



CODEN [USA]: IAJPBB

ISSN: 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.1473769>Available online at: <http://www.iajps.com>

Research Article

**ANALYSIS OF RISK OF FOOT ULCERS IN DIABETIC
PATIENTS AMONG LOCAL POPULATION OF PAKISTAN**¹Dr. Hafsa Tariq, ²Dr. Ifraha Abbas, ¹Dr. Nouman Ashraf¹ Women Medical Officer at Endocrinology Department, Services Hospital, Lahore² Omar Hospital & Cardiac Centre, Lahore³Urology department, DHQ Hospital, Faisalabad**Abstract:**

Introduction: Diabetic foot complications are the most common cause of non-traumatic lower extremity amputations in the industrialized world. The risk of lower extremity amputation is 15 to 46 times higher in diabetics than in persons who do not have diabetes mellitus. **Objectives of the study:** The basic aim of the study is to examine the risk factors for foot ulcers in patients with diabetes mellitus in local population of Pakistan. **Methodology of the study:** This descriptive study was conducted at Services hospital Lahore with the collaboration of Omar hospital Lahore during Jan 2018 to March 2018. In this descriptive analytical study all patients with diabetes under 65 years referred to the hospital were studied. Exclusion criteria of the study were hypothyroidism, pernicious anemia, discopathy, malignancy because they can also lead to neuropathy. **Results:** Forty patients with foot ulcers were treated at the hospital during this period. Forty controls attending the same diabetic clinic during the same period were also selected for the analysis. The mean age of the total sample was 55.5 years. The majority of the sample was male (51.1%), non-smokers (95.6%) and did not have hypertension (67.8%). **Conclusion:** It is concluded that it is difficult to treat the foot ulcer in diabetic patients. It can be difficult to differentiate local soft tissue infection and inflammation from osteomyelitis. Three-phase bone scans and radiolabelled leukocyte scans are expensive but can help to establish an accurate diagnosis in problematic cases.

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Please cite this article in press Hafsa Tariq et al., *Analysis of Risk of Foot Ulcers in Diabetic Patients among Local Population of Pakistan.*, Indo Am. J. P. Sci, 2018; 05(10).

INTRODUCTION:

Diabetic foot complications are the most common cause of non-traumatic lower extremity amputations in the industrialized world. The risk of lower extremity amputation is 15 to 46 times higher in diabetics than in persons who do not have diabetes mellitus. Furthermore, foot complications are the most frequent reason for hospitalization in patients with diabetes, accounting for up to 25 percent of all diabetic admissions in the United States and Great Britain [1].

The vast majority of diabetic foot complications resulting in amputation begin with the formation of skin ulcers. Early detection and appropriate treatment of these ulcers may prevent up to 85 percent of amputations. Indeed, one of the disease prevention objectives outlined in the "Healthy People 2000" project of the U.S. Department of Health and Human Services is a 40 percent reduction in the amputation rate for diabetic patients. Family physicians have an integral role in ensuring that patients with diabetes receive early and optimal care for skin ulcers [2].

Diabetes mellitus, a metabolic disease, has a population prevalence of about 10-15%. The incidence of foot ulcers range from 8 to 17% in the cohort studies, with varying lengths of follow-up, and cause severe disability and possible hospitalization to patients and considerable economic burden to families [3]. A variety of foot lesions are seen in people with uncontrolled diabetes mellitus namely fissures, abscess, cellulites, ulcers, claw toes and Charcot's joints. There is a risk of developing gangrene and of consequent amputation of the foot especially for people from the lower socioeconomic strata and for those living in rural areas. Clinical guidelines recommend that all patients with diabetes should be screened annually to establish their risk of foot ulceration [4]. Diagnostic tests and physical signs that detect peripheral neuropathy and those that detect excessive plantar pressure were all significantly associated with future diabetic foot ulceration. However, there was a paucity of evidence from India concerning the predictive value of symptoms and signs [5].

Diabetes is one of the main problems in health systems in the world. The world prevalence of diabetes among adults was 6.4%, and will increase to 7.7% by 2030. Patients with diabetes are at greater risk of complications, the most important of them are diabetic neuropathy [3] and peripheral vascular disorders that lead to diabetic foot ulcers. Currently the most common cause of neuropathy in western

countries is diabetes. Diabetic neuropathy will develop in 50% of type 1 and 2 patients with diabetes [6]. Diabetic foot problems are the most common cause of hospitalization in patients with diabetes and it accounts for 2 million patients with diabetes in the United States annually and often need long-term hospital admission. Diabetes is a major factor in half of all lower extremity amputations [7].

Objectives of the study

The basic aim of the study is to examine the risk factors for foot ulcers in patients with diabetes mellitus in local population of Pakistan.

METHODOLOGY OF THE STUDY:

This descriptive study was conducted at Services hospital Lahore with the collaboration of Omar hospital Lahore during Jan 2018 to March 2018. In this descriptive analytical study all patients with diabetes under 65 years referred to the hospital were studied. Exclusion criteria of the study were hypothyroidism, pernicious anemia, discopathy, malignancy because they can also lead to neuropathy, and lower limb edema and congestive heart failure, because they can interfere with the assessment of neuropathy in examination and duration of diabetes less than 5 years in patients with type I because in this period neuropathy has still not developed.

Collection of data

A questionnaire including age, sex, BMI, diabetes duration, type of treatment, HbA1C, deformity, neuropathy symptoms, vascular symptoms, history of foot ulcer, previous training regarding foot care, smoking, history of retinopathy and nephropathy was completed for all patients. The patients were evaluated for deformity: contracted toe, prominent metatarsal heads and Halux valgus. Questions regarding symptoms of neuropathy and vascular disorder including numbness and tingling of toes and legs, pain and feeling hot or cold sensation in the legs, intermittent claudication, rest pain, thin skin, glossy and bluish skin discoloration and foot ulcer or amputation were asked from the patients.

Ulcer evaluation

Participant's feet were evaluated for callus and ulcer. The neurological examination was performed by 10 grams monofilament, neuro-thesiometer, needle and hammer. Superficial pressure was assessed by 10g monofilament. Patients closed their eyes while being tested.

Ethical consideration

This research project was approved by "Departmental Ethics and Research committee" of the hospital. The purpose of the study was explained to the study

participants accordingly. Permission was obtained from hospitals research center and nephrology clinic.

Statistical analysis

The data of respiratory function were compared between the smoker and non-smoker groups using the independent t-test for normally distributed data or the Mann-Whitney U test for other distributions. Differences were considered statistically significant at $p < 0.05$.

RESULTS:

Forty patients with foot ulcers were treated at the hospital during this period. Forty controls attending

the same diabetic clinic during the same period were also selected for the analysis. The mean age of the total sample was 55.5 years. The majority of the sample was male (51.1%), non-smokers (95.6%) and did not have hypertension (67.8%). The average duration after diagnosis of diabetes mellitus was 6.1 (SD 6.3) years. The majority did not have peripheral neuropathy (81.1%), absent peripheral pulses (90.0%), pre-ulcerous states (90.0%), callous (89.9%), fissures on feet (64.4%), nail pathology (97.1%), foot deformity (93.3%) or disability (94.4%). The majority were on treatment with diet and oral anti-diabetic medication (90.0%).

Table 1: Risk factors for developing foot ulcers in patients with diabetes mellitus

Characteristic	Cases <i>n</i> (%)	Controls <i>n</i> (%)	Univariate statistics		Multivariate statistics	
			Odds ratio (95% CI)	<i>P</i> -value	Adjusted odds ratios (95% CI) ¹	<i>P</i> -value
Gender- Male	22 (48.9)	24 (53.3)	0.84 (0.37-1.91)	0.673	0.83 (0.36-1.90)	0.652
Age- Over 55 years	25 (55.6)	23 (51.1)	1.20 (0.52-2.74)	0.673	1.21 (0.53-2.78)	0.652
Body mass index >25	24 (54.5)	26 (57.8)	0.88 (0.38-2.03)	0.759	1.27 (0.55-2.95)	0.578
Hypertension on treatment with ACEI	10 (22.2)	19 (42.2)	0.39 (0.16-0.98)	0.042	0.29 (0.10-0.80)	0.018
Smoker	2 (4.4)	1 (2.3)	2.00 (0.18-22.89)	0.570	2.47 (0.21-29.76)	0.477
Duration of diabetes in years >3	28 (62.2)	22 (48.9)	1.72 (0.74-3.99)	0.203	1.20 (0.52-2.78)	0.669
Treated with anti-hyperglycemic medication or insulin	33 (82.5)	26 (66.7)	2.36 (0.82-6.76)	0.106	2.39 (0.82-6.92)	0.11
Treated with insulin	8 (17.8)	1 (2.2)	9.51 (1.14-79.60)	0.014	11.05 (1.29-94.54)	0.028

DISCUSSION:

Foot ulcers is a disabling complication and not uncommon among people with diabetes mellitus. The disability and possible progression to the loss (amputation) of digits and limbs make it a serious issue [7]. This study attempted to examine the risk factors for foot ulceration using a case control design. Systematic assessments done routinely in the special clinic and the computerization of the data were the strengths of the study. Assessment of arterial pulses using Doppler and biothesiometer were not practical and cost effective in secondary care clinical practice and hence were not used in this study. However, assessments using Doppler often give a misleading

ankle/brachial index (ABI) in patients with diabetes due to arterial calcification. Foot pulses were used in the clinical assessment, and their absence is usually associated with an ABI of < 0.76 [8].

The risk factors identified included the need for insulin therapy for uncontrolled blood sugars possibly reflecting a severe form of the condition with poorer glycemic control [9]. The presence of peripheral neuropathy seems to contribute to the development of ulceration and those with pre-ulceration, callosities and deformity seem to be at increased risk [10]. However, those with hypertension seem to be protected. As all the patients in the study were on ACE inhibitors, a possible

mechanism for such protection could be due to improved endothelial function leading to enhanced peripheral circulation. People with the presence of these risk factors will require greater care in preventing such ulceration. Available international literature is supportive of these risk factors as causative for foot ulcers in people with diabetes [11].

Because these ulcers almost always form in patients with neuropathy, they are typically painless. Even in the presence of severe infection, many patients have few subjective complaints and are often more concerned with soiled footwear and stockings than with the penetrating wound [12]. Adequate debridement is the first step in the evaluation of a foot ulcer. Debridement should remove all necrotic tissue and surrounding callus until a healthy bleeding edge is revealed. Patients (and physicians) often underestimate the need for debridement and may be surprised by the appearance of the newly debrided ulcer. Topical debriding enzymes are expensive and have not been conclusively shown to be beneficial [13].

CONCLUSION:

It is concluded that it is difficult to treat the foot ulcer in diabetic patients. It can be difficult to differentiate local soft tissue infection and inflammation from osteomyelitis. Three-phase bone scans and radiolabelled leukocyte scans are expensive but can help to establish an accurate diagnosis in problematic cases. The involvement of underlying structures and the presence or absence of ischemia and/or infection must be determined before an appropriate wound classification can be made and a subsequent treatment plan can be implemented.

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