

Evaluation of Bacteriological Profile of Diabetic Foot Infections: An Institutional based Study

Praveen Kumar Prabhakar*

Associate Professor, Department of Microbiology,
Venkateshwara Institute of Medical Sciences, Gajraula, Amroha, Uttar Pradesh, India.

ABSTRACT

Background: Diabetic foot infection (DFI) is a dreaded complication of diabetes mellitus. The present study was conducted to assess bacteriological profile of diabetic foot infection.

Materials & Methods: The present study was conducted on 64 patients with diabetic foot infection of both genders. Local examination of the foot and ulcer was done, and grading was carried out as per Wagner's system.

Results: Out of 64 patients, male were 34 and females were 30. Wegener's grade I was seen in 2 anaerobe positive and 5 Anaerobe negative bacteria, II in 4 anaerobe positive and 7 Anaerobe negative bacteria, III in 8 Anaerobe positive and 12 Anaerobe negative bacteria and IV and V in 10 anaerobe positive and 16 Anaerobe negative bacteria. The difference was significant ($P < 0.05$).

Conclusion: It was concluded that wegener's grade IV and V

was seen in maximum cases. Anaerobic negative was seen in maximum number of cases.


Key words: Anaerobe, Diabetic Infection, Wegener's Grade.

*Correspondence to:

Dr. Praveen Kumar Prabhakar,
Associate Professor, Department of Microbiology,
Venkateshwara Institute of Medical Sciences,
Gajraula, Amroha, Uttar Pradesh, India.

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INTRODUCTION

Diabetes mellitus, a chronic disease, is affecting a large segment of population. About 12%–25% of diabetics across the world have a lifetime risk of developing foot ulcers, thus contributing to a major public health issue.¹ Rate of amputation of a limb is estimated to be forty times greater in infected nonhealing ulcer in diabetics than the patients of trauma. Infections precede in >60% cases of foot amputations. Peripheral sensory and motor neuropathy leading to deformities, macro- and microangiopathy leading to ischemia, and infection are the major etiologies of diabetic foot.²

Diabetic foot infection (DFI) is a dreaded complication of diabetes mellitus and the most common reason for diabetes-related hospitalization. It occurs following foot ulceration. Indeed, neuropathy and ischemia interplay to produce foot ulceration in about 25% of diabetics with a 40%-80% infection rate, resulting in either a minor or major amputation in more than 50% of cases.³ The normal skin microbial flora is usually the first to invade the underlying tissue following such breakdown of the innate defense mechanism of the foot offered by the skin; and later, other pathogens often synergize to give a polymicrobial infection.⁴ Various bacterial pathogens have been identified, ranging from Gram - positive cocci such as Staphylococcus

aureus and Streptococcus species in grades I and II DFI, to polymicrobial aerobic Gram-positive S. aureus, Staphylococcus epidermidis and Enterococcus species, gram-negative bacilli such as Pseudomonas species etc. Foot problems are largely preventable, and successful treatment depends on the correct evaluation of the patient, diagnosis, and proper management of infection.⁵ The present study was conducted to assess bacteriological profile of diabetic foot infection.

MATERIALS & METHODS

The present study was conducted in Department of Microbiology, Venkateshwara Institute of Medical Sciences, Gajraula, Amroha, Uttar Pradesh, India. It included 64 patients with diabetic foot infection of both genders. They were informed regarding the study and written consent was obtained. Ethical clearance was obtained prior to the study. Patient information such as name, age, gender etc. was recorded. Local examination of the foot and ulcer was done, and grading was carried out as per Wagner's system. Biochemical, hematological, serological, bacteriological as well as radiological profiles of the patients were noted. Results were tabulated any subjected to statistical analysis. P value < 0.05 was considered significant.

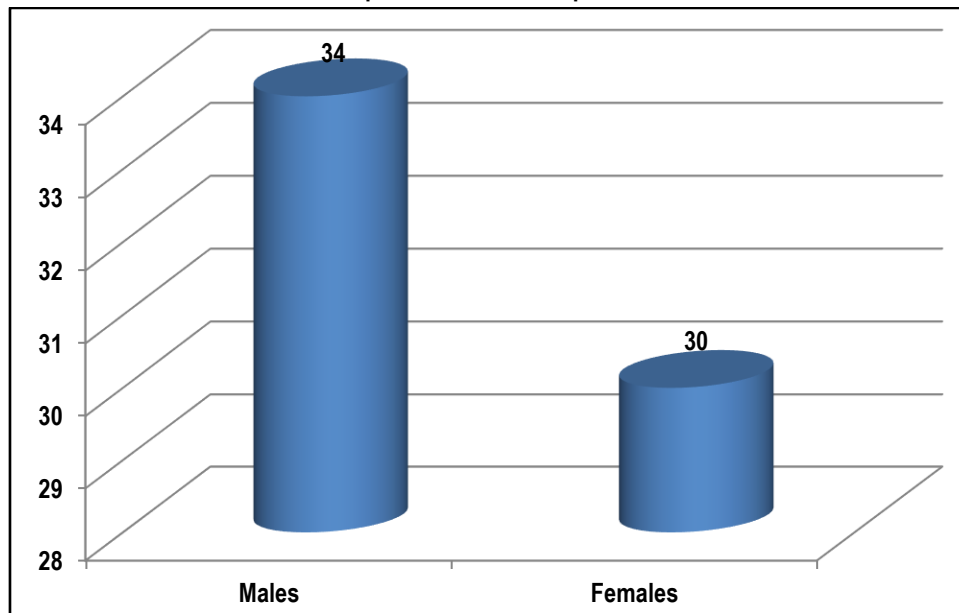
Table I: Distribution of patients

Total - 64		
Gender	Male	Female
Number	34	30

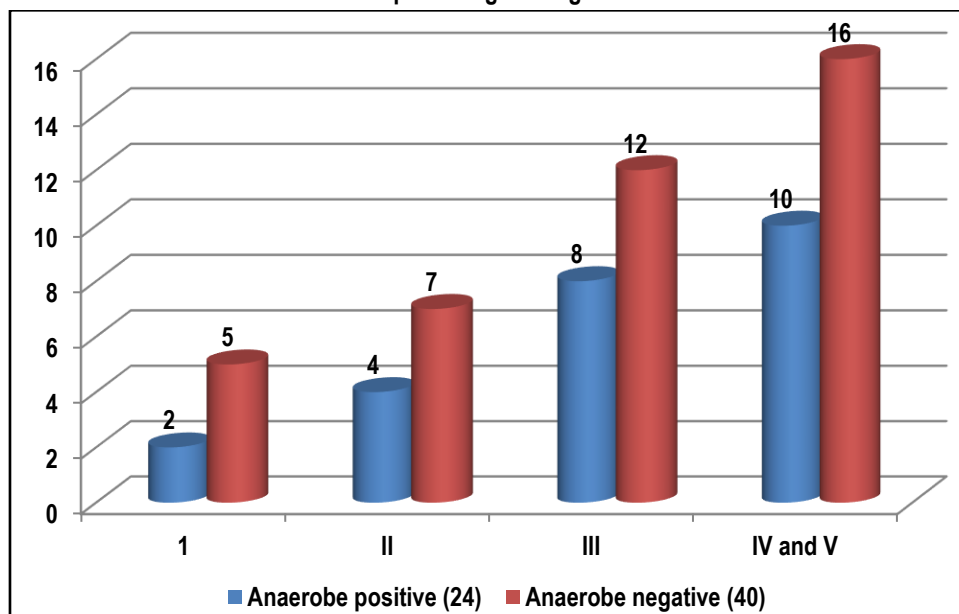
Table II: Wegener's grade

Wegener's grade	Anaerobe positive (24)	Anaerobe negative (40)	P value
I	2	5	0.05
II	4	7	
III	8	12	
IV and V	10	16	

Graph I: Distribution of patients



Graph II: Wegener's grade



RESULTS

Table I, graph I shows that out of 64 patients, male were 34 and females were 30. Table II, graph II shows that Wegener's grade I was seen in 2 anaerobe positive and 5 Anaerobe negative

bacteria, II in 4 anaerobe positive and 7 Anaerobe negative bacteria, III in 8 Anaerobe positive and 12 Anaerobe negative bacteria and IV and V in 10 anaerobe positive and 16 Anaerobe negative bacteria. The difference was significant ($P < 0.05$).

DISCUSSION

Antimicrobial regimens are usually selected empirically initially based on local epidemiological and antimicrobial susceptibility patterns, and later modified according to the culture and sensitivity test results.⁶ Thus, knowledge of the microbiological and antimicrobial sensitivity pattern in any locality is important in making the initial empirical antimicrobial choice and avoiding indiscriminate use of antimicrobial which may lead to emergence of antimicrobial resistant organisms. DFI spreads rapidly leading to irreversible tissue damage, an effect facilitated by suppressed immunity, late presentation, underestimation of extent of infection, and inappropriate/indiscriminate antimicrobial use.⁷ The present study was conducted to assess bacteriological profile of diabetic foot infection. In this study, out of 64 patients, male were 34 and females were 30. Dang et al⁸ in their study fifty-six patients' medical records were reviewed. There were 35 males and 21 females. The mean age of the patients was 56.2 years (range 48–75 years). Three patients had bilateral lesions. The Wagner grades of the lesions were Grades II–V, with Grade IV being predominant. Eight bacteria species and a fungus were isolated from the 59 swab specimens studied. Four specimens yielded no growth, whereas 7 specimens yielded contaminants. Monomicrobial cultures were predominant, with Gram-negative bacteria being preponderant. *Staphylococcus aureus* was the most common isolate, followed by *Proteus* species. The isolates showed greater susceptibility to levofloxacin and ciprofloxacin.

We found that Wegener's grade I was seen in 2 anaerobe positive and 5 Anaerobe negative bacteria, II in 4 anaerobe positive and 7 Anaerobe negative bacteria, III in 8 Anaerobe positive and 12 Anaerobe negative bacteria and IV and V in 10 anaerobe positive and 16 Anaerobe negative bacteria.

In a study of Umadevi⁹, 104 patients were included in the study. There were no significant differences between the two groups with regards to duration of diabetes, random blood sugar (RBS) at the time of admission, compliance to drugs, and mode of blood sugar control and prior intake of antibiotics. Patients with anaerobic infections were found to have a higher incidence of fever in this study (38.1% vs. 14.5%; $p = 0.0057$), as compared to patients with aerobic infections. More than half of the patients in the anaerobic infection group presented with Wagner's grade IV and above, as compared to the aerobic infection group (59.5% vs. 32.2%; $p = 0.0059$), which was statistically significant. Patients with anaerobic infections also had high numbers of major and minor amputations when compared to patients with aerobic infections.

Mohanasoundaram et al¹⁰ in their study two hundred and forty aerobic and 21 anaerobic bacteria were isolated from these ulcers; *Staphylococcus aureus* and *Bacteroides* spp. are the most common aerobic and anaerobic bacteria isolated, respectively. Of the *S. aureus*, 77.8% were methicillin resistant, while 42.1% of the Gram-negative Enterobacteriaceae were extended-spectrum beta-lactamase (ESBL) positive. *Klebsiella* spp. was the highest ESBL producer whereas *Acinetobacter* spp. was the highest metallo-beta-lactamase producer. Linezolid, teicoplanin, and vancomycin were the most sensitive drugs for *Staphylococcus* spp. Gram - negative isolates were mostly sensitive to cefoperazone-

sulbactam and imipenem. *Pseudomonas* spp. was mostly sensitive to imipenem and piperacillin-tazobactam, whereas *Acinetobacter* spp. was sensitive to netilmicin and levofloxacin. As diabetic ulcers are often infected by multidrug-resistant bacteria, a knowledge of the common bacterial pathogens implicated as well as their sensitivity pattern helps the clinician to choose the proper antibiotic for a timely treatment.

CONCLUSION

It can be concluded that Wegener's grade IV and V was seen in maximum cases. Anaerobic negative was seen in maximum number of cases.

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