Microbial Study and Antibiotic Pattern in Diabetic Foot Infections from Teritary Care Hospital

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ABSTRACT   *Purpose: Study of microbial pathogens and its antibiotic pattern in diabetic foot infections Methods: A total number of 28 diabetic patients with foot ulceration were studied during the period of 5 months and organisms isolated were subjected to antibiotic susceptibility testing on Muller- Hinton agar using Kirbey-Bauer disc diffusion method Results: Of the total 28 diabetic foot patients studied 22 (78.57) were males and 6 (21.43) were females, the male: female ratio being 2:1. Their ages ranged from 21 - 70 years with an average of 50 years In our study, of 28 cases, Staphylococcus aureus and Klebsiella spp were found to be the most common pathogen accounting for 28.4% each of the bacteriological isolates. This was followed by Proteus, which accounted for 21.4%, streptococcus and pseudomonas accounting for 14.2 % & 7.1% each Conclusion: DFIs are common in diabetics and common aetiology is Staph. aureus, E. coli, and Pseudomon as which can be treated effectively with cephaperazone/β-lactamase inhibitors, ceftraixone and flouroquinolones. MRSA is also seen in diabetic foot ulcers and can be effectively treated with Linezolid*

INTRODUCTION

Diabetes is a metabolic disorder of the endocrine system which approximately 17 million people nationwide. Each year over 700,000 new cases are diagnosed; 12,000 to 14,000 of which are children, teenagers and young adults, while this life threatening disease can be controlled. Diabetes is often accompanied by serious complications, and still today there is no cure. By 2010 it is predicted that it will affect 239 million people world wide. Fifteen per cent of people with diabetes will develop a foot ulcer at some time during their life, and 85% of major leg amputations begin with a foot ulcer. Poorly controlled diabetes is prone to skin infections because elevated blood sugar reduces the effectiveness of bacteria fighting cells. Carbuncles, boils, and other skin infections may be hazardous if not properly treated (1). Even a small cut may progress to a deep, open sore, called an ulcer. In most cases ulceration is a consequence of the loss of protective sensation that is, the loss of awareness of trauma that can cause the breakdown of the skin (2). The organisms that occur on foot infections are generally Staphylococcus aureus and Streptococcus pyogens arising from the patients' own skin and Enterococci from bowel. Among the Gram positive aerobes Staphyloccoci are more prevalent. Many of these microorganisms are developing resistance to commonly used antibiotics largely due to their indiscriminate use(3). The present study was undertaken to determine the microbiology of the diabetic foot ulcers and the antimicrobial sensitivity pattern of the isolates.

Diabetes mellitus is a genetically determined disorder in metabolism of carbohydrate, protein, and fat, associated with relative or absolute insufficiency of insulin secretion. It is the disease which affects whole of the body involving many of the organs and systems, notably the eyes, the kidney, the blood vessels and peripheral nerve (4).

MATERIALS AND METHODS

A total number of 28 diabetic patients with foot ulceration were studied during the period of 5 months between June 2012 to December 2012 November with the complaint of diabetic leg ulcer, any age of both sexes were selected in this study. Swabs were collected from ulcers that were macroscopically examined and swabbing was done on sloughy or inflammmed tissue as bacteria tend to present in greater number in these areas. From each patient two swabs were collected (5). The sterile cotton was moistened with sterile saline before collecting the specimens. One of the swabs was used for the grams stain and the other swab was used for culture. For the isolation the swab was inoculated onto blood agar, and Mac Conckey agar and the plates were incubated at 37ºC for 18- 24 hours. The organisms isolated were subjected to antibiotic susceptibility testing on Muller- Hinton agar using Kirbey-Bauer disc diffusion method (6).

RESULTS

Of the total 28 diabetic foot patients studied 22 (78.57) were males and 6 (21.43) were females, the male: female ratio being 2:1. Their ages ranged from 21 - 70 years with an average of 50 years. The maximum number of patients having diabetic foot infections belonged to the age group of 51-60 years, the cases was with diabetes mellitus for more than a decade. The breakup of the cases and its distribution is given in the following table 1

Table 1: Shows sex distribution of diabetic ulcers

Sex	No. of Cases	Percentage
Male	22	78.5
Female	6	21.4

The breakup of the age distribution of diabetic ulcers cases and its distribution is given in the following table 2

Table 2: Shows age distribution of diabetic ulcers

S. No	Age groups	No. of Cases	Percentage (%)
1	0 – 20	0	0
2	21 – 30	1	3.5
3	31 – 40	2	7.1
4	41– 50	6	21.4
5	51-60	15	53.5
6	61-70	4	14.2

As noted above the maximum no of patients suffering from diabetic ulcers were in the age group of above 50 years accounting for about 67.85% of the cases.

. **Table 4: Shows types of bacteria isolated from the ulcers**

S. No	Pathogen	No. of Cases	Percentage (%)
1	Staph. aureus	08	28.5
2	Klebsiella spp	08	28.5
3	Proteus	06	21.4
4	Strep. pyogens	04	14.2
5	Pseudomonas	02	7.1

In our study, of 28 cases, Staphylococcus aureus and Klebsiella spp were found to be the most common pathogen accounting for 28.4% each of the bacteriological isolates. This was followed by Proteus, which accounted for 21.4%, streptococcus and pseudomonas accounting for 14.2 % & 7.1% each. Common organ-

isms like Staphlococcus aureus and Klebsiella spp are mostly sensitive to Amikacin, gentamycin and penicillin. Proteus sensitive to Cefotaxime, gentamycin, amikacin and ofloxacin. Pseudomonas mostly sensitive to Piptaz and Imipenam.

DISCUSSION

The presence of S. aureus, Proteus species and otheraerobic gram negative bacilli in septic complications of infected diabetic feet have been reported in various

studies.The infections are usually polymicrobial in nature,caused by aerobic Gram-positive S. aureus, and by Gram negative positive bacilli like E. coli, Klebsiella species and Proteus

In the present study Staphylococcus aureus (28.5%) was predominantly isolated. As regards the aerobic Gram negative bacilli, Klebsiella spp (28.5%), Proteus spp (21.4%), Streptococcus pyogenes(14.2%) and Pseudomonas aeruginosa (7.1%) were the common organisms isolated. There is increasing prevalence of MRSA species worldwide which requires aggressive therapy as infection with this organism may have a worse outcome and leaves treating physician with smaller choice in terms of use of antibiotics(7). In our study out of 08 cases of Staphylococcus, 3 (37.5%) were MRSA. Linezolid is effective for treatment of infections due to gram-positive bacteria, including methicillin, cephalosporin, and vancomycin resistant strains, but it has minimal activity against gram negative bacteria(8). However, as Linezolid is expensive, we preferred to reserve it for treatment of documented antibiotic resistant organisms.

. In Pseudomonas the total isolates were resistant to the most commonly used antibiotics like ciprofloxacin, amikacin, chloramphenicol, gentamycin and tetracycline,but all were sensitive

cephalosporins (Cefotaxime) and Carbapenam (Imipenem). In this study all the Gram negative isolates were susceptible to carbapenem (imipenem), which is resistant to inactivation by most bacterial beta lactamases and so it has the widest spectrum of antibacterial activity. Imipenem should therefore be used as a monotherapy against polymicrobial infections in difficult gram negative infections. It produces a response rate comparable to that of third generation cephalosporins(9)

The necessary duration of antibiotic therapy for diabetic foot infections has not been well studied. For mild to moderate infections, a 1-2 week course has been found to be effective, while for more serious infections, treatment has usually been given for about two weeks, sometimes longer. Adequate debridement, resection, or amputation of infected tissue can shorten the necessary duration of therapy (10). Some investigators have classified diabetic ulcers as metabolic. The most important factors responsible for causation of ulcer in diabetes are the arteriosclerotic lesions in large leg arteries and or neuropathy resulting in decreased sensation. In our study, diabetic ulcers are considered to be vascular disorders rather than metabolic (11). However, this is controversial and in diabetes it is a combination of factors that are to be considered in causation of leg ulcers. (12)

CONCLUSION

DFIs are common in diabetics and pose serious health problems for developing countries. Common aetiology is Staph. aureus, E. coli, and Pseudomonas which can be treated effectively with cephaperazone/β-lactamase inhibitors, ceftraixone and flouro-quinolones. MRSA is also seen in diabetic foot ulcers and can be effectively treated with Linezolid orally. (13)

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