



Diabetic Foot ulcer Prevalence and Characteristics in Eastern Afghanistan

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ABSTRACT:

Diabetes Mellitus is a very common metabolic disorder in our society causing both acute and chronic complications of which diabetic foot ulcer stays the leading etiology of amputations and disability. The main purpose of the study was to find out the prevalence and related characteristics of diabetic foot ulcer at the time of diagnosis or admission.

It was a cross sectional hospital based multicenter study including both male and female diabetic patients admitted to both internal medicine and orthopedic wards of Nangarhar university teaching hospital and Nangarhar regional hospital during six months period.

The study included 310 diabetic patients of whom only 46 patients (14.8%) had foot ulcers. In fact, 20.4% of male and 11.9% of female diabetic patients suffered from ulcers. Diabetic foot ulcers were directly related with increasing age as it occurred 11.1% in the lowest age group compared to 25% in the age group ≥ 78 years. In addition, most ulcers were grade 2 and grade 3 (30.4% each) followed by grade 1 (26.1%) and the least, grade 4 (8.7%). 47.8% of ulcers had gray color while the remaining 52.2% ulcers had pink color. Moreover, 60.9% ulcers had sinuses and 26.1% of ulcers had bad smell. Ischemic changes on physical examination of the ipsilateral limb were evident in 91.3% of patients while neuropathic changes were evident in only 30.4% of patients. Ulcers were directly associated with the increasing duration of diabetes mellitus as half of the patients (50%) with diabetes duration of 21 years or greater had ulcer compared with 9.1% of 1-5 years of diabetes duration. 18/46 patients had history of amputation and 34.8% patients had hypertension as the comorbid factor.

Diabetic foot ulcer as a complication leading to disability was highly prevalent in our study more specifically in males, old age, type 1 diabetes and patient with long standing diabetes. Most ulcers respectively had ischemic, neuropathic and infectious or inflammatory changes. Awareness programs should be designed to both the patients and healthcare providers to decrease cases of diabetic foot ulcer and thus decrease disability and social burden.

Introduction

Diabetes mellitus is a very prevalent metabolic disorder worldwide which bears acute and chronic complications unless detected and treated earlier of which diabetic foot ulcer remains multifactorial being caused by either ischemia, neuropathy, or infection (Doğruel et al., 2022; Syafril, 2018). In fact, almost 20% of people in the world are currently suffering from diabetes mellitus and its prevalence is supposed to increase by the coming

years while only 2-5% of people in Europe live with diabetes mellitus (Mariam et al., 2017). Moreover, studies have shown that 2.5% of diabetic patients annually suffer from diabetic foot ulcers in England and 20% of hospital admitted diabetic patients in the same country are suffering from diabetic foot ulcers (Nyamu et al., 2003). In fact, 10-30% patients of diabetic foot ulcer in a study by Rigato and his colleagues are shown to have undergone amputation consequently causing



disability and social burden (Rigato et al., 2018). In addition WHO reported that 150 million people worldwide have diabetes which are supposed to be doubled by 2025; and only 12-25% of these patients suffered from diabetic foot ulcers (Roglic et al., 2016). A study by Mohammad Yasin Zafar and his colleagues 214 diabetic foot ulcers in Pakistan demonstrated that 64 patients had ulcers less than 3 cm² while 150 had wider ulcers than 3 cm²; sharp debridement was advised to 157 patients and 163 patients had a hospital stay of less than 20 days while the rest had a hospital stay of greater than 20 days.

Unfortunately, the prevalence of diabetes and consequent diabetic foot ulcer has increased in our region and despite many researches we do not have any data on the prevalence of diabetic foot ulcers and their characteristics. Therefore, we aimed to conduct this study to find out the exact prevalence and their specific characteristics so that we could provide data to be used in the effective prevention and management programs in the relevant field to reduce morbidity and disability.

Methodology

It was a cross sectional hospital based multicenter study including both male and female diabetic patients

admitted to both internal medicine and orthopedic wards of Nangarhar university teaching hospital and Nangarhar regional hospital during six months period. (May-Oct 2023). All patients with known diabetes mellitus admitted to the relevant hospitals in the mentioned period aging over 18 years were included to the study based on purposive sampling. Patients not agreeing with the study or those who had other recent reasons for foot ulcers such as traffic accidents or other forms of incidental traumas were excluded from the study. Written consent was taken from patients and for privacy reasons their identity was hidden including only their medical record numbers in questionnaire.

Data was stored in Microsoft Excel and analyzed by Statistical Package for Social Sciences (SPSS) version 26 using mean \pm standard deviation for continuous variables and frequency and percentage for categorical variables.

Results

The study included 310 patients of whom 202 (65.2%) were females and 108 (34.8%) were males which are shown in Table 1 along with other demographic details of the study.

Table 1. Demographics of the study population

Demographic Data			Clinical Data		
Parameter		Frequency (%)	Parameter		Frequency (%)
Gender	Male	108 (34.8%)	BMI	Underweight	30 (9.7%)
	Female	202 (65.2%)		Normal weight	122 (45.8%)
Age groups (years)	18-27	18 (5.8%)		Overweight	102 (30.3%)
	28-37	12 (3.9%)	Diabetes type	Obese	54 (14.2%)
	38-47	32 (10.3%)		Type 1	96 (31%)
	48-57	62 (20%)		Type 2	214 (69%)
	58-67	128 (41.3%)	Diabetes duration (years)	1-5	154 (49.7%)
	68-77	42 (13.5%)		6-10	66 (21.3%)
	≥ 78	16 (5.2%)		11-15	50 (16.1%)
Income status	Poor	150 (48.4%)		16-20	28 (9%)
	Fair	122 (39.4%)		≥ 21	12 (3.9%)
	Good	38 (12.3%)			

Mean age of the study population was 56.8 ± 14.3 and mean body mass index (BMI), diabetes duration, systolic blood pressure and glycemia are shown in Table 2.



Table 2. Descriptive statistics

Parameters	minimum	maximum	Mean \pm SD
Age (years)	18	85	56.8 \pm 14.3
BMI	13.9	36.6	24.8 \pm 4.7
Diabetes duration (years)	1	28	7.6 \pm 6.5
Systolic blood pressure	60	210	122.7 \pm 26.4
Glycemia (mg/dl)	86	435	212 \pm 71.3

SD= Standard Deviation

Only 46 patients (14.8%) had diabetic foot ulcer at the time of diagnosis as shown in Figure 1.

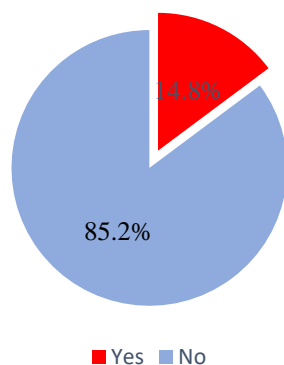


Figure 1. Diabetic foot ulcer prevalence

In fact, 20.4% of male and 11.9% of female diabetic patients suffered from ulcers. According to grade, most ulcers were grade 2 and 3 (30.4% each) followed by grade 1 (26.1%) and grade 4 (8.7%) respectively. In addition, according to ulcer color, 47.8% of ulcers had gray color while the remaining 52.2% ulcers had pink color. Moreover, 32 (69.6%) ulcers had pus, 28 (60.9%) ulcers had sinuses and 12 (26.1%) of ulcers had bad smell.

Inflammatory signs such as swelling, warmth and etc, ischemic changes such as absence of pulse, cold skin,

and trophic changes, and neuropathic changes such as paresthesia and absence of touch, temperature, position, and vibration sense during physical examination of the ulcer in total are shown in Figure 2.

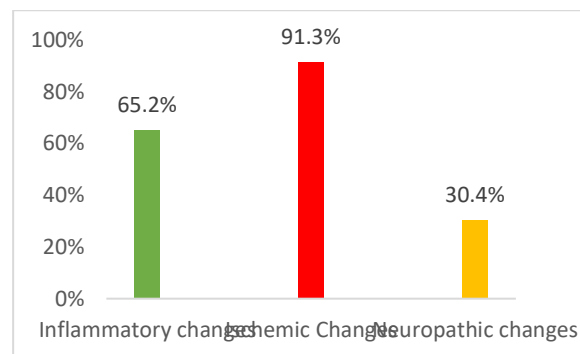


Figure 2. Inflammatory, ischemic and neuropathic changes in DFU

Figure 2 shows that most patients (91.3% out of 100%) had ischemic changes compared with (30.4% out of 100%) neuropathic changes at the time of admission.

Only 18 patients (39.1%) had prior history of amputation of a finger or a whole limb.

The number of cases of diabetic foot ulcer directly increased with the increasing duration of diabetes mellitus as shown in Figure 3.

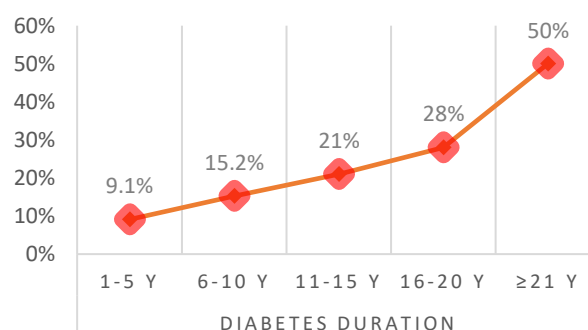


Figure 3. Diabetic foot ulcer across diabetes duration

Figure 3 shows diabetic foot ulcers were directly associated with the increasing duration of diabetes mellitus as half of the patients (50%) with diabetes duration of 21 years or greater had ulcer compared with 9.1% of 1-5 years of diabetes duration.

Furthermore, the prevalence of diabetic foot ulcer across gender, age, BMI, and diabetes type is shown in Table 3.



Table 3. Diabetic foot ulcer across gender, age, BMI, and diabetes type

Parameter		No Ulcer		Foot Ulcer	
		Frequency	Row %	Frequency	Row %
Gender	Male	86	79.6%	22	20.4%
	Female	178	88.1%	24	11.9%
Age Groups	18-27	16	88.9%	2	11.1%
	28-37	10	83.3%	2	16.7%
	38-47	28	87.5%	4	12.5%
	48-57	54	87.1%	8	12.9%
	58-67	110	85.9%	18	14.1%
	68-77	34	81%	8	19%
	≥78	12	75%	4	25%
Income status	Poor	124	82.7%	26	17.3%
	Fair	108	88.5%	14	11.5%
	Good	32	84.2%	6	15.8%
BMI Groups	Underweight	26	86.7%	4	13.3%
	Norma weight	110	77.5%	12	9.8%
	Overweight	86	91.5%	16	15.7%
Diabetes Type	Obese	42	95.5%	14	25%
	Type 1	72	75%	24	25%
	Type 2	192	89.7%	22	10.3%

Prevalence of diabetic foot ulcer was comparatively higher in patient having family history of the disease 56.5% versus 43.5% in patients without family history.

Patients with diabetic foot ulcer had hypertension as the leading (34.8%) comorbid condition while the rest of the comorbid conditions are shown in Table 4.

Table 4. Comorbid conditions alongside diabetic foot ulcer

Comorbidity	No Ulcer, Count (%)	Foot Ulcer, Count (%)
Hypertension	38 (14.4%)	16 (34.8%)



Infections	34 (12.9%)	4 (8.7%)
DKA	40 (15.2%)	4 (8.7%)
Kidney disease	28 (10.6%)	4 (8.7%)
COPD	8 (3%)	0 (0%)
Heart disease	14 (5.3%)	2 (4.3%)
Anemia	6 (2.3%)	0 (0%)
More than one	28 (10.6%)	6 (13%)
None	68 (25.8%)	10 (21.7%)

Discussion

The major findings of the study included that diabetic foot ulcer was more prevalent in diabetic patients specially in male gender, advanced age, obese patients, poor and type 1 diabetes compared with their counterparts. In addition, diabetic foot ulcer prevalence directly increased with increasing age and diabetes duration. Ischemic changes such as the absence of the pulse in the relevant area, cold skin, and trophic changes followed by neuropathic changes such as paresthesia and the absence of sensation against touch, temperature, position, and vibration, and infective changes such as the presence of pus, bad smell, and sinus on physical examination were the leading characteristics of the ulcers. Hypertension was the leading comorbid condition.

The prevalence of diabetic foot ulcer in our study if compared with the studies in Africa, Cameroon, Nigeria or worldwide was relatively high for which the possible reasons include lack of education and awareness, usage of home remedies usually self-made, poor diabetes control, poverty, recklessness, poor hygiene and etc. However, its prevalence was comparatively lower than that of a study in Tanzania (4.8% vs 15%) (Chiwanga et al., 2015).

Moreover, studies in India and Pakistan have also shown that diabetic foot ulcer was more prevalent in male gender and type 1 diabetes in comparison to their counterparts (Shahi et al., 2012; Yasin et al., 2018).

In addition, the distribution of ulcer characteristics as in the account of ischemic and neuropathic changes were similar with the study of Shahi et al., in northern India

(Ischemic changes 73.1% versus 46.4% neuropathic changes) while it was different from the study of Mohammad Zafar and his colleagues in Pakistan (Ischemic changes 54.6% versus 76.7% neuropathic changes) (Shahi et al., 2012; Yasin et al., 2018).

In fact, diabetic foot ulcer was less prevalent in diabetic patients with normal weight as compared with overweight and obese subjects in our study which is consistent with the result of a study in Australia (19% in normal weight versus 35.5% and 29.8% in overweight and obese subjects respectively). In addition grades of ulcer in the both studies were comparable (Zhang et al., 2017).

We recommend healthcare providers specifically health policy makers to take measures to reduce disease burden through awareness and capacity building to decrease the prevalence and subsequent disability and mortality.

Conclusion

Diabetic foot ulcer as a complication leading to disability was highly prevalent in our study more specifically in males, old age, type 1 diabetes and patient with long standing diabetes. Most ulcers respectively had ischemic, neuropathic and infectious or inflammatory changes. Awareness programs should be designed to both the patients and healthcare providers to decrease cases of diabetic foot ulcer and thus decrease disability and social burden.

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Conflict of interest

None declared

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