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Research Article

**STUDY TO DETERMINE THE INCIDENCE OF VARIOUS  
TYPES OF AMPUTATION IN DIABETIC FOOT ULCER**Dr. Aali Ahmed Ejaz<sup>1</sup>, Dr. Shiza Butt<sup>2</sup>, Dr. Anam Riaz<sup>2</sup><sup>1</sup> MBBS, FCPS-1 (Surgery) POF Hospital Wah Cantt<sup>2</sup> Islamabad Medical and Dental College**Article Received:** March 2020**Accepted:** April 2020**Published:** May 2020**Abstract:*****Aim:** To know the frequency of different types of amputation in diabetic foot ulcers.****Material and methods:** A prospective study was held in the Department of Surgery and Orthopedic department of POF Hospital Wah Cantt among 53 consecutive patients for one year from April 2019 to April 2020. All patients with Wagner fourth and fifth-degree diabetic foot ulcers were included in the study. Standard hip disarticulation, amputation above knee, amputation below knee and ray amputation were performed accordingly.****Results:** 53 patients participated in the study. Men were 30 years old, women 23 years old. The minimum age is 30 years, the maximum is 80 years, the average age is 58.26 years. According to Wagner's classification, 9 patients were grade 4 and the rest were grade 5. The right side was in 25 (47.2%) patients and the left side was in 28 (52.8%) patients. Finger amputation in 5 (9.4%), amputation with 2 fingers in 2 (3.8%), amputation with 3 fingers in 1 (1.9%) patients, little finger in 1 (1.9%) patients, amputation below knees in 33 (62.3%) patients, 1 patient of ray knee amputation (1.9%), above knee amputation in 9 (17%) patients and hip bone disarticulation in 1 (1.9%) patient.****Conclusion:** The final results of a prospective study of diabetic foot ulcers indicate that the result is associated with poor glycemic control and longer duration of diabetes. Non-traumatic diabetic ulcers and amputations of the lower extremities are an important and costly problem for patients, healthcare systems and government.****Key words:** diabetic foot, ulcer, amputation, Wagner's degree.***Corresponding author:****Dr. Aali Ahmed Ejaz,**

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**INTRODUCTION:**

Non-insulin-dependent diabetes mellitus (NIDDM) and insulin-dependent diabetes mellitus (IDDM) have two common and serious complications associated with significant mortality, foot ulcers and amputations. Foot ulcers are injuries that include epithelial loss and fracture of the skin and can sometimes spread to the dermis and deeper layers, including bones and muscles; while amputation involves removing the end part of the limb that cannot survive<sup>1-2</sup>. Diabetes is one of the main causes of lower limb amputation in the world. In people with diabetes, amputations are reported 15 times more often than others. 50% of all amputations occur in people with diabetes. Amputations are carried out when all efforts to save the foot or leg are ineffective or when the infection causes extensive tissue damage. Diabetic foot infections can spread to the leg<sup>3-4</sup>. Sometimes the infection is so severe that you need to cut off part of the foot and possibly the leg. Serious infection can be fatal. In such cases, amputation can save lives. Recent epidemiological data on ulceration and amputation indicate that foot ulceration is just over 2% per year in the general diabetes population. Ulceration is more common in patients with predisposing risk factors; Annual incidence rates for neuropathic individuals range from 5% to 7%. While foot ulceration has already occurred in over 5% of diabetic patients, the cumulative lifetime incidence can be as high as 15%<sup>7</sup>.

Up to 85% amputation of foot ulcers occurs. Therefore, it can be assumed that after each success in reducing the incidence of foot ulcers, there will be a reduction in the number of amputations. Diabetic patients with neuropathic risk factors cause five times higher direct costs of ulcer and amputation treatment and live 2 months shorter than those without neuropathy<sup>8-9</sup>. In the United States, the average cost for patients hospitalized in 1997. Due to complications of the lower extremities is: foot ulcer USD 16,580; toe or toe and other distal amputations USD 25,241; large amputations \$ 31,436. The average outpatient cost of a diabetic foot ulcer attack is estimated at USD 28,000 over 2

years. Proper and early care for the diabetic foot of these affected foot or foot ulcers can reduce medical and psychological costs. We presented this study for a year to demonstrate the final results of patients with diabetic foot ulcers that were considered an emergency or planned case in the orthopedic department<sup>10</sup>.

**MATERIAL AND METHODS:**

A prospective study was held in the Department of Surgery and Orthopedic department of POF Hospital Wah Cantt among 53 consecutive patients for one year from April 2019 to April 2020. All patients with Wagner's foot ulcer with fourth and five-degree diabetes were enrolled. The severity of ulceration was assessed according to the Wagner classification (Table 1). A complete history of diseases was collected, a full physical examination was carried out. All patients were informed of situations requiring immediate surgery. Written consent was obtained from all patients. Some patients were admitted in an emergency, while others were chosen for selection. The techniques used for various amputations depended on the level of amputation and the situation that required it. Standard hip deformities, amputation above knee, ampoule below knee and lightning were performed accordingly. The amputation site was mainly left closed or open (followed by delayed closure) depending on the degree of purity or infection of the wound, followed by cleansing and dressing. The analysis was performed using SPSS version 19. The frequency of various diseases leading to amputation was recorded.

**RESULTS:**

53 patients participated in the study. Men were 30 years old; women were 23 years old (Table 2). The minimum age was 30 years, maximum 80 years, average age 58.26 (standard deviation 10.15) (Table 3). According to Wagner's classification, 9 patients were grade 4 and the rest were grade 5. The right side was included in 25 patients (47.2%) and the left side was in 28 patients (52.8%) (Table 4).

**Table 1: Wagner Classification of diabetic foot ulcers**

Grades	Description
Grade 0	No ulcer in a high-risk foot.
Grade 1	Superficial ulcer involving the full skin thickness but not underlying tissues.
Grade 2	Deep ulcer, penetrating down to ligaments and muscle, but no bone involvement or abscess formation.
Grade 3	Deep ulcer with cellulitis or abscess formation, often with osteomyelitis.
Grade 4	Localized gangrene.
Grade 5	Extensive gangrene involving whole foot

**Table 2: Gender of patients (n=53)**

Gender	Frequency	%	Cumulative%
Female	23	43.4	43.4
Male	30	56.6	100.0

**Table 3: Statistics of age of patients**

	Age
N	53
Mean	58.26
Median	60.00
Mode	60
Std. Deviation	10.15
Minimum	30
Maximum	80

**Table 4: Side involvement of patients (n=53)**

Side	Frequency	%	Cumulative%
Left	28	52.8	52.8
Right	25	47.2	100.0

Finger amputation in 5 (9.4%), amputation with 2 fingers in 2 (3.8%), amputation with 3 fingers in 1 patient (1.9%), little finger in 1 (1.9%) patients, amputation below knees in 33 (62.3%) patients, 1 patient of ray knee amputation (1.9%), above knee amputation in 9 (17%) patients and disarticulation (1.9%) of the patient (Table 5). Three (5.66%) patients had amputated feet treated below the knee. Four (7.54%) patients with below knee amputation were treated later above the knee amputation. Three (5.66%) patients with amputation above the knee and 9 (17%) patients with amputation below the knee had a stump. The wound was completely opened during 1 amputation (1.9%) of the big toe.

**Table 5: Different types of amputation (n=53)**

	Frequency	%	Cumulative %
Amputation of big toe	5	9.4	9.4
Above knee amputation	9	17.0	26.4
Amputation of little toe	1	1.9	28.3
Amputation of 2 toe	2	3.8	32.1
Amputation of 3 toe	1	1.9	34.0
Below knee amputation	33	62.3	96.2
Hip disarticulation	1	1.9	98.1
Trans knee amputation	1	1.9	100.0

## DISCUSSION:

Many complications can be associated with diabetes. Diabetes impairs the vascular system and affects many areas of the body, such as eyes, kidneys and feet. Studies show that low-level amputations (foot, foot and ankle) are more common in diabetes than those without diabetes (54.8% versus 29.9%). Above knee amputations that were more disabled than lower-level amputations were less common in diabetes than non-diabetic (38.0% vs. 16.8%). Other studies show that the age-corrected amputation rate calculated by the estimated population of diabetics or overall is about 15-40 times higher in diabetics than in non-diabetics<sup>11-12</sup>. The percentage of discharge from the hospital in which amputation containing diabetes is listed is between 45% and

63%. Standard treatment for diabetic foot according to Wagner's classification includes grade 0 prophylaxis, antibiotics and good glycemic control for grade 1. Hospitalization is necessary because it requires surgical intervention in combination with antibiotics and glycemic control in class 2. Stage 3 requires some kind of amputation. Grade 4, extensive cleansing and amputation is therapeutic below knee amputation in class 5.

Abbas et al. 115 evaluated 627 diabetic patients, of whom 92 (15%) had foot ulcers. While 30 (33%) of these 92 patients were selected for small and large amputations, the rest were treated conservatively. Due to the severity of ulceration in patients with a score of  $\geq 4$  according to Wagner, there is a greater

likelihood of amputation than in patients with neuroischaemic foot injuries <4 (p <0.001). The overall mortality rates for amputated and non-amputated patients were similar (29%); the highest hospital mortality (54%) was observed in patients with inoperable severe ulceration (Wagner's degree  $\geq 4$ )<sup>13</sup>. Muqim et al. He worked on 100 diabetic foot ulcers, from Wagner to zero to five. In the study, men had 62%, women 38%, and the ratio of men to women 3: 2 was comparable to our study with 30 men (56, 6%) and 23 (43.4%) in women. Forty-eight (48%) different types of amputations were required, 32 patients received Toe / Rye amputation, 5 Syme patients and 11 knee amputation patients<sup>14</sup>. While their studies only had 25 (25%) patients with grade 4 or 5 ulcers, all patients who were amputated in this study were in grade 4 or 5. In outpatient clinical trials with diabetes, 6-43% (depending on the severity of the ulcer) amputation is the result of patients with a diabetic foot ulcer as a result of the most severe diabetic foot. Two studies found that foot ulcers occurred before 84% and 85% of amputations, respectively. Skoutas et al. 121 patients with grade 4 or higher Wagner diabetic ulcers were examined and all patients had some type of amputation. 26 of 121 patients were rebuilt. Follow the strategy for dealing with diabetic foot ulcers in which complete excision of one ulcer, wide exposure, primary bone deformity should be corrected, primary closure should be achieved, and a one-step surgical approach. Recovery without the need for additional surgery. This should reduce the percentage of relapses while reducing hospital stay and costs. Representing the most dramatic development of foot ulceration, amputation has profound psychosocial, economic and functional effects in patients with diabetes<sup>15</sup>. For these reasons, a comprehensive strategy should be developed to reduce the incidence of diabetic foot ulcers. Systematic monitoring is recommended for high-risk patients. Patient education is one of the most important steps to the success of this strategy.

### CONCLUSION:

The final results of a prospective study of diabetic foot ulcers indicate that the result is associated with poor glycemic control and longer duration of diabetes. Non-traumatic diabetic ulcers and amputations of the lower extremities are an important and costly problem for patients, healthcare systems and government. Research is needed to address amputation factors such as ulcer healing, healing and recurrence.

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