

# PATTERN OF DIABETIC FOOT AND ITS MANAGEMENT AT A TERTIARY CARE SURGICAL UNIT

Hassan Mehmood Tabassum,<sup>1</sup> Muhammad Haseeb,<sup>1</sup> Muhammad Muneeb<sup>1</sup>

## ABSTRACT

**Background:** In diabetes mellitus involvement of foot with infection, neuropathy and vascular involvement is a diabetic foot. It is a common problem.

**Objective:** To find the pattern of diabetic foot infection in a tertiary care unit and its surgical solution.

**Methodology:** This was a descriptive study conducted at a surgical unit in Sheikh Zayed Medical College, Rahim Yar Khan. It included 32 patients suffering “diabetic foot” admitted between 1<sup>st</sup> June 2018 to 31<sup>st</sup> December 2018. All adult patients regardless of sex were included in the study. Data was analysed by using SPSS version 20.

**Results:** There were 32 patients presented with diabetic foot and 29 (90.6%) were male. Only eighteen were known diabetic. Smokers were 11 (34.4%). The right foot was involved in 19 (59.4%). The disease was advance as Wagner Grade 1, in 3 (9.4%), Grade 2, 5 (15.4%) Grade 3, 16 (50%) and beyond the grade were eight patients. Ulcer size was less than 4 cm in 2 (6.25%). The infection was superficial in 2 (6.25%), subcutaneous in 13 (40.6%) and deep in 23 (71.9%) patients. In 5 patients Rays amputation was done, forefoot amputations in 2, below knee amputations in 11, above knee amputation in five patients. Two patients were managed conservatively, and eight were subjected to significant debridement of leg and/ thigh and submitted to the Plastic Surgery department for plastic procedures.

**Conclusion:** In conclusion, infection is the major cause of infected foot in our study. The below knee amputations, above knee amputations and Rays' amputations, were the most common type of amputations performed in this study.

**Key words:** Amputation pattern, Diabetic foot, Foot infection.

## INTRODUCTION

Diabetes mellitus is a common disorder.<sup>1,2</sup> It is a significant burden on the economics of the country.<sup>2</sup> It is associated with very high morbidity and mortality worldwide.<sup>3</sup> Diabetes is a chronic disorder present by a high level of blood glucose resulting from the defect in insulin function and secretion.<sup>1</sup> Foot infection in soft tissue or bone below the malleoli is diabetic foot infection, which is the result of diabetes and its complications.<sup>2</sup> In recent years there is an epidemic of type 2 diabetes in the world. It is resulting in an ever-increasing population of patients with lower limb complications.<sup>3</sup> Diabetic foot presents as the common complication. In a survey, the patients showed one or more complications of diabetes. Most common complication encountered was nephropathy,

second, being diabetic foot and then others.<sup>4</sup> At the general surgical floor, the Diabetic foot ulcer is the primary morbid diabetic condition being managed. It observed that 1-4% of patients with type 2 diabetes develop foot ulcer each year. It is estimated that the lifetime risk of developing a foot ulcer in a diabetic patient is 15% to 25%. The annual incidence is 3% to 10%.<sup>5</sup>

It is observed that the etiology of diabetic foot ulcer is multifactorial. When several components factors are added up together, they create a significant impact on foot ulceration.<sup>6</sup> Inflammation and purulence are two classic clinical findings observed in the diabetic foot. Aerobic Gram-positive cocci and Staphylococcus species are the most common pathogens implicated in it. In addition to infection, the involvement of bone and artery are the factors that compound the situation.<sup>5</sup> The most common elements in causation

1. Department of Surgery, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan, UHS, Lahore, Pakistan.

2. X-House Officer, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan, UHS, Lahore, Pakistan.

3. Bangla Manthar, District Rahim Yar Khan.

**Correspondence:** Prof. Dr. Hassan Mahmood Tabassum, Department of Surgery, Sheikh Zayed Medical College/Hospital, Rahim Yar Khan, Pakistan.

**Email:** hmtryk786@gmail.com

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of diabetic foot are vascular involvement, immunological involvement, mechanical stress, and neuropathy.<sup>6</sup> An increase in total mortality, cardiovascular morbidity, and kidney disease is also seen.<sup>5,6</sup>

Recently HbA1c has become a standard tool measure that is used to monitor chronic control of serum sugar in diabetic patients.<sup>6</sup> HbA1c reflects the status of glycemic control over 2-3 months. Ulcer healing rate is inversely proportional to the HbA1C levels. Serum ESR has got its significance in the management of diabetic foot as recent evidence supports that the use of ESR correlates well in the evaluation of the possibility of bone infection of sufficient impact leading to its amputation.<sup>7</sup>

It is observed that poor glycemic control is also associated with high Basal Metabolic Index, retinopathy, nephropathy, hypertension, neuropathy and smoking.<sup>8-10</sup> It is estimated that 15% of patients with diabetes mellitus develop lower extremity ulceration during their disease.<sup>8</sup> One of the complications of poor control of sugar in diabetic patients is its association with neuropathy.<sup>9</sup> The objective of this study was to find the pattern of diabetic foot infection in a tertiary care unit, and its surgical solution.

## METHODOLOGY

This was cross sectional study, undertaken at surgical unit II, Sheikh Zayed Hospital Rahim Yar Khan between 1<sup>st</sup> June 2018 to 31<sup>st</sup> December 2018 with the approval from the Institutional Review Board of Sheikh Zayed Medical College / Hospital, Rahim Yar Khan. A total of 32 patients having diabetic foot were included in this study. Serum sugar was in all the patients admitted in the ward. All the diabetic patients suffering from foot infection/gangrene, and needing surgical intervention were included in this study. Age, sex, grade of diabetic foot, awareness about diabetes, treatment taken for diabetes, smoking, HbA1C,

and other associated illnesses were recorded. All other relevant investigations needed in the decision making either for the conservative management or surgical intervention was also undertaken, but these were not recorded in the study. The Wagner ulcer classification system is a very comprehensive scheme for grading diabetic foot. It classifies range from 0 to grade 5. In Grade 0, there is no open lesion. In grade 1, an ulcer is superficial. In grade 2, the ulcer extends into the ligaments, the joint capsule or deep fascia. In grade 3, a deep ulcer is associated with abscess or bone infection / joint sepsis. In grade 4, there is partial gangrene involving forefoot or heel. Grade 5 ulcers, affects the entire foot.<sup>10</sup> In 2004, the Infectious Diseases Society of America (IDSA) and the International Working Group on the Diabetic Foot (IWGDF) each published a comprehensive set of guidelines for the management of diabetic foot infections. These guidelines included a classification scheme for disease according to its severity into uninfected, moderate and severe categories on clinical grounds.<sup>11</sup>

Techniques used in the amputations of diabetic feet were the above knee amputation, the below-knee amputation, Rays' amputation. They were performed as per standard surgical techniques mentioned in operative textbooks and are commonly practiced.

Exclusion criteria: Infected or ischemic foot in the patients having no evidence of diabetes on clinical evaluation, regular serum sugar or normal HbA1C were excluded from the study. Demographic, clinical and pathological and operative data were collected. Operative management done was recorded.

## RESULTS

A total of 32 patients were included in this study. Demographic findings are presented in the table 1. This study showed that 29 (90.6%) were male, 18 (56%) were known diabetic, 11 (34%) were smokers and 16 (50%) have grade 3 infection.

**Table I: Demographic variables in diabetic foot patients included in the study.**

Variable	No.	Percentage
<b>Age(years)</b>		
40-49	3	9.4%
50-59	18	56.2%
60-69	11	34.4%
<b>Sex</b>		
Male	29	90.6%
Female	3	9.4%
<b>Diabetic awareness</b>		
Known diabetic	18	56.2%
Not knowing diabetic	14	43.8%
<b>Smoking</b>		
Smoker	11	34.4%
Non smoker	21	65.6%
<b>Foot involved</b>		
Right	19	59.4%
Left	13	40.6%
<b>HbA1C</b>		
<6.5	2	6.25%
>6.5	30	92.75%
<b>Grade of infection</b>		
Grade 1	3	9.4%
Grade 2	5	15.5%
Grade 3	16	50.0%
Beyond Wagner grade	8	25%
<b>Wound size</b>		
<4m	2	6.25%
>4cm	30	93.75%
<b>Wound depth</b>		
Superficial	2	6.5%
Subcutaneous	13	41%
Osteomyelitis	4	13%
Amputations	23	71.9%
<b>Surgical Procedure</b>		
Rays amputations	5	15.6%
Below knee amputations	11	34.4%
Above knee amputations	5	15.6%
Forefoot amputations	2	6.3%
Watchful Conservation	3	9.4%
Debridement leg/thigh & reconstruction	8	25%
<b>Associated conditions</b>		
Hypertension	5	15.6%
Nephropathy	3	9.4%
Ischemic heart disease	1	3.1%
Hepatitis C	5	15.6%

## DISCUSSION

A total of thirty-two patients were included in this study. Out of these, 14 diabetic sufferers neither knew that they had diabetes, nor they were taking any care/anti-diabetic medicine. This finding

correlates with the observation of Kitchlew et al.<sup>12</sup> They observed that a significant number of undiagnosed asymptomatic diabetics are present in the population.<sup>12</sup> These are the patients that did not take care of their foot or diabetes.

In our study, the grade of infection in the diabetic foot was highly advanced than as classified and graded by IWGDE & IDSA, as half of our patients either needed below or above knee amputations due to infection in the diabetic foot beyond Wagner grade 5. In addition to this half, a quarter of patients were subjected to initial debridement and then referred to the plastic and Reconstructive surgical department for further management.

Our study verifies the findings of the survey by Akhtar et al.<sup>13</sup> Akhtar et al. observed that the lower limb amputations are strongly associated with nephropathy, hypertension, long duration of diabetes mellitus and the increasing age of patient.<sup>13</sup> There is a contrast to the study of Akhtar et al, where nephropathy is common than the diabetic foot, but in our research, diabetic foot is more common than nephropathy. It is due to the reason, Akhtar et al, concentrated on the foot amputations in patients with renal failure, but our study is based on the population at large.

Diabetic foot wounds frequently yield poly microbial growths. The differentiation between commensal bacteria and pathogenic organisms can be difficult. Bacterial isolates from diabetic foot wounds are usually multiple drugs resistant organisms,<sup>14</sup> it is also evident in our study that very advanced disease and higher infection rate resulted in an amputation stump dehiscence. It needs another survey to determine the impact of infection on wound dehiscence.

In the diabetic foot, the decision to manage the patient conservatively or submit the patient to surgery is crucial. At present, no clear cut convincing evidence mandates operation in all cases. There is no sufficient clarity in the literature to define when surgery becomes a necessity adequately. Several series shows early surgical intervention in the form of initial minimal debridement, drainage of the pus collection in a patient with systemic signs of sepsis, reduces the subsequent need for lower-limb amputation. It is observed that by keeping the wounds open, allows free egress of purulent wound discharge that results in a reduction in the risk of bacterial colonization.<sup>15</sup> The judicious use of antibiotics against Multidrug-resistant organisms alongside surgical treatment remains obligatory.

In our patients, the major amputations were commoner than minor amputations as compare to Viswanathan V et al study. In Viswanathan V et al, study major amputations were 29.1 % and minor amputations in 70.9 % patients. Among their patients, who underwent significant amputations, more than 50% account for below-knee amputations and 11.9% above knee amputations. Out of total amputations, over half of the amputations noticed were toes and Rays.<sup>16</sup>

In contrast to our study, an Ethiopian research is presented by Gebrselassie et al,<sup>17</sup> that includes 87 patients. These patients underwent amputations. The most common indication of amputation was trauma (37.7%). Second common cause was a tumor (24.1%), in the last peripheral arterial disease (PAD) (20.7%) were the reason for amputation. There is a similarity to our study that the most frequent type of amputation was significant lower limb amputation (58.6%) which includes above knee amputation (35.6%) and below knee amputation (23%).<sup>17</sup>

In the study of Hellar et al,<sup>18</sup> from Tanzania, the presentation of disease was as advanced as in our patients due to the reason that both countries are parts of the under-developed world. Diabetic foot is social devastation to the patients and their families. In these parts of the world, both diabetes and foot care are neglected segments. Wagner Grade 4 and 5 were the most common ulcers encountered, and major amputation was the most common treatment option. It was performed in 44.8% of the patients.<sup>18</sup> It is evident as noticed by Eknithise et al,<sup>19</sup> that knowledge, perception, and practice toward self-care, especially among the elderly patients, suffering from type 2 Diabetes Mellitus was poor.<sup>19</sup> It is common practice to use over the counter, or herbal medicine by diabetic patients as observed by Kamaran et al. about half of the patients suffering from diabetes mellitus are in everyday use of herbal medicine.<sup>20</sup> If we train these Hakims and Homeopaths in patient counselling much of the talent can be used, and gravity of diabetic sufferings lessened.

## CONCLUSION

In conclusion, infection is the primary cause of infected foot in our study. The below the knee, above knee amputations and rays' amputations, were the most common type of amputations. A countrywide campaign for Diabetic patients

counselling will improve foot care.

**Authors Contribution:** HMT: Article writeup and supervision of study. MH: Data Collection. MM: Data analysis and interpretation. All authors critically revised and approved its final version.

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## REFERENCES

- Hassan C, Parial R, and Islam M. Association of HbA1C, Creatinine and lipid profile in patients with diabetic Foot Ulcer Middle-East J 2013 :16 (11):1508-11
- Use of glycosylated haemoglobin (HbA1c) in the Diagnosis of Diabetes Mellitus).Abbreviated report of WHO consultation WHO/NHM/CHP/CPM/11.1 PAGE 1-25.
- Boulton MJA. The diabetic foot .grand overview, epidemiology and pathogenesis: Diabetes Metab rev 2008; 24(supple1): 3-6 doi 10.1002/dmrr
- Khan MIK, Mushtaq J, Amjad I et al. Diabetes mellitus type 2; complications: in medical ward General Hospital Lahore, Professional Med J 2017; 24(12):18844-1851.
- Gemechu FW, Seemat F, Curley CA. Diabetic Foot Infection, American Family Physician, 2003; 88 (3): 177-184
- Syafril S. Pathophysiology diabetic foot ulcer, Earth and environmental Science (2018):1-6
- Bikramjit P, Raveender N, Sudipta P, The importance of HbA1C and erythrocyte sedimentation rate a prognostic factor in predicting the outcome of diabetic foot ulcer disease. International Journal of advances in Medicine.2017; 4(1): 137-42
- Zubair M, Malik A, Ahmad J. Glycosylated haemoglobin in diabetic foot and its correlation with clinical variables: in the north Indian tertiary care hospital. J Diabetes and Metab 2015 6: 571. Doi:10.4172/2155-6156.1000571
- Kumar S, Kumar N, Kumar H et al. Circadian variation in the onset of acute myocardial infarction in diabetics. J Ayub Meical College Abbottabad 2018; 30(1): 71-77
- Eryberg GR. Diabetic foot ulcer; pathogenesis and management, Am Fam Physician, 2002 Nov 1: 66(9):1655-1663
- Lavery LA, Armstrong DG, Douglas p et al Validation of the Infectious Diseases Society of America's Diabetic Foot Infection Classification System Clinical Infectious Diseases 2007; 44 (4) : 562–565
- Kitchlew R, Chachar AZK, Haider M, et al, pre-diabetes; prevalence of prediabetes in our local population. Professional Med J 2017; 24(12): 1860-1866

13. Akhtar A, Ahmad S, Tabassum HM, et al. Diabetic Foot Amputation; frequency of diabetic nephropathy among patient, Professional Med J 2017;24(2):302-307
14. Hussain SM, Janjua SA, Fareed A et al. Surgical site infection Professional Med J 2017; 24(12): 1770-1774
15. Andrew A, Powlson Anthony P. Coll. The treatment of diabetic foot infections, Journal of Antimicrobial Chemotherapy 2010: 65, (3) :113-119
16. Viswanathan V, Kumpatla S. Pattern and causes of amputation in diabetic patients--a multicentric study from India. J Assoc Physicians India.2011; 59:148-51.
17. Gebreslassie B, Gebreselassie K, Esayas R. Patterns and Causes of Amputation in Ayder Referral Hospital, Mekelle, Ethiopia: A Three-Year Experience, Ethiopia J Health Sci. 2018 Jan; 28(1): 31–36.
18. Hellar AM, Mbemati AAN. The Pattern and Surgical Management of Diabetic Foot: at Muhimbili National Hospital, Dar-es-Salam. Tanzania East and Central African Journal of Surgery 2011: 16,(1) 2011: 37-45
19. Eknithiset R, Samrongthong R, Kumar R J , FACTORS associated with knowledge, perception and practice toward self-care among elderly patients suffering from type 2 Diabetes Mellitus in rural Thailand. Ayub Medical College Abbottabad 2018; 30(1): 107 -110
20. Kamaran E, Erkin O, Senman S et al. The use of herbal supplements by individuals with diabetes mellitus. JPMA 2018;68(4):587-594

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