

A Prospective Analysis of Diabetic Chronic Osteomyelitis at a Tertiary Care Teaching Hospital

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ABSTRACT

Introduction: Foot infections and their sequelae are among the most common and severe complications of diabetes mellitus. Present study was conducted to analyse bacteriological profile and antibiotic sensitivities of organisms of diabetic foot osteomyelitis.

Materials and Methods: Present study was conducted on confirmed Diabetic patients with foot ulcers. Detailed history taking and clinical examination was done on all subjects. Routine laboratory investigations and Tissue/swab samples were collected for microbial culture and antibiotic sensitivity tests. X-ray (foot) was taken and cases which showed evidence of osteomyelitis were chosen for the study.

Results: Total 107 Patients were included to take part in study. Age group 40-59 years were commonly involved (Total 65 patients, 60.75%). Most diabetic foot infections with osteomyelitis occur after ten years of the onset of diabetes mellitus. Altogether 142 bacteria were isolated from 107 cases. Among 142 bacterial isolates, 71 (66.36 %) were Gram negative while 36 (33.64%) were Gram-positive bacteria. Staphylococcus aureus was the most common pathogen isolated from samples.

Conclusion: Diabetic foot infections are a severe complication of diabetes and early diagnosis of osteomyelitis in diabetic foot ulcer and appropriate treatment are essential. Decision to select a proper antibiotic should always rely on culture and antibiotic sensitivity tests.

KEYWORDS: Diabetics, Foot, Osteomyelitis, Antibiotics, Culture Sensitivity.

INTRODUCTION

Prevalence of diabetes mellitus is growing rapidly all over the globe. Currently, estimated prevalence of people with diabetes worldwide is 285 million, and this number is set to increase to 438 million by the year 2030.^{1,2} The major proportion will occur in developing countries where the diabetes predominantly affects younger adults. Major burden will be borne by Asian countries which will see a 2.7–3.6-fold increase in the prevalence rates.^{3,4} According to the data from the International Diabetes Foundation; India, considered as the diabetic capital of the world. The Indian diabetic population is expected to increase to 87 million by 2030.⁵

Foot infections and their sequelae are among the most common and severe complications of diabetes mellitus.⁶ In diabetes population, Osteomyelitis is seen in approximately 20% of cases of foot infection and chances of lower-extremity amputation greatly increases. Still, there are no widely agreed and accepted guidelines

for either the diagnosis and management of diabetic foot osteomyelitis (DFO).^{7,8}

Diabetic foot ulcers have a higher tendency towards bacterial infections, rapid spread and irreversible tissue damage. Diabetic foot osteomyelitis is considered as one of the severe complications of diabetes mellitus.^{9,10} Diabetic foot osteomyelitis tend to complicate around one third of diabetic foot infections. Therefore, present study was conducted to analyse bacteriological profile and antibiotic sensitivities of organisms of diabetic foot osteomyelitis.

MATERIALS AND METHODS

Present study was conducted on confirmed Diabetic patients with foot ulcers after obtaining written informed consent. Prior approval from institutional ethics committee was obtained. Detailed history taking and clinical examination was done on all subjects. Demographical data included age, sex, duration of

diabetes, duration of diabetic foot, location of foot ulcer etc. were recorded for every subject. Following laboratory investigations were performed on all subjects: complete blood count (Haemoglobin-Hb; TLC/DLC), and glycosylated haemoglobin (HbA1C). Tissue/swab samples were collected for microbial culture and antibiotic sensitivity tests.

X-ray (foot) was taken 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 normal 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.

RESULTS

Total 107 Patients were included to take part in study. Age group 40-59 years were commonly involved (Total 65 patients, 60.75%). Most diabetic foot infections with osteomyelitis occur after ten years of the onset of diabetes mellitus.

Altogether 142 bacteria were isolated from 107 cases. Among 142 bacterial isolates, 71 (66.36 %) were Gram negative while 36 (33.64%) were Gram-positive bacteria. Staphylococcus aureus was the most common pathogen isolated from samples, followed by E.coli, Citrobacter sp., Proteus mirabilis, Pseudomonas aeruginosa, Acinetobacter sp., Streptococci, Klebsiella pneumoniae, Bacillus sp., Enterobacter aerogenes.

Table 1: Observations of present study.

	No. of cases	% of cases	
Age group (in years)	<20 Years		
	20-29	8	7.5%
	30-39	9	8.41%
	40-49	27	25.23 %
	50-59	38	35.51%
Sex	60 +	25	23.36%
	Male	69	64.49%
	Female	22	35.51%
Duration of diabetes	<5 years	7	6.54% %
	5-10 years	17	15.89%
	10-20 years	46	42.99%
	20-30 years	31	28.97%
	>30 years	6	5.61% %
Duration of diabetes Foot	<6 months	38	35.51%
	6-12 Months	49	45.79%
	1-2 Years	14	13.08%
Location of foot ulcer	>2 Years	6	5.61%
	Ball of great toe	26	24.3 %
	Heel	24	22.43 %
	Inter-digital cleft	21	19.63 %
	Dorsum Foot	17	15.89 %
	Lower 1/3rd foot	11	10.28 %
	Lateral malleoli	6	5.61%
	Medial malleoli	2	1.87 %

DISCUSSION

The prevalence of diabetic foot ulcers is roughly estimated to be about 25%.¹¹ Diabetic 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, therefore treatment of infections becomes difficult. Studies have shown that staphylococcus aureus is the most prevalent isolate in diabetic foot ulcers, together with other aerobes (Including Staphylococcus

epidermidis, Streptococcus spp., Pseudomonas aeruginosa, Enterococcus spp. and coliform bacteria) and anaerobes.¹² Findings were comparable with present study.

Sustained eradication of chronic osteomyelitis is difficult to achieve for several reasons, including the low levels of most antibiotic agents in chronically infected bone; the decreased metabolism of the pathogens, which are usually incorporated into a relatively impermeable

glycocalyx biofilm; and the particular characteristics of the osseous environment as regards pH level, partial pressure of oxygen, and protein concentrations.¹³ The soft-tissue infection usually starts as a complication of a neuropathic ulcer, but can result from penetrating injury or ischaemic soft-tissue loss. Arterial insufficiency may be present but tends to play a less important role than neuropathy. Osteomyelitis therefore most often affects bones underlying sites where ulcers are most common: the toes, metatarsal heads and calcaneum. The midfoot bones are less commonly involved unless foot deformity (from neuropathic osteoarthropathy, for example) has caused ulceration.¹⁴

Recently, several authors have reported satisfactory outcomes of management of diabetic foot osteomyelitis by conservative treatment consisting of antibiotic therapy with little or no surgery. The antibiotics most frequently used in these studies were fluoroquinolones, rifampin, and clindamycin, all of which reached high concentrations in bone and exhibited activity against bacteria in the stationary growth phase. A combined drug regimen is strongly recommended (especially with rifampin), comprising 2 components active against pathogens.¹⁵⁻¹⁸

CONCLUSION

Diabetic foot infections are a severe complication of diabetes and early diagnosis of osteomyelitis in diabetic foot ulcer and appropriate treatment are essential. Decision to select a proper antibiotic should always rely on culture and antibiotic sensitivity tests.

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