



Original Research Article

Microbiological profile of infective keratitis in a tertiary care hospital in north Karnataka

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ABSTRACT

Introduction: Corneal blindness is seen worldwide with 1.5 to 2 million new cases reported every year and approximately there are 6.8 million cases of corneal blindness in India.

Materials and Methods: The study constituted 109 clinically diagnosed infective keratitis cases. Aseptically collected corneal scrapings are subjected to Gram stain, KOH wet mount & Culture. Further identification done by study of Colony morphology, staining & biochemical tests. Antibiotic sensitivity was found using Kirby bauer's disc diffusion method following CLSI guidelines.

Results & Discussion: Males affected more common than females. Common age group being 21-40 yrs. Infective keratitis is usually Bacterial(61.4%) in origin than fungal(22%). Trauma found to be the most common predisposing factor followed by diabetes, other ocular diseases, surgery & corticosteroid therapy. Trauma with vegetative material is most common. Streptococcus pneumonia & pseudomonas are most common bacterial cause while Fusarium & Aspergillus cause most fungal cases.

Conclusion: Infective keratitis both bacterial & fungal are more common in working males, mainly agriculturists who are exposed to vegetative trauma. Early detection and treatment with proper antibacterial & antifungals is important to prevent ocular problems and scarring of cornea.

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1. Introduction

Infective keratitis is one of the leading cause of monocular blindness in developing countries in Asia and Africa.¹ Corneal ulcer is infective condition of cornea which is a vision threatening disorder. Corneal blindness is seen worldwide with 1.5 to 2 million new cases reported every year and approximately there are 6.8 million cases of corneal blindness in India.² Infective keratitis affects both male and females of all age group.^{1,2}

Infective keratitis leading to corneal ulcers are caused by various causative agents both bacterial and fungal. The bacterial causes such as staphylococcus aureus,

streptococcus pneumoniae, streptococcus viridians and pseudomonas. The fungal causes are Fusarium spp, Aspergillus spp, curvularia, and unclassified fungi.³

Infective keratitis are commonly caused by trauma mainly in people engaged in agricultural, manual labourers usually dealing with plant or vegetative matter that causes infection which ulcerate and leads to corneal blindness if left untreated. Most of the fungal keratitis are associated with various predisposing factors such as trauma, surgical ocular condition, use of contact lens, diabetes and use of steroids.^{3,4}

Present study was conducted to systematically determine the microbiological profile of infective keratitis in this region and its antibiotic sensitivity pattern, early diagnosis and treatment not only will prevent the corneal blindness but

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also to reduce the morbidity associated with it.

2. Material and Methods⁵⁻⁹

The present study was conducted as a retrospective study for a period of one year starting from March 2018 in a tertiary care hospital attached to MR Medical College, Kalaburagi in north Karnataka.

Present study was conducted by Dept. of microbiology and ophthalmology department of MR medical college. Total samples collected were 109 from clinically diagnosed cases of infective keratitis.

2.1. Inclusion criteria

All clinically diagnosed cases of infective keratitis of all age groups belonging to both sexes.

2.2. Exclusion criteria

Patients diagnosed as viral or protozoal keratitis were not included in the study.

2.3. Specimen collection

Corneal scrapings were collected by the ophthalmologist after anesthetizing the affected eye by tropical lignocaine. Corneal scrapings were collected from the edge and base of the ulcer. For bacterial, the received samples were inoculated on sheep blood agar Mac Conkeys agar. Blood agar plate and macconkey agar plates incubated for 37⁰c for 24-28hrs. Further identification was based on colony morphology, grams stain and battery of biochemical tests done as per standard protocol. Antibiotic sensitivity testing of bacterial isolates was done by modified Kirby Buer's disc diffusion method as per CLSI guidelines. HiMedia antibiotic discs used for gram positive and gram negative bacilli.

Fungal keratitis was diagnosed by doing a KOH mount of specimen and cultured on sabourauds dextrose agar incubated at 25⁰c. Fungal cultures were identified by colony morphology and LPCB mount.

3. Results

Total Clinically diagnosed cases were 109 out of which 67 were bacterial corneal ulcer and 24 were fungal corneal ulcers, 18 samples didn't give any growth (Table 1)

Infective keratitis is usually Bacterial(61.4%) in origin than fungal(22%).

Infectious keratitis most commonly seen in Males than females with ratio 2.2:1.

21-40 age group(45%) are most commonly affected followed by 41-60yrs (33%)

Agriculturists (50.3%) are found to be the most commonly affected followed by Manual labour(16.51%), carpenter(13.56%) & others(14.67%).

Table 1: Types of infective keratitis

S. No.	Type of infection	Number of cases(%)
1	Bacterial isolates	67 (61.46%)
2	Fungal isolates	24(22.01%)
	No bacterial or fungal growth(clinically diagnosed)	18(16.51%)
	Total	109

Table 2: Distribution of cases based on sex

S.No.	Sex	Number of cases
1	Male	75(68.8%)
2	Female	34(31.2%)
	Total	109

Table 3: Age wise distribution of cases

S.No.	Age	Number of cases	Percentage of cases
1	0-20	09	9.1%
2	21-40	49	44.95%
3	41-60	36	33.02%
4	61-80	15	13.76%

Table 4: Occupational distribution of cases

S.No.	Occupation of patients	Number of cases	Percentage of cases
1	Agriculture	55	50.3
2	Manual labour	18	16.51
3	Carpenter	15	13.76
4	Welders/blacksmith	06	5.5
5	others	16	14.67
6	Total	109	100

Trauma(54.1%) found to be the most common predisposing factor followed by diabetes(34.86%), other ocular diseases (4.58%), surgery(3.66%) & corticosteroid therapy(2.75%).

Table 5: Case distribution based on preexisting factors

S.No.	Pre-existing condition in patients	Number of cases	Percentage of cases
1	Corneal Trauma	59	54.12
2	Diabetes	38	34.86
3	Ocular diseases	05	4.58
4	Post ocular surgery	04	3.66
5	Corticosteroid therapy	03	2.75
	Total	109	100

Corneal trauma with the vegetative material (54.25%) is most common in causing infective keratitis.

Table 7 Total of 67 bacterial isolates was seen in the study out of which 46 were gram positive, 21 gram negative

Table 6: Nature of material causing corneal trauma

S.No	Nature of material causing corneal trauma	Number of cases	Percentage of cases
1	Vegetative material	32	54.25
2	Sand/dust	09	15.25
3	Finger nails	5	08.47
4	Stone pieces/metal pieces	5	08.47
5	Wood dust	4	06.77
6	Cloth	1	1.69
7	Miscellaneous (Insect, cow tail/ acid)	3	5.08
	Total	59	100

bacteria and 24 were fungal isolates. *Staphylococcus aureus* is most common gram positive bacteria followed by *Streptococcus pneumoniae*, *Staphylococcus epidermidis*, *Corynebacterium* spp & *Micrococcus* species. Among gram negative bacteria *Pseudomonas* is the most common followed by *Klebsiella*, *Haemophilus*, *Moraxella* & *Acinetobacter*.

Mycotic keratitis is mainly caused by *Fusarium* (37.5%) followed by *aspergillus* (37.4%), *curvularia* (8.33%) & *candida* (4.16%).

Antibiotic sensitivity pattern of bacterial isolates showed Amikacin as the best antibiotic with higher sensitivity. The antibiotic sensitivity is as shown in Tables 9 and 10. Antibiotic sensitivity of gram positive bacteria.

4. Discussion

Present study was conducted for period of two year at hospital attached to MR Medical college, Kalaburagi in north Karnataka to determine the microbiological profile of infective keratitis prevalent in the region.

In the present study incidence of corneal ulcer was seen most common in age group 21-40 years with 44.9% followed by 41-60years with 33.02% Which is supposed to be comparable with studies conducted by Amrutha KB et al,¹⁰ Waghmare AS et al,¹¹ Sharmila Raut et al,¹² Metha S et al,¹³ Gotekar R. B et al,¹⁴ where as Vasudha CL¹⁵ study had 41-50 years as most common age group with 38.8%, Gotekar R.B et al¹⁴ study stated 56-70 years as most affected age group with 35%.

Present study the percentage of males affected 68.8% compared to females affected 31.2% and male female ratio 2.2:1, males were more affected may be due to more exposure outdoors and hard labour in dry dusty areas. This was in accordance with studies done by Waghmare AS et al,¹¹ Metha S et al,¹³ Jayashree MP et al.¹⁶

Agricultural workers (50.3%) were most affected people in the present study due to exposure to the vegetative injuries because of nature of work, this was in line with studies done by Metha S et al¹³ Vasudha CL,¹⁵ Jayashree MP et al.¹⁶

Predisposing factors such as corneal trauma in our study was 54.12% followed by diabetes 34%, this finding was comparable with studies done by Waghmare AS et al.,¹¹

Sharmila Raut et al.,¹² Metha S et al.,¹³ Suwal S,¹⁷ Gotekar R. B et al.,¹⁴ Jayashree MP et al,¹⁶ Tarekegn Wuletaw et al.¹⁸

Percentage of vegetative trauma was 54.25% followed by Sand and dust 15.2%. Similar findings are seen in most of the studies done. In a study done by Vasudha CL¹⁵ vegetative trauma was 27.7% diabetes 16.6%, Waghmare AS et al.,¹¹ Sharmila Raut et al.¹² 30% and 36% respectively.

Our study showed bacterial isolates were 61.4% and fungal isolates 22% whereas 18 (16.4%) samples from clinically diagnosed cases didn't show any growth, this was in accordance with studies done by Amal Ibrahim Abouzeid et al.¹⁹ showed that 40% of samples didn't grow any type of isolates, Gotekar R.B et al.¹⁴ showed 39.7% no growth.

Most common bacterial isolate was streptococcus pneumoniae(34.3%) followed by staphylococcus aureus (17.9%) which was comparable with Vasudha CL,¹⁵ Jayashree MP et al.,¹⁶ whereas study done by Reena Anie Jose et al.²⁰ showed staphylococcus epidermidis and Waghmare AS et al.¹¹ showed staphylococcus aureus to be the most common bacterial isolate.

Most common fungal isolate was fusarium followed by aspergillus spp similar findings were seen in studies conducted by Vasudha CL et al,¹⁵ Waghmare AS et al,¹¹ while Sharmila Raut et al¹² study showed aspergillus as most common fungal isolate with 39.3%

5. Conclusion

Infective keratitis whether bacterial or fungal are more common in working males, agriculturist who are exposed to vegetative trauma. North Karnataka is known for farming which is the main occupation where vegetative injuries are more common. The prevalence of streptococcus pneumoniae and fusarium infections are more compared to other causative microorganisms. Immediate diagnosis is helpful in the detection of the type of microorganisms by Gram stain and KOH mount of corneal scrapings. Early detection and treatment with proper antibacterials or antifungals is important to prevent ocular problems and scarring of cornea.

Table 7:

S.No.	Gram positive bacterial isolates	Number of cases	Percentage
1	<i>Streptococcus pneumoniae</i>	23	34.3%
2	<i>Staphylococcus aureus</i>	12	17.9%
3	<i>Staphylococcus epidermidis</i>	05	7.46%
4	<i>Corynebacterium spp</i>	03	4.47%
5	<i>Micrococcus spp</i>	03	4.47%
	Total gram positive bacteria	46	68.6%
S.No	Gram negative bacterial isolates	Number of cases	Percentage
1	<i>Pseudomonas aeruginosa</i>	12	17.9%
2	<i>Klebsiella pneumoniae</i>	03	4.47%
3	<i>Haemophilus influenzae</i>	03	4.47%
4	<i>Morexella spp</i>	02	2.98%
5	<i>Acinetobacter baumannii</i>	01	1.49%
	Total gram negative bacteria	21	31.34%

Table 8: Fungal isolates

S.No	Fungal isolates	Number of cases	Percentage
1	<i>Fusarium species</i>	09	37.5%
2	<i>Aspergillus flavus</i>	05	20.83%
3	<i>Aspergillus fumigatus</i>	04	16.66%
4	<i>Curvularia</i>	02	8.33%
5	<i>Candida species</i>	01	4.16%
6	Unidentified fungus	03	12.5%
	Total fungal isolates	24	100%

Table 9: Antibiotic sensitivity of gram positive bacteria

Organism	No. tested	Ampicillin	Amikacin	Erythromycin	Gentamicin	Ofloxacin	Ciprofloxacin
		No. %	No. %	No. %	No. %	No. %	No. %
<i>Streptococcus pneumoniae</i>	23	23 100	23 100	23 100	23 100	15 65.2	16 69.5
<i>Staphylococcus aureus</i>	12	6 50	12 100	3 25	11 91.6	5 41.6	3 25
<i>Staphylococcus epidermidis</i>	5	4 80	5 100	2 40	5 100	5 100	4 80
<i>Corynebacterium spp.</i>	3	3 100	3 100	3 100	3 100	2 66.6	2 66.6
<i>Micrococcus sp.</i>	3	3 100	3 100	3 100	3 100	3 100	3 100.00
Total	46	39 -	46 -	34 -	44 -	30 -	28 -

Table 10: Antibiotic sensitivity of gram negative bacteria

Organism	No. tested	No. of strain sensitive and percentage								
		Ampicillin	Amikacin	Gentamicin	Ofloxacin	Ciprofloxin	Polymyxin B	Cephalexin	Pip-taz	imipenem
		No %	No %	No %	No %	No %	No %	No %	No %	No %
Pseudomonas aeruginosa	16	-	16	15	14	11	14	8	15	12
Haemophilus influenzae	3	-	100	93.7	87.5	68.7	87.5	50	93.7%	75%
Morexella sp.	2	100	100	100	100	-	-	1	-	-
Acinetobacter baumannii	1	2	2	2	2	2	-	2	-	-
			100	100	100	100	-	100		
		1	1	1	-	-	1	1	1	1
Total	21	5	28	25	26	18	16	11	16	13
		-	-	-	-	-	-	-	-	-

6. Source of Funding

None.

7. Conflict of Interest

The authors declare that there is no conflict of interest.

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