

**THE ANALYSIS OF THE DIABETIC FOOT OSTEOMYELITIS AT A TERTIARY CARE CENTER-A PROSPECTIVE STUDY**

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**ABSTRACT: INTRODUCTION:** India is considered as the diabetic capital of the world. Diabetic foot osteomyelitis is considered as one of the severe complications of diabetes mellitus. Diabetic foot osteomyelitis tends to complicate around one third of diabetic foot infections. In view of this we conducted a prospective study on the bacteriological analysis of diabetic foot osteomyelitis at a tertiary care center. **MATERIALS AND METHODS:** A prospective study was performed at a tertiary care hospital in India. 78 Diabetic patients with foot ulcers were recruited in the study during the year June 2013 to November 2014 after obtaining written informed consent. All subjects underwent detailed clinical examination. Foot x-ray was done and cases which showed evidence of osteomyelitis were chosen for the study. Swab/tissue samples after debriding the wound were collected aseptically from the wound site and sent for blood culture, isolation and identification of bacteria. Antibiotic sensitivity tests for the isolated bacteria were performed by disc diffusion method against commonly used antibiotics. **RESULTS:** In our study we found that most diabetic foot infections with osteomyelitis occur after 10 years of the onset of diabetes mellitus, most belonged to age group 41 to 50yrs. Altogether 86 bacteria were isolated from 54 cases. Among 82 bacterial isolates, 54 (63 %) were Gram negative. **CONCLUSION:** Diabetic foot osteomyelitis are caused majority by gram negative bacteria, followed by gram positive organism.

**KEYWORDS:** Diabetics, foot, osteomyelitis.

**INTRODUCTION:** India is considered as the diabetic capital of the world according to the data from the International Diabetes Foundation India has the most number of diabetic's with a continuously increasing number.<sup>1</sup> The Indian diabetic population is expected to increase to 87 million by 2030.<sup>2</sup>

The lifetime incidence of diabetic foot ulcer is approximately 15% and the need for some form of amputation is around 28%.<sup>3,4</sup> when the foot infections are considered in general the diabetic foot ulcers have a higher tendency towards bacterial infections rapid spread and irreversible tissue damage.<sup>5,6</sup> Diabetic foot osteomyelitis is considered as one of the severe complications of diabetes mellitus. Diabetic foot osteomyelitis tend to complicate around one third of diabetic foot infections In view of this we conducted a prospective study on the bacteriological analysis of diabetic foot osteomyelitis at a tertiary care center.

**MATERIALS AND METHODS:** A prospective study was performed at a tertiary care hospital in India. Diabetic patients with foot ulcers were recruited in the study during the year June 2013 to November 2014 after obtaining written informed consent. The study was approved by the institute ethics committee.

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All subjects underwent detailed history and clinical examination. Demographical data that included age, sex, duration of diabetes, duration of diabetic foot, location of foot ulcer, and Wagner's grade were recorded for every case. On the day of admission the following tests were done Blood was collected for clinical investigations, such as complete blood count (Haemoglobin-Hb; total leukocyte count-TLC; differential leukocyte- DLC), and glycosylated haemoglobin (HbA1C). Tissue/swab samples were collected for microbial culture and antibiotic sensitivity tests.

Foot x-ray was done and cases which showed evidence of osteomyelitis were chosen for the study. To eliminate the possibility of isolating colonizing bacteria, after rinsing the wound area thoroughly with saline and debriding the dead tissue, swab/tissue samples were collected aseptically from the wound site.

Bacterial culture, isolation and identification were done. Pure cultures of each bacterial isolate were obtained by repeated streaking on nutrient agar plates. Identification of isolated bacteria was performed based on Gram staining and biochemical characteristics using standard methods.

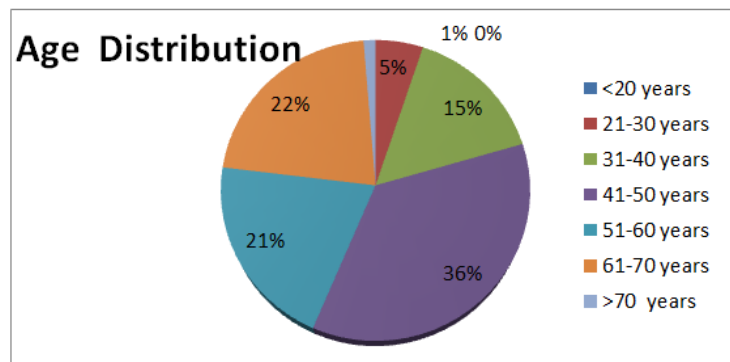
Antibiotic sensitivity tests for the isolated bacteria were performed by disc diffusion method against commonly used antibiotics.

**STATISTICAL ANALYSIS:** Data was represented as mean ( $\pm$  SD) and analyzed using SPSS 16.0

**RESULTS:** In our study we enrolled 78 subjects who were willing to take part in the study

### 1. Demographical Data:

- **Age Distribution:**



**Fig . 1: Age Distribution**

Most patients in our study belonged to the age group 41-50 years (28 patients, 36%)

- **Sex Distribution:**

Gender	No. of Patients
Females	22
Males	56
<b>Total</b>	<b>78</b>

**Table 1: Gender Distribution**

In our study 72% were males were affected with diabetic foot with osteomyelitis.

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### 2. Clinical Details:

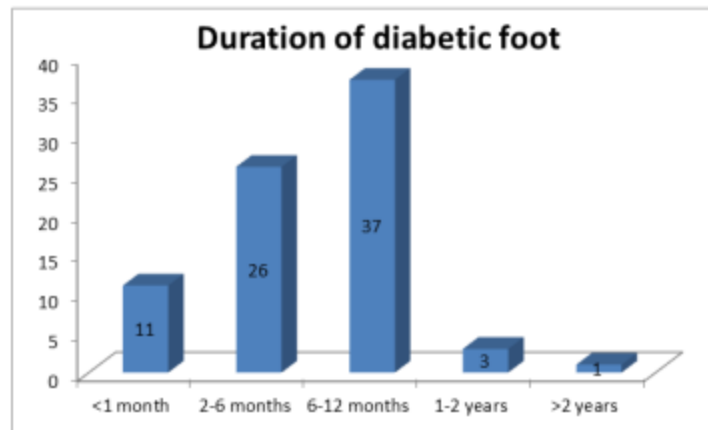
- **Duration of Diabetes:**

Duration of diabetes	No. of Patients
<5 years	7
5-10 years	11
10-20 years	39
20-30 years	18
>30 years	3
<b>Total</b>	<b>78</b>

**Table 2: Duration of diabetes**

In our study we found that most diabetic foot infections with osteomyelitis occur after ten years of the onset of diabetes mellitus.

- **Duration of diabetic foot:**



**Fig. 2: Duration of diabetic foot**

In our study we found that most diabetic foot infections with osteomyelitis, the duration was between 6 months to one year.

- **Location of foot ulcer**

Location of foot ulcer	No. of Patients
Heel	19
Ball of great toe	18
Dorsum of foot	15
Inter-digital cleft	13
Lower 1/3rd foot	9
medial malleoli	3
Lateral malleoli	1

**Table 3: Location of foot ulcer**

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In our study we found that most diabetic foot infections with osteomyelitis the location of foot ulcer were the plantar aspect of the foot.

Altogether 86 bacteria were isolated from 54 cases. Among 82 bacterial isolates, 54 (63 %) were Gram negative while 32 (37%) were Gram-positive bacteria. *Escherichia coli* was the most common pathogen isolated followed by *Staphylococcus aureus*, the other organisms isolated were *Proteus mirabilis*, *Citrobacter sp.*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Streptococci*, *Acinetobacter sp.*, *Enterococcus faecalis*, *Klebsiella oxytoca*, *Klebsiella pneumoniae*, *Bacillus sp.*, *Morganella sp.*, *Enterobacter aerogenes*. Gram-negative infection was most common in mono-microbial infections, whereas both Gram-positive and Gramnegative were high in cases with polymicrobial infection.

**DISCUSSION:** Diabetes mellitus (DM) is a serious health problem that is rapidly expanding worldwide.<sup>1</sup>

The prevalence of foot ulcers in diabetic patients is roughly estimated to be about 25%.<sup>7</sup> In diabetic patients with altered sensations the complications usually start as a simple foot ulcer which goes un-noticed and gets infected, leading to significant morbidity and lower extremity amputations.<sup>8,9,10</sup>

Infections in patients with diabetes are difficult to treat because these patients have impaired microvascular circulation, which limits the access of phagocytic cells to the infected area and results in a poor concentration of antibiotics in the infected tissues. Studies have shown that *Staphylococcus aureus* is the most prevalent isolate in diabetic foot ulcers (DFUs), together with other aerobes (Including *Staphylococcus epidermidis*, *Streptococcus spp.*, *Pseudomonas aeruginosa*, *Enterococcus spp.* and coliform bacteria) and anaerobes.<sup>11</sup>

The microbiologic features of diabetic foot infections vary according to the tissue infected.

Abdulrazak and co-workers in their study showed that the most common pathogens in an acute, previously untreated, superficial infected foot wounds in patients with diabetes are aerobic gram-positive bacteria, particularly *Staphylococcus aureus* and beta-hemolytic streptococci (Group A, B, and others) and the infection in patients who have recently received antibiotics or who have deep limb-threatening infection or chronic wounds are usually caused by a mixture of aerobic gram-positive, aerobic gram-negative (E.g., *Escherichia coli*, *Proteus species*, *klebsiella species*), and anaerobic organisms.<sup>12</sup>

Osteomyelitis in diabetic foot present is seen in approximately 20% of cases of foot infection in persons with diabetes.<sup>13,14</sup>

**CONCLUSION:** Diabetic foot infections are a real public health problem and early diagnosis of osteomyelitis in diabetic foot ulcer and appropriate treatment are essential.

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