

Original Research Article

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## Study of Bacteriological Profile of Corneal Ulcers in Patients Attending VIMS, Ballari, India

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### ABSTRACT

Corneal infection is leading cause of ocular morbidity and blindness worldwide. Identification of the pathogen, initiation of immediate therapy based on the organism identified represent the keys to success in management of corneal ulcers. Aim of this study is to define the bacteriological profile of corneal ulcers and to test their *in-vitro* bacterial susceptibility. Patients presenting with suspected bacterial corneal ulceration 2015 were included. Corneal scraping was performed and processed for direct microscopy, and bacteriological culture. Antimicrobial susceptibility testing was done according to CLSI guidelines. Of 300 specimens examined, 62(20.7%) had bacterial growth. Gram positive cocci were comprised of 43(69.4%) and gram negative bacilli 19(30.6%). The commonest bacterial pathogen isolated was *Staphylococcal aureus* 28(45.2%), followed by Coagulase Negative *Staphylococci* 8 (12.9%) and *Streptococcus* 7(11.21%). *Pseudomonas* spp 5 (8.1%) and *E.coli* 5 (8.1%). *Staphylococcus aureus* and *E.coli* were 100% susceptible and all other strains were >80% susceptible to gentamycin and amikacin. *Staphylococcus* spp. were the most common bacterial pathogens isolated from patients with corneal ulcers in this institute. High percentages of gram-positive and gram-negative bacteria were susceptible to aminoglycosides. So, these drugs appear to be the therapy of choice for corneal ulcers. Routine microbiological examination of corneal ulcer is necessary to analyze the microbial etiology and to treat them with appropriate antibiotics to prevent further complications.

#### Keywords

Corneal ulceration, Corneal scraping, Antimicrobial susceptibility testing, Gram positive cocci, Gram negative bacilli.

#### Article Info

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### Introduction

Corneal infection is leading cause of ocular morbidity and blindness worldwide. Corneal ulceration is a major cause of monocular

blindness in developing countries. Corneal scarring listed second only to cataracts as an important cause of blindness and visual impairment in many developing countries in

Asia, Africa and the Middle East (Amatya *et al.*, 2012). The avascular corneal stroma is particularly susceptible to bacterial infection, and many patients have a poor clinical outcome if aggressive and appropriate therapy is not promptly initiated.

Corneal perforations, which can occur in less than 24 hours, have been reported in the presence of particularly invasive pathogens such as *Pseudomonas aeruginosa* and *Staphylococcus aureus* (Schaefer *et al.*, 2001). The bacterial sensitivity to various antimicrobial agents varies from place to place and in the same place from time to time (Sharma *et al.*, 2011; Bharathi *et al.*, 2010). Identification of the pathogen, initiation of immediate therapy based on the organism identified represent the keys to success in management of corneal ulcers.

The main objectives of this study to define the bacteriological profile of corneal ulcers. And to test their *in-vitro* bacterial susceptibility.

### **Materials and Methods**

Patients presenting with suspected bacterial corneal ulceration were included. Total of 300 corneal scraping samples were collected for the study.

### **Inclusion Criteria**

Patients presenting with suspected infectious bacterial corneal ulceration were included in this study.

### **Exclusion Criteria**

Patients suspected of having or with a positive culture for fungal, viral, or parasitic infection were excluded.

### **Sample Collection**

Material was obtained under topical anaesthesia (4% lignocaine hydrochloride) by scraping the base and edges of the ulcerated part of the cornea under the magnification of a slit lamp by an ophthalmologist using a sterile platinum spatula or a sterile Bard-Parker knife (Priscia *et al.*, 2013; Kalamurthy *et al.*, 2013). Samples were immediately inoculated onto slides for gram staining and microscopy, and onto blood or chocolate agar plates, and Sabouraud agar plates (in that order) for culture (Orlans *et al.*, 2011; Tesfaye *et al.*, 2013), and sent to microbiology laboratory for processing.

### **Sample Processing**

KOH mount and gram staining was performed. Depending on the type of growth, various biochemical tests were performed to identify the pathogen. *In vitro* Antimicrobial susceptibility testing was done according to CLSI guidelines, by the standard agar disc-diffusion method (Kirby-Bauer) on Mueller Hinton agar (Pachigolla *et al.*, 2007; Orlans *et al.*, 2011).

### **Results and Discussion**

Of 300 specimens examined, 62(20.7%) had bacterial growth. The mean age of the patients was of 38.5 years (range 3–80 years) of 62 patients, 36 (58.1%) were males, and 26 (41.3%) were females (fig 1).

Among growth positive cases, most common isolates were gram positive cocci, comprising of 43(69.4%), followed by gram negative bacilli 19(30.6%)(fig 2). The commonest bacterial pathogen isolated among gram positive cocci was *Staphylococcal aureus* 28(45.2%), followed by Coagulase Negative *Staphylococci* 8

(12.9 %) and *Streptococcus* 7(11.21%) (fig 3).

Among gram negative bacilli most common organism were *Pseudomonas* spp 5(8.1%) and *E.coli* 5(8.1%). *Klebsiella* and *Citrobacter* were 2(3.2%), non fermenting GNB 4(6.4%), *Enterobacter* 1(1.6%) (fig 4).

*Staphylococcus aureus* and *E.coli* were 100% susceptible to gentamycin and amikacin. All other isolates were >80% susceptible to gentamycin and amikacin.

80 % *Pseudomonas* were resistance to amoxycillin clavulanic acid combination, while 30.4% *S.aureus* were so. GPCs were susceptible to most of the drugs as compared to GNBs.

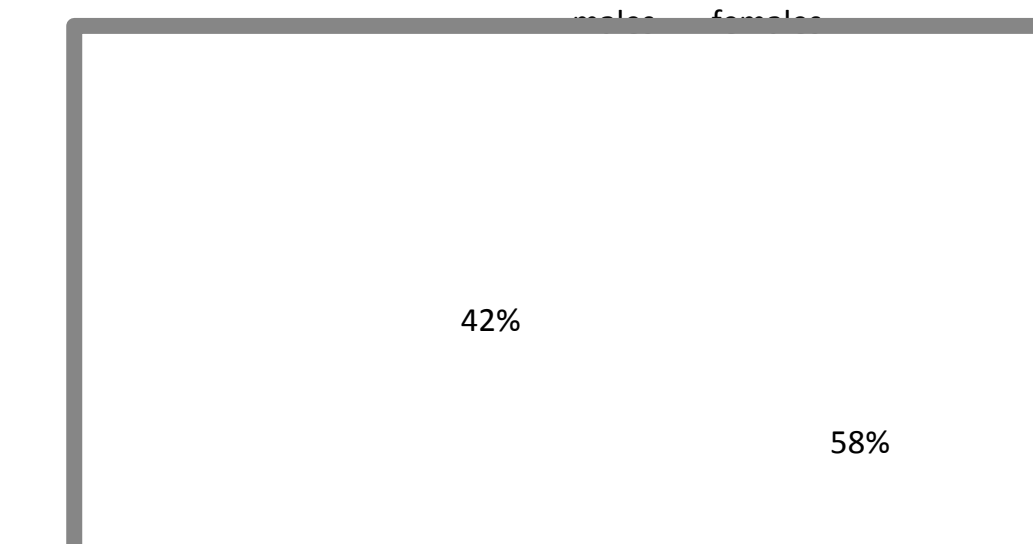
Corneal ulceration is a major cause of monocular blindness in developing countries. Bacterial keratitis is a potentially devastating ocular infection that may occur when the corneal epithelial barrier is compromised due

to injury or trauma, leading to ulceration and infiltration of inflammatory cells.

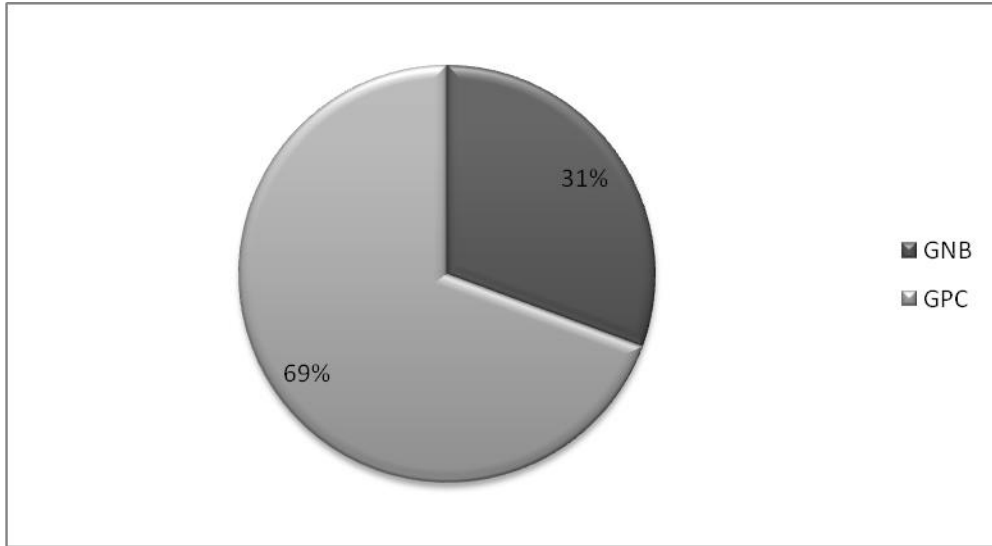
This study focuses on to the pattern of bacterial pathogens causing corneal ulcers and their antibiogram among patients who attended VIMS, Ballari. Infection largely involves gram-positive cocci such as, *S.aureus*, *CONS* and *Streptococcus* spp, as well as gram-negative bacteria such as *Ps.aeruginosa*. In this study, gram-positive cocci accounted for 43 of 62 (69%) bacterial isolates. This result is comparable to the 77% in a study done by J Kaliamurthy *et al*, and 52.0 % in study by T Tesfaye *et al* in Ethiopia. Predominant among GPC is *S.aureus* 45.2%, which is consistent with studies done by T Tesfaye, R Amatya, HO Orlans which showed 54.5%, 44.5% and 40.1% *S.aureus* respectively.

Among GNB, *Pseudomonas* was common in this study accounting for 8.1%, which is almost similar to 9.38% in the study done by R Amatya *et al*.

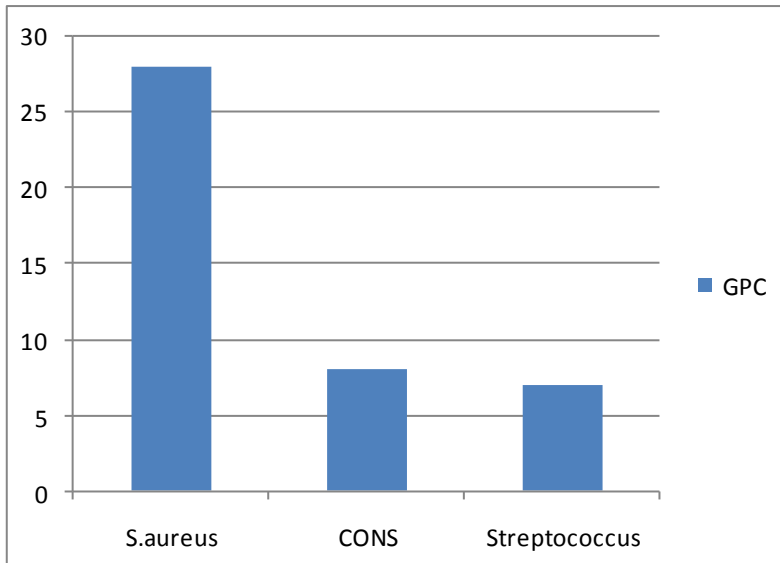
Fig.1 Sex Ratio



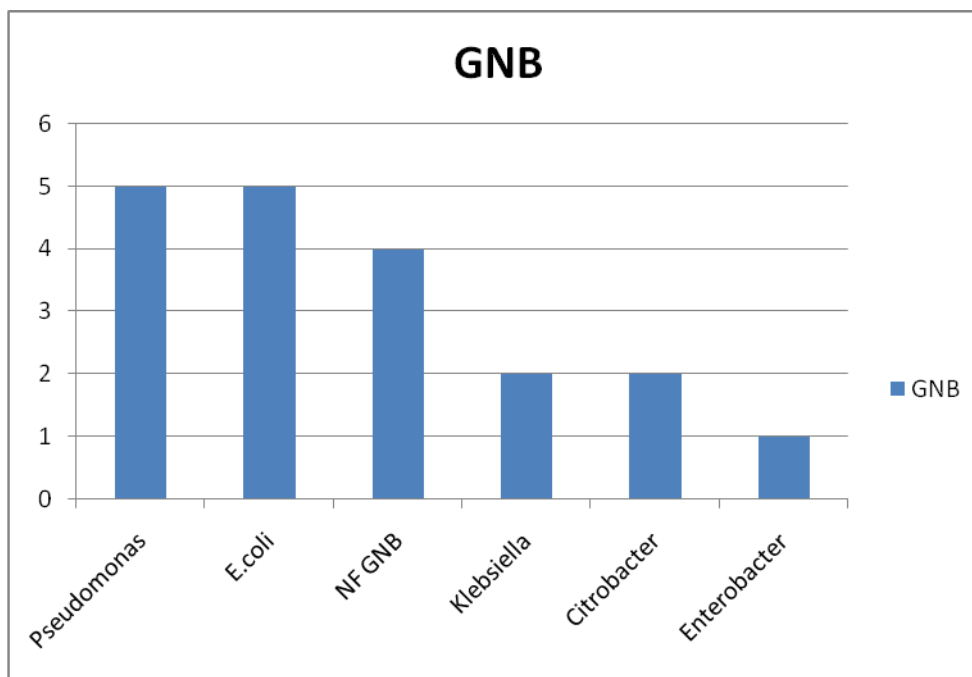
**Fig.2** Organism Ratio



**Fig.3** Percentage of Gram Positive Isolates



**Fig.4** Percentage of Gram Positive Isolates



Almost all the organisms were highly susceptible to gentamycin and amikacin.

*S.aureus* was 100% susceptible to gentamycin and amikacin, 83% to ceftriaxone, 72% to cefotaxime, 70% to amoxicillin clavulinate, 64% to ciprofloxacin.

*Pseudomonas* was 80% susceptible to aminoglycosides, followed by ciprofloxacin 75% and cefotaxime 60%. This was consistent with study done by J Kaliamurthy *et al* susceptible to amikacin (89.7%), gentamicin(89.7%), ciprofloxacin (82.9%). *E.coli* was 100% susceptible to gentamycin and amikacin, followed by ceftriaxone 75%.

In conclusion, gram positive cocci especially, *Staphylococcus* spp. were the most common bacterial pathogens isolated from patients with corneal ulcers in this institute. Among gram negative organisms, *Pseudomonas*, *E.coli* were common pathogens. High percentages of gram-

positive and gram-negative bacteria were mostly susceptible to aminoglycosides. So, these drugs appear to be the therapy of choice for corneal ulcers. Routine microbiological examination of corneal ulcer is necessary to analyze the microbial etiology and to treat them with appropriate antibiotics to prevent further complications.

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