

Assessment of Microbiological Profile of Infection Keratitis: An Institutional Based Prospective Study

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ABSTRACT

Background: The incidence of infectious keratitis has risen in the last decade, partially due to an increasing number of contact lens users and immune-compromised patients. Hence; the present study was undertaken for assess the microbiological profile of patients with infection keratitis.

Materials & Methods: A total of 96 patients of infection keratitis were enrolled in the present study. Complete demographic and clinical details of all the patients were obtained. Slit-lamp biomicroscope examination of all the patients was done. This was followed by collection of corneal scrapings under septic conditions by experienced and skilled ophthalmologist. Inoculation of the material directly on the solid media was done. The media used were blood agar, chocolate agar and Sabouraud dextrose agar (SDA). Overnight incubation of seeded media was done. Assessment of culture and colonies was done by skilled and experienced microbiologists.

Results: Only bacterial isolates were found to be present in 54.2 percent of the patients. Only fungal isolates were found to be 39.6 percent of the patients. Mixed infection was found to be present in 6.2 percent of the patients. Fusarium,

Aspergillus, Hyalohyphomycetes, Curvularia and Candida were the most common fungal species encountered. S.aureus, S.pneumoniae, Pseudomonas aeruginosa and Klebsiella pneumonia were the most common bacterial species encountered.

Conclusion: Infection keratitis comprises of mixed spectrum of bacteria and fungi.

Key words: Infection Keratitis, Microbiological Profile.

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INTRODUCTION

Bacterial infectious keratitis (BK) is a common reason of consulting in ophthalmology and is associated with high morbidity. All cases of moderate to severe keratitis require a detailed laboratory work-up, which ensures that if there is partial or no response to initial therapy, the antimicrobial treatment can be modified based on the results of culture and susceptibility tests.¹⁻³ Generally, broad-spectrum antibiotics are used as empiric first-line treatment for presumed BK after obtaining appropriate corneal scrapes. The drugs chosen as initial therapy are either commercially available quinolone or a combination of fortified antibiotics, topical solutions prepared from parenteral antibiotics by reconstituting them with sterile injection water or Balanced Salt Solution (BSS) with one agent largely directed against Gram-positive and the other against Gram-negative organisms.⁴⁻⁶ Recently, antimicrobial resistance has emerged as a major issue in infection. In ophthalmology, the incidence of infectious keratitis has risen in the last decade, partially due to an increasing number of contact lens users and immune-compromised patients. Also,

the changes have been reported in microbial compositions responsible for infectious keratitis and antibiotic resistance patterns.⁵ Hence; under the light of above mentioned data, the present study was undertaken for assess the microbiological profile of patients with infection keratitis.

MATERIALS & METHODS

The present study was planned in Department of Ophthalmology, K M Medical College, Mathura, U.P. (India) with the aim of assessment of microbiological profile of patients with infection keratitis. Ethical approval was obtained from institutional ethical committee and written consent was obtained from all the patients after explaining in detail the entire research protocol. A total of 96 patients of infection keratitis were enrolled in the present study. Complete demographic and clinical details of all the patients were obtained. Slit-lamp biomicroscope examination of all the patients was done. This was followed by collection of corneal scrapings under septic conditions by experienced and skilled

ophthalmologist. Prior to the collection, instillation of 4% lignocaine without preservative was done. Inoculation of the material directly on the solid media was done. The media used were blood agar, chocolate agar and Sabouraud dextrose agar (SDA). Overnight incubation of seeded media was done.

Assessment of culture and colonies was done by skilled and experienced microbiologists.

All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. Chi- square test was used for assessment of level of significance.

Graph 1: Demographic profile

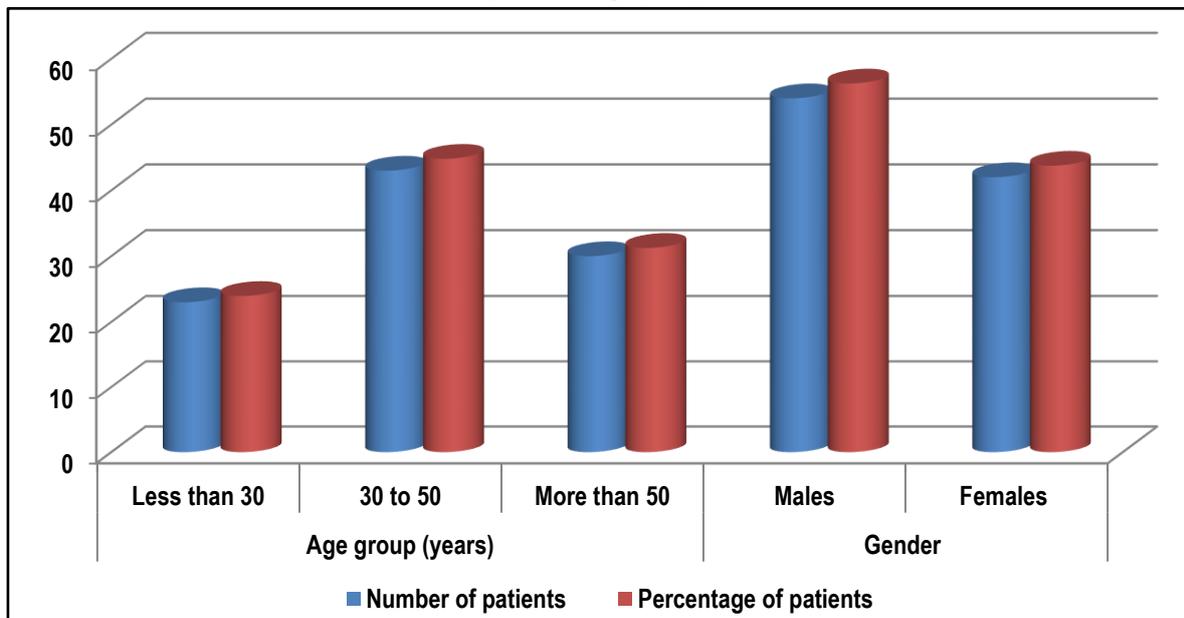


Table 1: Clinical profile

Clinical parameter	Number of patients	Percentage
Contact lens wear	23	23.9
Ocular surgery history	28	29.1
Ocular trauma history	25	26.1
Diabetes mellitus	23	23.9

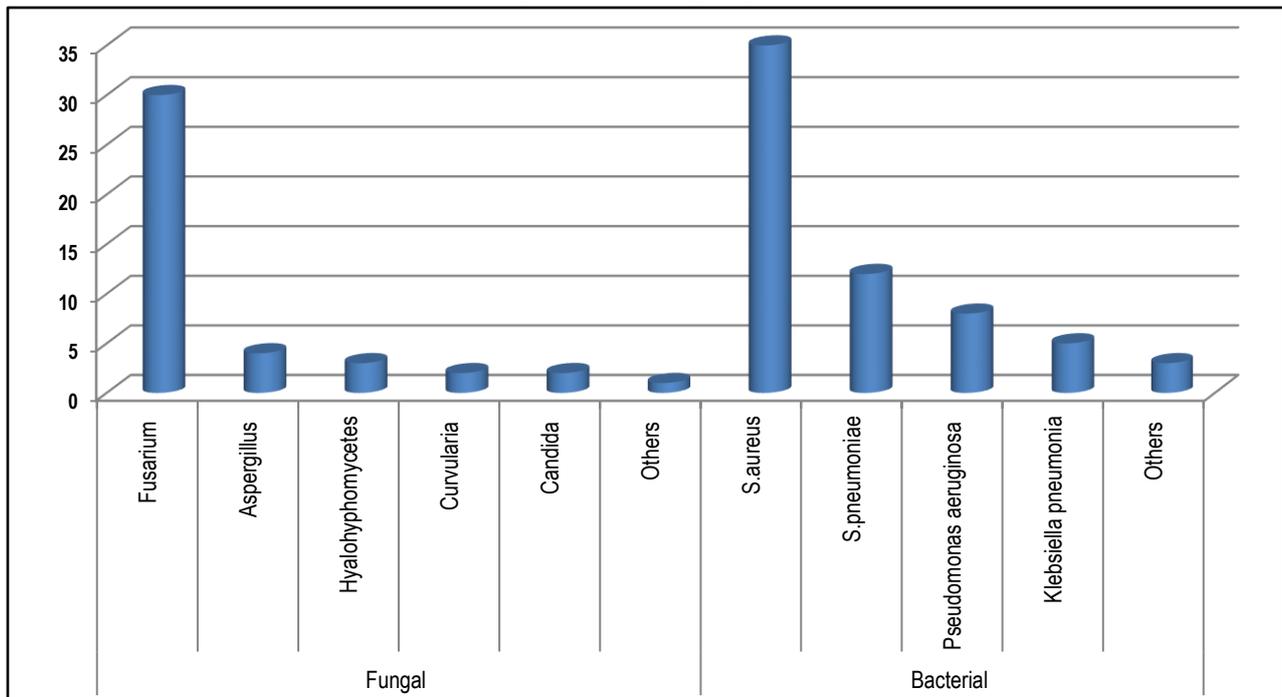
Table 2: Type of isolates

Type	Number	Percentage
Only fungal	38	39.6
Only bacterial	52	54.2
Mixed	6	6.2

Table 3: Microbiological profile

Microbiological profile		Number
Fungal	Fusarium	30
	Aspergillus	4
	Hyalohyphomycetes	3
	Curvularia	2
	Candida	2
	Others	1
	Bacterial	S.aureus
S.pneumoniae		12
Pseudomonas aeruginosa		8
Klebsiella pneumonia		5
Others		3

Graph 2: Microbiological profile



RESULTS

In the present study, assessment of a total of 96 patient of infection keratitis was done. Mean age of the patients of the present study was 45.8 years. Majority of the patients of the present study belonged to the age group of 30 to 50 years. 56.25 percent of the patients of the present study were males while the remaining were females. In the present study, contact lens wear was found to be present in 23.9 percent of patients. Positive ocular surgery history was found to be present in 29.1 percent of patients. Ocular trauma history was found to be present in 26.1 percent of the patients. 23.9 percent of the patients were diabetic. In the present study, only bacterial isolates were found to be present in 54.2 percent of the patients. Only fungal isolates were found to be 39.6 percent of the patients. Mixed infection was found to be present in 6.2 percent of the patients. Fusarium, Aspergillus, Hyalophomycetes, Curvularia and Candida were the most common fungal species encountered in the present study. S.aureus, S.pneumoniae, Pseudomonas aeruginosa and Klebsiella pneumonia were the most common bacterial species encountered in the present study.

DISCUSSION

Worldwide, infectious corneal disease is an important cause of visual impairment and blindness, with reported annual incidence between 1.5 to 8 million, being more prevalent in developing countries. Although, infectious keratitis is an uncommon event in paediatric patients, amblyopia is of concern, since altered corneal transparency during infancy prevents normal neurophysiological development.^{6,7} The etiological and epidemiological features of infective keratitis [IK] depend on host factors, geographical location and the climate. Several risk factors like age, sex, immune status and socio-economic background determine the pathogenesis of IK. Therefore, knowledge of above features plus local organisms and resistance patterns help in rapid identification and appropriate selection of antimicrobial therapy.⁸ Hence; under the light of above mentioned data, the present study was

undertaken to assess the microbiological profile of patients with infection keratitis.

In the present study, assessment of a total of 96 patient of infection keratitis was done. Mean age of the patients of the present study was 45.8 years. Majority of the patients of the present study belonged to the age group of 30 to 50 years. 56.25 percent of the patients of the present study were males while the remaining were females. Mediero S et al studied antibiotic susceptibility in bacterial keratitis (BK), its profile over 10 years and its influence on ophthalmological practice. Risk factors for keratitis, visual acuity (VA), empirical topical treatment, corneal infection characteristics and outcomes were analyzed for BK due to Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus pneumoniae, Pseudomonas aeruginosa and Propionibacterium acnes. 389 positive corneal scrapings were collected. All Gram-positive bacteria were susceptible to vancomycin. P. aeruginosa demonstrated >90% sensitivity to the most-commonly-used topical antibiotics. Susceptibility to methicillin was 90.2% for S. aureus and 66.3% for S. epidermidis. 1.9% required enucleation and 2.8% required surgical treatments. Final VA improved after treatment in keratitis due to S. aureus ($p=0.026$) and S. epidermidis ($p=0.005$). There was a correlation between S. aureus resistance to methicillin ($p=0.002$) and levofloxacin ($p=0.043$) and enucleation (20% and 10%, respectively) compared with a 0% rate of enucleation in S. aureus-susceptible keratitis. BK due to S. pneumoniae is very aggressive irrespective of antibiotic sensitivity.⁹

In the present study, contact lens wear was found to be present in 23.9 percent of patients. Positive ocular surgery history was found to be present in 29.1 percent of patients. Ocular trauma history was found to be present in 26.1 percent of the patients. 23.9 percent of the patients were diabetic. The distribution of each bacterial isolate among the different type of ocular infections might be determined by variety of factors. For instance, ocular surface disease and contact lens use have been strongly associated with bacterial keratitis; the inflammatory reaction and anatomical

disruption might be a good opportunity for some normal floras such as members of the Staphylococci to elicit infection. Moreover, infections might be attributed to traumatic inoculation of the organisms along with foreign bodies and delayed repair secondary to trauma. This has been evidenced in post-traumatic infections of Staphylococci, Streptococci, *B. cereus* and many other gram negative organisms. Bacteria such as *P. aeruginosa* are resistant to lens cleaning solutions where they adhere and spread through the formation of lipid rafts in contact lens users.¹⁰⁻¹²

In the present study, only bacterial isolates were found to be present in 54.2 percent of the patients. Only fungal isolates were found to be 39.6 percent of the patients. Mixed infection was found to be present in 6.2 percent of the patients. *Fusarium*, *Aspergillus*, *Hyalohyphomycetes*, *Curvularia* and *Candida* were the most common fungal species encountered in the present study. *S.aureus*, *S.pneumoniae*, *Pseudomonas aeruginosa* and *Klebsiella pneumonia* were the most common bacterial species encountered in the present study. Ranjini CY et al microbial profile of infectious keratitis in a tertiary eye care hospital. A total of 312 patients presenting to a tertiary eye care hospital with infected corneal ulcer were enrolled in this study. Their socio-demographic data and risk factors were recorded. Corneal scrapings collected from the edge of the ulcer were processed for direct gram stain and KOH mount. Culture was recovered on blood agar, chocolate agar, MacConkey agar and Sabouraud's dextrose (SDA) agar in multiple C shaped streaks. After overnight incubation, bacterial culture was followed by standard biochemical tests and antimicrobial sensitivity according to the clinical and laboratory standards institute (CLSI) guidelines. Inoculated SDA was inspected daily for up to 10 days and the growth was identified by its colony morphology, pigment production and lacto-phenol cotton blue mount examination. Of 312 patients, a microbial etiology was established in 117 cases (37.5%). Of these, 72 (61.5%) were male. The age range of 41-60 years was the most affected group. Of 117 positive cases, 52 (44.5%) were bacterial, 58 (49.5%) were fungal and 7 (6%) patients showed mixed bacterial and fungal infection. The most common isolated fungus was *Fusarium* which was detected in 36 (31%) cases, followed by *Aspergillus* spp in 13 (11%) subjects. *Staphylococcus aureus* was the most common isolated bacteria. All Gram positive cocci were susceptible to vancomycin followed by gatifloxacin, whereas all Gram negative bacilli were susceptible to gatifloxacin. Routine microbiological examination of patients with corneal ulcer is necessary in order to analyze and compare the changing trends of the etiology and their susceptibility patterns.¹⁰

CONCLUSION

From the above results, the authors conclude that infection keratitis comprises of mixed spectrum of bacteria and fungi. However; further studies are recommended for better exploration of results.

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