



ORIGINAL RESEARCH PAPER

Microbiology

Spectrum of aerobic microbial flora in a diabetic foot infection: a prospective study.

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ABSTRACT

Background: Diabetic foot infections are major public health problem. It is the most frequent reason for diabetes-related hospitalization. It develops because of several diabetes-related factors including arterial insufficiency, neuropathy, foot deformities, previous ulcers, previous amputation, and local trauma. **Aim:** The aim was to investigate the spectrum of aerobic microbial flora. **Methods:** A prospective study was carried out on 50 patients with diabetic foot lesions for a period of 2 years in to determine their clinical characteristics, the spectrum of aerobic microbial flora. These patient's pus samples were examined as Gram-stained smear and cultured aerobically on blood agar and MacConkey agar plates. **Result:** Total of 78 organisms were isolated and an average of 1.56 isolates per case was reported. Polymicrobial infection was found in 58% of patients. **Conclusion:** Prevalence showed Gram-negative bacteria was slightly more than Gram-positive bacteria in diabetic foot ulcers.

INTRODUCTION

Infected foot ulcer is a common cause of morbidity in diabetic patients, ultimately leading to dreaded complications like gangrene and amputations. Lifetime risk be as high as 25%.⁽¹⁾ Infection is most often a consequence of foot ulceration, which typically follows trauma to a neuropathic foot. The alarming fact is that India has more people with diabetes than any other country and the incidence of foot problems and amputations remains very high, accounting for up to 20% of diabetes-related hospital admissions. This can be easily attributed to several practices prevalent in India, such as barefoot walking, inadequate facility etc. They are among the most common reasons for hospital admission of the diabetic patient. A diabetic foot infection represents a failure by the patient and his management team to understand and correct the multifactorial conditions that predisposed the patient to the infection. Efforts directed toward prevention⁽²⁾ of the foot infection are much more likely to meet with success than is therapy of the established foot infection. This preventive approach is likely to lead to a reduction in the incidence of major amputations and there by improve life expectancy. Understanding the pathophysiology associated with the diabetic foot is essential to the care of the diabetic patients. If a breach in skin integrity occurs, prompt assessment of vascular, neural, soft tissue, and wound status enhances the possibility of a successful clinical outcome⁽³⁾. The complexity of the management of a diabetic foot requires the knowledge and skill of a multidisciplinary team, which usually includes an internist, podiatrist, rehabilitation specialist, prosthetist, dietitian, and social worker in addition to a surgeon interested in caring for the complications of diabetic foot. The goals of this multispecialty group are to optimize local wound care, provide correct foot wear, improve glucose control, educate the patient concerning diet and life style changes, and identify the presence of peripheral neuropathies^(4,5) and reconstructable arterial lesions. This combined medical team approach has been documented to substantially reduce the incidence of major and minor amputations in the diabetic patients.

AIMS & OBJECTIVE

The aims and objective of the study was to investigate the spectrum of aerobic microbial flora.

MATERIAL AND METHOD

A total number of 50 diabetic patients with foot ulceration were studied during the period of August 2013 to July 2016. The study was conducted in the Department of Microbiology, Sri Aurobindo institute of Medical Sciences Indore. Pus was collected under aseptic precaution and examined macroscopically and classified based on Wagner method of evaluation. For isolation of microbes, different media like blood agar, Mac Conkey, chocolate agar was used. Inoculation was done by four flame technique and the plate was incubated aerobically overnight at 37°C. Similarly chocolate agar was incubated in CO₂ enriched environment atmosphere at 37°C for up to 48 hrs. For anaerobes^(3,4) due to lack of resources

anaerobic cultures was not done therefore results were analysed for aerobic flora only.

RESULT

In the present study, we studied 50 patients, both male and female attending the surgical and medical OPD and analyzed different types of samples along with other risk factors. Table 1 shows the pattern of isolation of microbial growth from Diabetic Foot Ulcers. Out of 50 sample 21 (42%) sample were monomicrobial while 29 samples were polymicrobial (58%). Seventy percent of patients had infection due to two species, while three species were isolated in 12.5% cases. Altogether 78 bacteria were isolated from 50 cases. Among 78 isolates, *Klebsiella pneumoniae* (21%) was the most common pathogen isolated. Co-infection with *Candida* spp. was also found with Gram negative infection. Table no 2 summarizes the comparison of isolates from diabetic foot ulcers.

Table 1: Pattern of isolation of microbial growth from diabetic foot ulcer

Total Patients examined	57
No growth n (%)	7
Patients with microbial growth n (%)	50 (86%)
Monomicrobial	21 (42%)
Polymicrobial	29 (58%)
Gram negative isolates	80.2 %
Gram positive isolates	17.8 %

Table 2: Bacterial Pathogens isolated from 50 Culture Positive Diabetic Foot Ulcers

Organism	Isolates (n=50) (%)
<i>Pseudomonas aeruginosa</i>	14 %
<i>Klebsiella pneumoniae</i>	21 %
<i>Escherichia coli</i>	15 %
<i>Staphylococcus aureus</i>	19 %
<i>Proteus mirabilis</i>	1.28 %
<i>Proteus vulgaris</i>	3.84 %
<i>Acinetobacter</i> spp.	7 %
<i>Klebsiella oxytoca</i>	1.17 %

DISCUSSION

Diabetic foot ulcer is the most common complication requiring hospitalization among diabetic patients. It is also the most common cause of non-traumatic lower extremity amputations. Physicians have an important role in the prevention, early diagnosis and management of diabetic foot complications. *Klebsiella pneumoniae* was predominantly isolated organism 21% followed by *Staph aureus* 19%, *E coli* 15.26%. Other organisms like *Acinetobacter baumannii* 3.82%, and *Proteus mirabilis* 3.86% were also isolated. Almost similar results were obtained by Ekta et al,⁶ Shankar et al and Prabahakar et al. Among 50 clinically suspected patient 78 organism were isolated that is 1.56 species

per patient similar with Ekta^[6] et al. 21(42%) sample were monomicrobial while 29 samples were polymicrobial(58%). Seventy percent of patients had infection due to two species, while three species were isolated in 12.5% cases similar to that reported by Gadepalli^[7] et al while differ from study done by Pappu^[8] A Ketal, Banashankar GS et al.

CONCLUSION

Diabetic foot infection is a polymicrobial infection of varying severity based on the extent, duration of the infection and the status of glycemic control. Gram negative organisms, like klebsiella pneumoniae was the most frequently isolated organism. In cases of poly-microbial infection, coexistence of Gram-negative and Gram-positive microorganisms was more common. However Prevalence of Gram-negative infection was higher in diabetic foot patients from our region.

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