

ORIGINAL RESEARCH

Evaluation of Bacteriological Profile in Patients of Diabetic Foot Ulcer: An Institutional Based Study

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ABSTRACT

Background: Various microbes are associated with chronic wounds especially in the margin of ulcers. Both aerobic and anaerobic microbes are responsible for causing diabetic foot ulcers. Pseudomonas spp, E. coli, Proteus, S. aureus, and Enterococcus spp are the common pathogens isolated from diabetic foot infections. The present study was conducted for assessing Bacteriological Profile of Diabetic Foot Ulcer. **Materials & Methods:** 100 patients with diabetic foot ulcer were enrolled. The samples were collected after the wound was debrided. No antimicrobial agent or antiseptic was used in the wound before collection of the tissue specimen. The specimens were placed into sterile transport containers and sent to the microbiology laboratory for aerobic microbial culture as soon as possible. Cultures were processed following the standard procedures for tissue sample processing. Microbial growth plates were examined for growth on the following day. Microbiological profile was evaluated. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. **Results:** While evaluating the microbiological profile, it was seen that E. coli and staphylococcus species were detected in 25 percent and 29 percent of the patients respectively. Klebsiella species and Enterococcus species were seen in 16 percent and 10 percent of the patients respectively. Proteus species, Enterobacter species, Serratia species and Pseudomonas species were seen in 5 percent, 8 percent, 3 percent and 4 percent of the cases respectively. **Conclusion:** Most common organisms among patients with diabetic foot ulcer was S. aureus. Monomicrobial infection is more prominent.

Key words: Bacteriological, Diabetes, Foot Ulcer.

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INTRODUCTION

Diabetes is a metabolic disorder of the endocrine system which plagues 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. Foot ulceration and infection in diabetic patients is one of the major causes of morbidity, hospitalization and foot amputation.^{1- 3}

Various microbes are associated with chronic wounds especially in the margin of ulcers. Both aerobic and anaerobic microbes are responsible for causing diabetic foot ulcers. Pseudomonas spp, E. coli, Proteus, S. aureus, and Enterococcus spp are the common pathogens isolated from diabetic foot infections. However, the etiology of wound infection differs from country to country and from hospital to hospital even within the same region. Usually, mild diabetic foot infections yield single microbe and severe wound infection exhibit polymicrobial

growth.⁴⁻⁶ Hence; the present study was conducted for assessing Bacteriological Profile of Diabetic Foot Ulcer.

MATERIAL AND METHODS

The present study was conducted for assessing Bacteriological Profile of Diabetic Foot Ulcer. A total of 100 patients with diabetic foot ulcer were enrolled. Complete demographic and clinical details of all the patients were obtained. Inclusion criteria for the present study included diabetic patients with foot ulcers. A clinical history was elicited with regard to the duration of the diabetes, the type of treatment for diabetes earlier received, and the presence of other systemic illnesses. The samples were collected after the wound was debrided. No antimicrobial agent or antiseptic was used in the wound before collection of the tissue specimen. The specimens were placed into sterile transport containers and sent to the microbiology laboratory for aerobic microbial culture as soon as possible. Cultures were processed following the standard procedures for tissue sample processing. The specimens were inoculated onto blood agar, chocolate agar, Mac Conkey's agar, and thioglycollate medium. The inoculated plates were

incubated at a temperature of 37°C overnight, and the plates were examined for growth on the following day. Microbiological profile was evaluated. All the results were recorded in Microsoft excel sheet and was subjected to statistical analysis using SPSS software.

RESULTS

Mean age of the patients was 51.7 years. The majority of patients belonged to the age group of more than 40 years. 63 percent of the patients were males. In 41 percent of the patients, the duration of diabetes was 5 to 10 years. Overall, the mean duration of diabetes was 10.8 years. While evaluating the microbiological profile, it was seen that E. coli and staphylococcus species were detected in 25 percent and 29 percent of the patients respectively. Klebsiella species and Enterococcus species were seen in 16 percent and 10 percent of the patients respectively. Proteus species, Enterobacter species, Serratia species and Pseudomonas species were seen in 5 percent, 8 percent, 3 percent and 4 percent of the cases respectively.

Table 1: Demographic data

Variable	Number	Percentage
Age group (years)	More than 40	71
	Less than 40	29
Gender	Males	63
	Females	37

Table 2: Duration of diabetes

Duration of diabetes	Number	Percentage
Less than 5 years	23	23
5 to 10 years	41	41
More than 10 years	36	36
Total	100	100

Table 3: Bacteriological profile

Bacteria	Number	Percentage
Escherichia coli	25	25
Klebsiella	16	16
Proteus	5	5
Enterobacter	8	8
Serratia	3	3
Pseudomonas	4	4
Staphylococcus	29	29
Enterococcus	10	10
Total	100	100

DISCUSSION

Foot ulcers are among the main complications of diabetes, with a 25% lifetime risk in all diabetic patients. In their review of diabetic foot and leg ulcers in several populations, previous authors found a prevalence of between 4.4% and 10.5%. Many of the diabetic foot ulcers need intensive treatment and lead

to hospitalization. Healing can take months, and amputation is a frequent outcome. Given the high prevalence of diabetes and the high costs associated with these ulcers, the treatment of this affliction is not only a major burden to the patients, but also to the healthcare system.^{5- 9} Hence; the present study was

conducted for assessing Bacteriological Profile of Diabetic Foot Ulcer.

Mean age of the patients was 51.7 years. The majority of patients belonged to the age group of more than 40 years. 63 percent of the patients were males. In 41 percent of the patients, the duration of diabetes was 5 to 10 years. Overall, the mean duration of diabetes was 10.8 years. While evaluating the microbiological profile, it was seen that *E. coli* and staphylococcus species were detected in 25 percent and 29 percent of the patients respectively. *Klebsiella* species and *Enterococcus* species were seen in 16 percent and 10 percent of the patients respectively. Zycover.S et al, did a randomised, double blind, placebo control study and he indicated that in the treatment of diabetic foot ulcers, soluble beta glucans were effective. Soluble beta glucans are available with the brand name woulganbiogel.⁸ Kaur. N et al did a study on clinical susceptibility profile of diabetic foot and observed that, out of 106 samples were cultured, in that 98 was culture positive ,136 organisms were isolated averaging of 1.38 organisms per positive culture. No growth was obtained in 8 patients (7.6%). Growth of one organism showed in 70 (71.4%), growth of 2 organisms was showed in 18 (18.36%), and three or four organisms were isolated in 10 patients (10.2%). Most commonly isolated organisms were gram negative, which was 67.6%, gram positive organisms were 28.6%, while yeast were 3.67%. Among the gram negative bacteria, the most frequent were *Proteus* species (27), followed by Review of Literature 41 *E.coli* (25). Among the gram-positive bacteria *S. aureus* (25). Most effective antimicrobial agent against gram negative were Meropenem, Polymyxin B, Imipenem, and Piperacillin/Tazobactam. While Linezolid, Vancomycin, Amikacin were most effective against gram positive organisms.⁹

In the present study, proteus species, *Enterobacter* species, *Serratia* species and *Pseudomonas* species was seen in 5 percent, 8 percent, 3 percent and 4 percent of the cases respectively. Sudarsh.N.J et al reported that compare to female, males are predominantly prone to post surgical infections. Most of the patients age group were 51 to 60 (28), followed by 61 to 70 (26) and 41 to 50 (23). Age factors played an important role in developing infections and contributed with other factors such as economical status and polypharmacy. The average bacteria per lesion was found to be 1.22. Gram negative organisms were dominated than gram positive and polymicrobial nature were observed. The most frequently isolated organisms were *Staphylococcus aureus* (39.34%) followed by *E.coli* (23.77%), *Enterococcus* (4.91%), *Pseudomonas aeruginosa* (9.83%), *Klebsiella pneumoniae* (7.37%). *Proteus* species (6.5%), *Acinetobacter* species (3.27%), *Citrobacter* species (1.63%).¹¹ Sridhar. K et al, did a study on clinic- bacteriological profile of diabetic foot infections, Out of 66 *pseudomonas* isolates screened

for AMP C beta lactamase, in that 18 were positive, without was 27.2%. Extended spectrum Beta lactamase screened in 59 isolates of *Klebsiella* species and 31 *E.coli*, in that 44% in *Klebsiella* were ESBL producers. And 32.2% *E.coli* were ESBL producers.¹²

CONCLUSION

Most common organisms among patients with diabetic foot ulcer was *S. aureus*. Monomicrobial infection is more prominent.

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