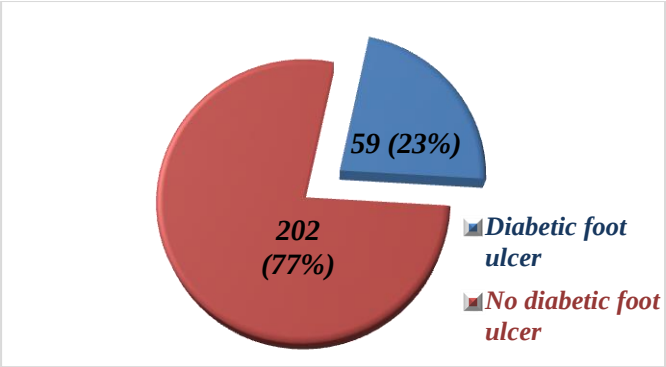

Figure 2. Prevalence of diabetic foot ulcer among adult diabetic patients at public hospitals of Goffa and Wolita Zones, South Ethiopia, Diabetic Clinic, 2021 (n = 261).

3.5. Clinical characteristic of respondents

The current study reveals that 65 (24.9%) of the respondents were found to be hypertensive whereas 96(36,8%) of respondents had HbA1C greater than 7.0mg/dl. Pertaining to co-morbidity, chronic kidney disease, peripheral neuropathy, and peripheral vascular disease were 25(9%), 49(18.8%) and 27(10.3%) respectively. The majority of the study participants 187(71.6%) had normal body mass index but also significant number of respondents 62(23.7%) had body mass index is higher than the recommended range (overweight or obese).

3.6. Factors associated with diabetic foot ulcer

In order to measure other variables related diabetic foot ulcer as shown in ***Table 2 below*** are assessed that includes ten variables are (type of diabetic medication, adherence to treatment, foot care, hypertension, chronic kidney disease, peripheral vascular disease, peripheral neuropathy, level of HbA1c, duration of diabetes and body mass index) were met required minima for multivariate logistic regression analysis from bivariate logistic regression with P-value of 0.05. For these 10 variables multivariate logistic regression analysis was done and only five variables (foot care, peripheral neuropathy, duration of diabetes, level of HbA1c, and body mass index) had found to be statistically significant association with P-value of less than 0.05.

Further, patients with poor foot care had 4 times higher chance of developing diabetic foot ulcer in comparison with diabetic patients with good foot care (AOR: 3.932, 95%CI (1.113,13.891) as depicted Table 3 below, and peripheral

Table 2. Factors associated with diabetic foot ulcer among diabetic patients attending diabetic follow up clinic at public hospitals of Wolaita and Goffa zones, South Ethiopia, (n=261).

Variables	Diabetic foot ulcer		COR (95%CI)	P value	AOR (95%CI)	P value
	Yes	no				
Type of diabetic medication						
Insulin alone	18(24.3%)	56(75.7%)	1		1	
Oral anti diabetic agent alone	25(15.6%)	135(84.4%)	.576(.292,1.139	0.113	.435(.073,2.585)	.360
Both	16(64%)	9(36%)	5.531(2.088,14.651)	.001*	.704(.072,6.916)	.764
Life style modification	0(0%)	2(100%)	.000(.000,.00)	.000	.000(.000,.000)	1.000
Adherence to treatment						
Good adherence	42(17.6%)	196(82.4%)	1		1	
Poor adherence	17(73.9%)	6(26.1%)	13.22(4.920,35.533)	.000*	1.711 (0.176,16.468)	.321
Foot care						
Good foot care	26(12.1%)	188(87.9%)	1		1	
Poor foot care	33(70.2%)	14(29.8%)	17(8.070-35.997)	.000*	3.932(1.113,13.891)	.033*
Hypertension						
Yes	36(55.4%)	29(44.6%)	9.337(4.853,17.967)	.000*	1.328(.296,6.060)	.714
No	23(11.7%)	173(83.3%)	1		1	
Chronic kidney disease						
Yes	19(76.0%)	6(14.0%)	15.517(5.831,41.294)	.000*	1.957(.253,15.164)	.520
No	40(16.9%)	196(73.1%)	1		1	

* Statistically significant at p-value< 0.0

Table 3. Factors associated with diabetic foot ulcer among diabetic patients attending diabetic follow up clinic at public hospitals of Wolaita and Goffa zones, South Ethiopia (n=261).

Variables	Diabetic foot ulcer		COR (95%CI)	P value	AOR (95%CI)	P value
	Yes	Yes				
Peripheral vascular disease						
Yes	19(70.4%)	8(29.6%)	11.519(4.714,28.146)	.000*	.243(.035,1.678)	.151
No	40(17.1%)	194(82.9%)	1		1	
Peripheral neuropathy						
Yes	34(69.4%)	15(30.6%)	16.955(8.113,35.432)	.000*	6.223(1.309,29.596)	.022*
No	25(11.8%)	187(88.2%)	1		1	
HbA1c						
<7mg/dl	4(2.4%)	161(97.6%)	1		1	
>=7mg/dl	55(57.3%)	41 (42.7%)	53.9(18.496,157.623)	.000*	68.404(13.523,346.015)	.000*
Duration of diabetes						
<10 years	26(12.8%)	177(87.2%)	1		1	
>=10 years	33(56.9%)	25(43.1%)	8.986(4.631,17.438)	.000*	5.463(2.603,28.013)	.000*
Body mass index						
Norma	22(11.8%)	165(88.2%)	1		1	
Over weight	16(48.5%)	17(51.5%)	7.059(3.125,15.944)	.000*	17.389(2.979,101.509)	.002*
Obese	19(65.5%)	10(34.5%)	14.250(5.878,34.547)	.000*	1.140(.149,8.705)	.899
Under weight	2(16.7%)	10(83.3%)	1.500(.308,7,297)	.615	.588(.036,9.507)	.708

* Statistically significant at p-value< 0.0

neuropath increased the risk by 6 times when compared to diabetic patients without peripheral neuropathy (AOR; 6.223,95%CI (1.309,29.596). Pertaining to duration, diabetes patients who had more than 10 years of diabetes since diagnosis were found to be 5.4 times higher chance of developing diabetic foot ulcer in comparison with those who were diagnosed for less than 10 years (AOR; 5.463,95%CI (2.603,28.013). Considering level of HbA1c, patients who had HbA1c level more than 7.0mg/dl were 68 times higher chance of developing foot ulcer when compared with patients who has less than 7.0mg/dl. This study also revealed that overweight patients had 17 times higher chance of developing DFU when compared to patient with normal weight.

4. Discussion

Diabetic foot ulcer is still the leading cause of non-traumatic lower limb amputation , but the prevalence of diabetic foot ulcer is still dramatically increasing through the country and the whole world as well [10,16]. The computed prevalence of diabetic foot ulcer prevalence from this study further assured this situation with 22.6%.

The prevalence from this study was consistent with studies conducted Felege Hiwot referral hospital, northern Ethiopia (21.7%) and Sudan Khartoum (18.1%). Whereas relatively higher than Gonder referral hospital (13.6%), Ayder referral hospital (12%), Cameroon (11.8%), Iran (6.4%), Egypt (8.7%) and Saudi Arabia (11.4%) [9,13,14,15, 17, 18]. These variations might be due to the study design and duration, socio-economic status, health institution service quality differences (most of the health institutions in the study area were not equipped with necessary medical equipment and specially trained health care providers) and attitude difference of diabetic patients towards treatment adherence and diabetic foot care.

In multi-varriate logistic regression; foot care, peripheral neuropathy, duration of diabetes, HbA1c, and BMI were declared independent predictor of the outcome variable diabetic foot ulcer.

Regarding the first independent predictor foot care; those categorized as poor foot care had 4 times higher chance of developing foot ulcer when compared to patients with good foot care; this finding coincides with the study conducted in Gonder referral hospital [13].

Pertaining to the second independent predictor variable peripheral neuropathy; patients with peripheral neuropathy had six times higher chance of developing diabetic foot ulcer when compared to patients without diabetic neuropathy; these finding corroborates the conclusion of the studies conducted in Gonder referral hospital, TASH and Saudi Arabia yet a study conducted in Iran argues that there is no significant association between diabetic foot ulcer and diabetic peripheral neuropathy [9,13,19].

Regarding the third independent predictor duration of diabetes; this study revealed that patients with more than 10 years of duration since diagnosis were 5.4 times greater probability of developing foot ulcer when compared to less than 10 years' diabetic duration. This is consistent with study conducted at Felege Hiwot referral hospital, Egypt and Iran but contradicts with the systemic review and meta-analysis conducted in Ethiopia [1,20,21]. This might be due to difference in study design, sample size and techniques.

The fourth independent predictor is HbA1c. HbA1c is a measure of how well blood sugar has been over the last 3 months. In this study patients with HbA1c of greater than 7mg/dl had 68 times a higher chance of developing diabetic foot ulcer in comparison with patients who have less than 7mg/dl; this is consistent with a similar study conducted in Saudi Arabia [14]. Yet neither most of the available studies in Ethiopia included this variable in their study nor identified independent association, this gap might be linked to lack of HbA1c test at most of the health institutions.

Regarding the fifth and last independent predictor of this study; overweight patients had 13 times higher chance of developing diabetic foot ulcer when compared to normal body weight patients. This finding is similar with a study conducted in Iran[9]. It is obviously clear that excessive weight gain increases cardiovascular problem and reduce blood flow to the lower limb and facilitates for the growth of pathogenic organisms like bacteria as the result infection and foot ulcer and then lead to death of tissue and causes gangrene.

5. Conclusion and Recommendations

In conclusion the prevalence of diabetic foot ulcer in this study found to be high and indicates that foot care practice, peripheral neuropathy, duration of diabetes, HbA1c and BMI found to be statistically significant association with the outcome variable diabetic foot ulcer.

It is better if the diabetic clinics are composed of multidisciplinary team including nurse, doctors, dieticians and diabetic educators which are specially trained on diabetic management as part of capacity building and focus on patient education on the prevention and care of foot ulcer. Furthermore, it's better for health professional to have a collaborative partnership with patients in order to promote the practice of foot care and glycemic control by patients. The health institutions are also encouraged to prepare scheduled diabetic foot examination sessions in addition to routine follow up programs which will help to reduce diabetic foot ulcer.

Abbreviations

AOR: *Adjusted odds ratio;* ***BMI:*** Body mass index; ***COR***: Crude odds ratio; ***DFU:*** Diabetic foot ulcer; ***DPN***: Diabetic Peripheral neuropathy **IDF:** International diabetic federation; ***PAD***: Peripheral arterial disease; ***PN:*** Peripheral neuropathy; ***PVD***: Peripheral vascular disease; ***TASH:*** Tikur Anbessa Specialized Hospital

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the research and ethical review board of Addis Ababa University, College of health sciences, school of Nursing, and midwifery. All the study subjects provided written informed consent and shared about the purpose and procedure of the study and their right to refuse was respected and consent was obtained from all study participants before the interview. The respondents were also told that the information obtained from them be treated with complete confidentiality and do not cause any harm to them. Methods were carried out in accordance with Helsinki guidelines and regulations.

Consent for publication: Not applicable.

Availability of data and materials

Datasets are available from the corresponding author on reasonable request.

Conflict of Interest/ competing interests

This thesis is submitted in partial fulfilment of the requirement for the MSc degree from the School of Postgraduate Studies at Addis Ababa University, School of Nursing and Midwifery, Department of Adult health nursing. The thesis is deposited in the Library of Addis Ababa University and is made available to the user under the rules of the library. The authors do not have any competing interests.

Funding

Funding for this study was not provided by any institution or agency, but some stationary items like A4 size papers for duplication of data collection interview questionnaire, pencils and research advisor assignment offered by the Addis Ababa University postgraduate office.

Authors' Contributions

The paper is the result of joint research, the contribution of every author is comparable to the others. DS. searched the literature, trained field researchers for data collection, and wrote draft results and reviews of the manuscript and YA. and KB. have participated in the data analysis, interpretation, review of the manuscript for publication. TH. Data analysis, Conceptualized the paper (report) and Manuscript preparation and other necessary document preparation for publication. All authors read and approved the final manuscript.

Acknowledgments

The authors would like to acknowledge to Addis Ababa University, Collage of Health Science, Department of Nursing and the study participant for their unreserved support during data collection.

References

1.Tolossa T, Mengist B, Mulisa D, Fetensa G, Turi E, Abajobir A. Prevalence and associated factors of foot ulcer among diabetic patients in Ethiopia: a systematic review and meta-analysis. BMC Public Health. 2020;20(1):1-14. https://doi.org/10.1186/s12889-019-8133-y

2.Armstrong DG, Boulton AJ, Bus SA. Diabetic foot ulcers and their recurrence. New England Journal of Medicine. 2017;376(24):2367-75. DOI: 10.1056/NEJMra1615439

3.Nigi L, Fondelli C, de Donato G, Palasciano G, Setacci C, Dotta F, editors. Fighting diabetic foot ulcers—The diabetologist: A king maker of the fight. Seminars in vascular surgery; 2018: Elsevier.
https://doi.org/10.1053/j.semvascsurg.2018.12.003

4.Bandyk DF, editor the diabetic foot: Pathophysiology, evaluation, and treatment. Seminars in vascular surgery; 2018: Elsevier. DOI: 10.1053/j.semvascsurg.2019.02.001

5.Yimam A. Assessment of Prevalence of Diabetic Foot Ulcer and Associated Factors among
Diabetic Patient Attending Tikur Anbesa Specialized Hospital Diabetic Clinic, Addis Ababa, Ethiopia, 2017: Addis Ababa University; 2017.
https://doi.org/10.1016/j.ijans.2021.100285

6.Ibrahim A. IDF Clinical Practice Recommendation on the Diabetic Foot: A guide for healthcare professionals. diabetes research and clinical practice. 2017; 127:285-. DOI: 10.1016/j.diabres.2017.04.013

7. World Health Organization. Global report on diabetes. 2016.

8.McEwen LN, Ylitalo KR, Herman WH, Wrobel JS. Prevalence and risk factors for diabetes- related foot complications in Translating Research Into Action for Diabetes (TRIAD). Journal of Diabetes and its Complications. 2013;27(6):588-92. DOI:
10.1016/j.jdiacomp.2013.08.003

9.Yazdanpanah L, Shahbazian H, Nazari I, Arti HR, Ahmadi F, Mohammadianinejad SE, et al. Prevalence and related risk factors of diabetic foot ulcer in Ahvaz, south west of Iran. Diabetes & Metabolic Syndrome: Clinical Research & Reviews. 2018;12(4):519-24.

10.Scott G. The diabetic foot examination: A positive step in the prevention of diabetic foot ulcers and amputation. Osteopathic family physician. 2013;5(2):73-8.
https://doi.org/10.1016/j.osfp.2012.08.002

11.Assaad-Khalil S, Zaki A, Rehim AA, Megallaa M, Gaber N, Gamal H, et al. Prevalence of diabetic foot disorders and related risk factors among Egyptian subjects with diabetes. Primary care diabetes. 2015;9(4):297-303.;
DOI: 10.1016/j.pcd.2014.10.010

12.Setacci C, de Donato G, editors. Introduction: Fighting foot ulcers and amputation in the diabetic population. Seminars in vascular surgery; 2018. 31(2-4):23-24.

13.Zhang P, Lu J, Jing Y, Tang S, Zhu D, Bi Y. Global epidemiology of diabetic foot ulceration a systematic review and meta-analysis. Annals of medicine. 2017;49(2):106-16.
DOI: 10.1080/07853890.2016.1231932

14.Hu Y, Bakhotmah BA, Alzahrani OH, Wang D, Hu FB, Alzahrani HA. Predictors of diabetes foot complications among patients with diabetes in Saudi Arabia. Diabetes research and clinical practice. 2014;106(2):286-94. DOI: https://doi.org/10.16/jdiabres.2014/07016

15.Mariam TG, Alemayehu A, Tesfaye E, Mequannt W, Temesgen K, Yetwale F, et al Prevalence of diabetic foot ulcer and associated factors among adult diabetic patients who attend the diabetic follow-up clinic at the University of Gondar Referral Hospital, North West Ethiopia, 2016: Institutional-based cross-sectional study. Journal of diabetes research. 2017;2017. DOI: 10.1155/2017/2879249

16.Deribe B, Woldemichael K, Nemera G. Prevalence and factors influencing diabetic foot ulcer among diabetic patients attending Arbaminch Hospital, South Ethiopia. J Diabetes Metab. 2014;5(1):1-7.
DOI: 10.4172/2155-6156.1000322

17.Thomas R, Halim S, Gurudas S, Sivaprasad S, Owens D. IDF Diabetes Atlas: A review of studies utilizing retinal photography on the global prevalence of diabetes related retinopathy between 2015 and 2018. Diabetes research and clinical practice. 2019; 157:107840.
DOI: 10.1016/j.diabres.2019.107840

18.Martins-Mendes D, Monteiro-Soares M, Boyko EJ, Ribeiro M, Barata P, Lima J, et al. The independent contribution of diabetic foot ulcer on lower extremity amputation and mortality risk. Journal of Diabetes and its Complications.2014;28(5):632-8.
https://doi.org/10.1016/j.jdiacomp.2014.04.011

19.Salomé GM, de Almeida SA, Mendes B, de Carvalho MRF, Bueno JC, Massahud Jr MR, et al. Association of sociodemographic factors with spirituality and hope in patients with diabetic foot ulcers. Advances in skin & wound care. 2017;30(1):34-9.

20.Degu H, Wondimagegnehu A, Yifru YM, Belachew A. Is health related quality of life influenced by diabetic neuropathic pain among type II diabetes mellitus patients in Ethiopia? PloS one. 2019;14(2): e0211449.
https://doi.org/10.1371/journal.pone.0211449

21.Rigato M, Pizzol D, Tiago A, Putoto G, Avogaro A, Fadini GP. Characteristics, prevalence, and outcomes of diabetic foot ulcers in Africa. A systemic review and meta-analysis. Diabetes research and clinical practice. 2018; 142:63-73. DOI:10.1016/j.diabres.2018.05.016