IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 23, Issue 1 Ser.3 (January. 2024), PP 54-59
www.iosrjournals.org

Status of Foot Infection among Diabetic and Non-Diabetic Patients Attending in Orthopaedic OPD at Tertiary Care Hospital of Faridpur, Bangladesh

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Abstract
Background:*A large percentage of people worldwide still live barefoot, making foot infections more likely. Local infections are frequently caused by slight skin damage.*
Aim of the study: *The purpose of the current study was to investigate different types of foot infections and compare the results in patients with and without diabetes in terms of etiopathogenesis, clinical characteristics, therapy, length of hospital stay, and outcome.*
Methods:*This prospective cross-sectional study was carried out over the period of two years, from October 2021 to October 2023, at the orthopaedic department of the Diabetic Association Medical College and Hospital, Faridpur, Bangladesh. Group A comprised 200 patients with diabetic foot infections, while Group B included 200 patients with non-diabetic foot infections. A total of 400 cases were split into these two groups. All of the data was gathered, recorded into a Microsoft Excel work sheet, and then descriptive statistics were used in SPSS 11.5 for analysis.*
Results:*The most common age group in the diabetes group was 51-60 years, while the non-diabetic group was 31-40 years. The current study included 400 patients, 66% of whom were males and 34% of whom were females. The diabetic group had 68% males and 32% females, while the non-diabetic group had 64% males and 36% females. Cellulitis was the most prevalent manifestation of foot infections in the current study 39.75%, and it was also the most common presentation in non-diabetic groups, 52%. Trauma was reported by 76% of diabetics and 84% of non-diabetics. In the current study, 42% of patients had Wagner's grade 3 lesions, 32% had grade 2 lesions,17% had grade 4 lesions,3.75% had grade 5 lesions and 1.25% had grade 0 lesions. In the current study, 52.5% of individuals had neuropathic pain.*
Conclusion: *Patients with diabetes require intensive therapies since their infections are more severe and their healing process is slower. They do exhibit a higher incidence of amputations and longer hospital stays in comparison to non-diabetic patients.*
Keywords:*Foot infections,Diabetes, Neuropathy, Peripheral vascular disease.*

I. INTRODUCTION

Foot infections were more common since a large proportion of the world's population remained barefoot, and minor skin damage was a common source of local infection. Foot problems in diabetic individuals continue to be a major public health concern, and were the most common reason for hospitalization [1]. Approximately 15% of the diabetic population will have a foot problem severe enough to warrant hospitalization during their lifetime [2]. Neuropathic foot ulcers continue to be the leading cause of diabetes-

related lower limb amputations, negatively compromising an individual's quality of life [1]. Sensory neuropathy was frequently a major contributor to the development of diabetes ulcers and amputations. Pain was one of the key natural warning systems that alerted people to act and seek medical attention. Because this early warning system was defective, people with diabetic neuropathy can incur injuries that are not recognized until they are severe enough to cause full-thickness neuropathic wounds [3]. It is not unexpected that the legs, being exposed and having a circulation stressed by human upright posture, are the site of infection and ulcers of various forms. The clinical diagnosis of a foot infection was first supported by test findings. The majority of diabetic foot infections were polymicrobial. The microbiology of diabetic foot wounds varies and is frequently determined by the breadth and severity of the infection. Much emphasis has been placed on the treatment of diabetic foot wounds, but less emphasis has been made on the appropriate management for nondiabetic foot wounds. Diabetic foot infections are treated differently than non-diabetic foot infections due to the disease's development. Diabetic foot ulcers were disabling and frequently resulted in amputation of the lower extremities. The study was carried out to look into the outcome of foot infections in persons with and without diabetes. Diabetes patients are more prone to have infections and are more sensitive to particular organisms than non-diabetic people, according to research. The best mode and duration of treatment for foot infection were not well characterized. This study can forecast, identify, and educate patients at risk of foot infections, as well as educate them on preventive measures and underlying pathology treatment. The study's goal was to compare the findings in diabetes and non-diabetic patients in terms of etiopathogenesis, clinical characteristics, therapy, days of hospital stay, and outcome.

II. METHODOLOGY

This prospective cross-sectional study was carried out over the period of two years, from October 2021 to October 2023, at the orthopaedic department of the Diabetic Association Medical College and Hospital, Faridpur, Bangladesh. Group A comprised 200 patients with diabetic foot infections, while Group B included 200 patients with non-diabetic foot infections. A total of 400 cases were split into these two groups.These groups were diverse, and included patients of both sexes, all ages over 11, all religions, and all socioeconomic levels. Patients with weak immune systems were excluded from this trial. Data was gathered through detailed history taking, thorough physical examination, routine investigations, relevant special investigations, selecting the appropriate line of treatment, and assessing patients' symptoms after treatment at regular intervals in comparison to their pre-treatment. All patients were evaluated, and clinical findings were documented in accordance with the proforma. The data from the case sheet was examined, and the necessary investigations and therapy were carried out. Predisposing factors, complications, treatment, and outcomes were all investigated, evaluated, and discussed. All of the data was gathered, recorded into a Microsoft Excel work sheet, and then descriptive statistics were used in SPSS 11.5 for analysis.

III. RESULT

The most common age group in the diabetes group was 51-60 years, while the non-diabetic group was 31-40 years [Table-1]. The current study included 400 patients, 66% of whom were males and 34% of whom were females. The diabetic group had 68% males and 32% females, while the non-diabetic group had 64% males and 36% females [Table-2]. Cellulitis was the most prevalent manifestation of foot infections in the current study 39.75%, and it was also the most common presentation in non-diabetic groups, 52%. Gangrene was more common in diabetics 20% than in non-diabetics 8% [Table-3]. In the current investigation, 90% of the patients had a history of trauma. Trauma was reported by 76% of diabetics and 84% of non-diabetics [Table-4].In the current study, 42% of patients had Wagner's grade 3 lesions, 32% had grade 2 lesions, and 17% had grade 4 lesions, 3.75% had grade 5 lesions and 1.25% had grade 0 lesions[Table-5]. In the current investigation, 42.5% of the total patients showed PVD symptoms [Table 6]. In the current study, 52.5% of individuals had neuropathic pain [Table 7]. Staphylococcus species were isolated in 50% of individuals with foot infections in this investigation [Table 8]. In the current study, 39.5% of patients with foot infections received debridement, dressings, and SSG, 27.5% received fasciotomy or I&D, and 10% received significant amputations [Table 9]. In the current study, the majority of patients 46% were discharged in less than 20 days, while in the diabetic group, 40% were discharged in less than 20 days of hospital stay, compared to 52% in the non-diabetic group [Table-10].

Table -1: Age of the participants in two groups (N=400)

Age in years	**Group-A** Diabetic group N (%)	**Group-B** Non diabetic group N (%)	**Total** N (%)
11-20	0 (0)	08 (04)	08 (02)
21-30	08 (04)	40 (20)	48 (12)
31-40	40 (20)	48 (24)	88 (22)
41-50	58 (29)	36 (18)	94 (23.5)
51-60	64 (32)	38 (19)	102 (25.5)
61-70	30 (15)	30 (15)	60 (15)
Total	200 (100)	200 (100)	400 (100)

Table-2: Sex of the participants in two groups (N=400)

Sex	**Group-A** Diabetic group N (%)	**Group-B** Non diabetic group N (%)	**Total** N (%)
Male	136 (68)	128 (64)	264 (66)
Female	64 (32)	72 (36)	136 (34)
Total	200 (100)	200 (100)	400 (100)

Table-3: Presentation of the participants in two groups (N=400)

Mode of onset	**Group-A** Diabetic group N (%)	**Group-B** Non diabetic group N (%)	**Total** N (%)
Ulcer	60 (30)	40 (20)	100 (25)
Cellulitis	55 (27.5)	104 (52)	159 (39.75)
Abscess	45 (22.5)	40 (20)	85 (21.25)
Gangrene	40 (20)	16 (08)	56 (14)
Total	200 (100)	200 (100)	400 (100)

Table-4: History of trauma of the participants in two groups (N=400)

H\o trauma	**Group-A** Diabetic group N (%)	**Group-B** Non diabetic group N (%)	**Total** N (%)
Present	152 (76)	168 (84)	360 (90)
Absent	48 (24)	32 (16)	40 (10)
Total	200 (100)	200 (100)	400 (100)

Table-5: Wagner's grade of the participants in two groups (N=400)

Wagner's grade	**Group-A** Diabetic group N (%)	**Group-B** Non diabetic group N (%)	**Total** N (%)
0	05 (2.5)	0 (0)	05 (1.25)
1	10 (5)	06 (03)	16 (04)
2	56 (28)	72 (36)	128 (32)
3	62 (31)	106 (53)	168 (42)
4	52 (26)	16 (08)	68 (17)
5	15 (7.5)	0 (0)	15 (3.75)

Table-6: Peripheral vascular disease of the participants in two groups (N=400)

Peripheral vascular disease	**Group-A** Diabetic group N (%)	**Group-B** Non diabetic group N (%)	**Total** N (%)
Present	120 (60)	50 (25)	170 (42.5)
Absent	80 (40)	150 (75)	230 (57.5)
Total	200 (100)	200 (100)	400 (100)

Table-7: Neuropathy of the participants in two groups (N=400)

Neuropathy	**Group-A** Diabetic group N (%)	**Group-B** Non diabetic group N (%)	**Total** N (%)
Present	170 (85)	40 (20)	210 (52.5)
Absent	30 (15)	160 (80)	190 (47.5)
Total	200 (100)	200 (100)	400 (100)

Table-8: Microorganisms isolated of the participants in two groups (N=400)

Organism in C\S	**Group-A** Diabetic group N (%)	**Group-B** Non diabetic group N (%)	**Total** N (%)
Staphylococcus	120 (60)	80 (40)	200 (50)
Pseudomonas	32 (16)	64 (32)	96 (24)
E.coli	24 (12)	24 (12)	48 (12)
Klebsiella	16 (08)	24 (12)	40 (10)
Proteus	8 (04)	8(04)	16 (04)
Total	200 (100)	200 (100)	400 (100)

Table-9: Management of foot infections of the participants in two groups (N=400)

Management	**Group-A** Diabetic group N (%)	**Group-B** Non diabetic group N (%)	**Total** N (%)
Debridement, dressing &SSG	86 (43)	72 (36)	158 (39.5)
Fasciotomy or I&D	30(15)	80 (40)	110 (27.5)
Disarticulation	60 (30)	32 (16)	92 (23)
Major amputations	24 (12)	16 (08)	40 (10)
Total	200 (100)	200 (100)	400 (100)

Table-10: Duration of hospital stay of the participants in two groups (N=400)

Hospital stay (in days)	**Group-A** Diabetic group N (%)	**Group-B** Non diabetic group N (%)	**Total** N (%)
0-20	80(40)	104 (52)	184 (46)
21-40	60 (30)	40 (20)	100 (25)
41-60	40 (20)	48 (24)	88 (22)
61-80	20 (10)	8 (04)	28 (07)
>80	0 (0)	0(0)	0 (0)
Total	200 (100)	200 (100)	400 (100)

IV. DISCUSSION

Diabetic foot infections were widespread, dangerous, and varied in the organism's microbiology. There was doubt about the best antibiotic treatment, and there was likely a significant difference in treatment between diabetes and non-diabetic patients. In the current study, the most common age group with diabetic foot was 51-60 years. According to Ellis et al., the age group 45 to 64 years had the highest frequency of foot infections [4]. Males outnumbered females in both categories (diabetes and non-diabetic) in the current study. The male prevalence in the current study was owing to greater exposure to injuries during work and recreational activities. This was analogous to the diabetic research centre, Chennai study from 2005 [5]. In a Canadian research, the male-to-female diabetic patient ratio was 2.82:1 [6].In the current study, 39.75% of the 159 patients presented with cellulitis, 25% with ulcer, 21.25% with abscess, and 14% with gangrene. The current study's findings were comparable to those of prior studies [7]. In the current study, 80% of patients had a history of trauma, whereas the remaining 20% had no history of trauma. This is comparable to the study of Reiber et al., in which 77% of patients had a history of trauma [8]. The dorsum of the foot was the most commonly affected place (36%). In the current study, the most prevalent site of lesion was dorsum (40%) in diabetes patients and sole (40% in non-diabetic individuals). In Apelquistin's 2000 study, the incidence of foot infections across the toes was 51%, 28% over the sole, and 14% over the dorsum [9]. In the current study, 32% of patients had Wagner's grade 2, 42% had grade 3, 17% had grade 4, 3.75% had grade 5 lesions and 1.25% had grade 0 lesions. In the diabetic group, 28% of patients had Wagner's grade 2 lesions, 31% had grade 3 lesions, and 26% had grade 4 lesions, which is consistent with prior research [4]. The limb was underperfused in patients with atherosclerosis or PVD, impeding the healing process. The current study found that 42.5% of patients had peripheral vascular disease. In the current study, the incidence of PVD was around 60% in diabetes individuals and 25% in non-diabetic patients. Walter found atherosclerosis in 24.2% of patients with foot infections in his research [10]. Neuropathy was a significant risk factor for developing foot ulcers. It causes loss of sensation, and the patient is oblivious of the injury and ignores it, resulting in ulcer and infection. Autonomic neuropathy raises the risk of ulceration by inducing anhidrosis, foot edoema, and peripheral sensory polyneuropathy, which reduces the protective sense of the distal limbs. Furthermore, because the neurological system interacts with the immune system, diabetes individuals with neuropathy may have altered local immunity [11]. The most prevalent bacterium discovered in culture in the current investigation was staphylococcus aureus (50%) which is equivalent to the Ialsaimary study [12]. Foot infections could be treated using a variety of methods. In this study, 39.5% of patients had debridement and dressing followed by split skin grafts, 27.5% had fasciotomy/I&D, 23% had disarticulations, and 10% had below knee amputations. A international investigation found that vascular problems and related risk factors were linked to amputations in both type 1 and type 2 diabetes [13].According to a recent Sudanese study, important factors related with severe lower extremity amputations were ischemia, neuropathy, wound depth, and infection grade [14]. Amputations can be reduced significantly by well-organized diabetic foot care teams including podiatric specialists, effective glycemic management, and patient education on foot care [15]. Simple measures can prevent foot ulcers and minimise amputations by up to 80% [16]. Multidisciplinary foot care facilities have been demonstrated to be very effective in reducing foot amputations in various countries throughout the world, including Sweden, the Netherlands, and the United Kingdom [17]. In the current study, the majority of patients 46% were discharged in less than 20 days, while in the diabetic group, 40% were discharged in less than 20 days of hospital stay, compared to 52% in the non-diabetic group. Despite thorough surgical treatments, daily dressings, and adequate antibiotic medication, diabetics and non-diabetics spent much more time in the hospital. Collagen dressings have been shown to promote quicker granulation tissue development [18]. Growth hormones are polypeptides that stimulate cell growth and proliferation. Individuals' foot care was influenced by a variety of factors such as socioeconomic position, education, occupation, and awareness of foot care. Early wound healing can be aided by educating patients and raising awareness.

Limitation of thestudy:

This study used modest sample sizes and a single focal point. It is therefore probable that the study's conclusions do not fully reflect the circumstances as a whole.

V. CONCLUSION&RECOMMENDATION

Patients with diabetes require intensive therapies since their infections are more severe and their healing process is slower. They do exhibit a higher incidence of amputations and longer hospital stays in comparison to non-diabetic patients. Many of the etiological factors that contribute to the formation of diabetic foot ulcers can be diagnosed in a clinical setting utilizing basic, low-cost technology, and early diagnosis of these factors, as well as fast therapy of the ulcers, were critical for a successful outcome. Health education for all patients with foot ulcers, particularly diabetic patients with PVD and neuropathy, is a crucial cornerstone in managing these patients and preventing recurrence and severe sequelae.

FUNDING: No funding sources**.**
CONFLICT OF INTEREST: None declared.
ETHICAL APPROVAL: The study was approved by the institutional ethics committee.

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