



CLINICAL AND ETIOLOGICAL STUDY OF INFECTIOUS KERATITIS

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ABSTRACT

Aim : To study the risk factors predisposing the patient to infectious keratitis. Also to identify the causative organisms by clinical examination and laboratory investigation. All walk in patients with keratitis presenting to the department of ophthalmology at tertiary care hospital. **Materials And Methods:** All patients with features suggestive of infectious keratitis presenting to the casualty and out patient department of ophthalmology from 1st January 2021 to 30th November 2022 will be included in this study. Patients having non-infectious keratitis will be excluded. **Results:** Out of 100 patients who were studied M:F ratio was 1.70:1. Most common age group affected was between 31 – 50 years (51.22% Bacterial, 55.38% Fungal and 45% Viral). Rainy season accounted for 41.46% of Bacterial, 34.14% of Fungal keratitis cases. Trauma was found to be the most common predisposing factor 62.2% of bacterial and 92.3% of fungal cases. Inferonasal cornea was involved with highest frequency in bacterial and central cornea in fungal keratitis. Streptococcus pneumoniae was the most common bacterial isolate whereas Fusarium sp. 32.3% was most common of fungal isolate. Both Streptococcus pneumoniae and Pseudomonas aeruginosa were highly sensitive to Amikacin. Response to treatment was superior in bacterial than fungal keratitis. Secondary glaucoma was the most frequent complication noted in 18.4% of bacterial keratitis and perforation was 17% in fungal cases. **Conclusion:** Trauma is the most common predisposing factor for infectious keratitis. Staphylococcus aureus is most common bacterial and Fusarium sp. is the most common fungal isolate. Response to treatment is good if diagnosis was made and treatment started early. In complicated cases secondary glaucoma is the most frequent complication.

KEYWORDS : Infectious keratitis; Non-infectious keratitis, Fungal keratitis, Bacterial keratitis, , Secondary glaucoma.

INTRODUCTION

Corneal infection is the most common cause of monocular corneal blindness worldwide. Corneal blindness accounts for 20 – 30 percent of all blindness in the developing countries of the world. Infective corneal disease is the leading cause of this problem in south asia.¹

Corneal blindness is a major public health problem in India and infections constitutes the most predominant cause. Surveys in Africa and Asia have confirmed this finding and a recent report on the causes of blindness world wide constitutently lists corneal scarring second only to cataract as the major aetiology of blindness and visual disability in many of the developing nations in Asia, Africa and the Middle East.²

According to World Health Organization (WHO) corneal diseases are among the major causes of vision loss and blindness in the world today, second only to cataract in overall importance. In India there are approximately 6.8 million people who have corneal blindness, with vision less than 20/200 (6/60) or in at least one eye and of these, about a million have bilateral corneal blindness. It is expected that the number of corneally blind people in India will increase to 10.6 million by 2020. Globally it is estimated that ocular trauma and corneal ulceration result in 1.5 to 2 million new cases of corneal blindness annually. Ninety percent of them occur in developing countries and it has now been recognized as a silent epidemic. A recent national survey by the government of India (1991-2001) estimated that corneal lesions are responsible for 9% of all blindness in our country.⁴

Microbial keratitis is a common, potentially sight threatening ocular infection that may be caused by bacteria fungi, viruses or parasites. Bacterial keratitis rarely occurs in normal eye because of the human cornea's natural resistance to infection. However, predisposing factors such as corneal injury, contact lens wear, ocular adnexal dysfunction (including tear film

deficiencies), corneal abnormalities and other exogenous factors, systemic disease and immunosuppression may alter the defense mechanisms of the outer eye and permit bacteria to invade the cornea. Bacterial corneal ulcer is an ocular emergency due to the often rapid progression of this corneal infection with the threat of visual loss and potential corneal perforation.⁵ A wide spectrum of microbial organisms can produce corneal infections and consequently the therapeutic strategies may be variable. Aggressive initial treatments for clinical cases of infectious keratitis can minimize the incidence of post infectious corneal scars. One of the key element in this effort is a proper understanding of the microbiological and clinical characteristics of this disease entity which will enable the ophthalmologist to initiate appropriate antimicrobial therapy.²

MATERIALS AND METHODS

The present study was undertaken on 100 patients of infective keratitis/corneal ulcer attending the out patient department of Ophthalmology with special reference to the etiology and predisposing factors, examination in detail for morphological features, microbiological work up, management and follow up.

History

- Age, sex, education, address
- Socio economic status
- Occupation
- History of injury or any other insult to the eye.
- Ocular symptoms and duration
- Review of prior ocular history
- Review of other medical problems
- Current ocular medications
- Aggravating factor/relieving factors
- Medication allergy

Examination

- General appearance of the patient
- Visual acuity
- Facial examination
- Eyelids and lid closure
- Conjunctiva and precorneal tear film
- Nasolacrimal apparatus
- Corneal sensation

Slit Lamp Biomicroscopy
Microbiological Investigations
 Microscopy Culture

Systemic Investigations

Haemoglobin
 Total and differential leucocyte count, Erythrocyte sedimentation rate. Random blood sugar
 HIV testing Hbs Ag testing

RESULTS

Clinical Characteristics

A total of 100 patients were seen with a corneal infiltrate that was compatible with a diagnosis of microbial keratitis during the study period of 29 months from January 2021 to November 2022. 59 eyes were examined for the first time in our OPD and 34 cases were referred from peripheral centers. Self medication with either steroid or steroid antibiotic combination eye drops was noted in 07 cases.

Keratitis involving the right eye was seen in 43 cases (43%) and the left eye in 57 cases (57%).

Table No. – 1 Sex Wise Distribution Of Cases

Microorganisms	Male		Female		Total	
	No	%	No	%	No	%
Bacterial	34	70.84	14	29.16	48	48
Fungal	23	62.16	14	37.84	37	37
Viral	6	40.00	9	60.00	15	15
Total	63	64.0	37	36.0	100	100

- In the above table male showed higher incidence of both bacterial and fungal cases (70.84% and 62.16 % respectively) females were predisposed slightly more to viral keratitis.
- The highest number of cases were seen between age group 31 to 50 years of age representing 25 and 21 cases of bacterial and fungal keratitis respectively.
- According to the above results socio-economically very poor class showed highest incidence of bacterial keratitis followed by fungal keratitis 27 and 24 cases respectively.
- The overall incidence of infectious keratitis in rural residents compared to urban residents (60.0 % and 40.0 % respectively) fungal cases were significantly higher in rural population.
- According to the data number of cases of infectious keratitis were seen in the months of July to October followed by November to February 41 and 35 cases respectively.

Table No. – 2 Predisposing Factor Associated With Corneal Ulcer

Factors associated	Bacterial		Fungal		Viral		Total	
	No.	%	No.	%	No.	%	No.	%
Trauma	30	62.5	33	89.2	05	33.4	68	68
Chronic dacrocystitis	04	8.3	00	00	00	00	04	4.0
Dry eye	06	12.5	01	2.7	00	00	07	7.0
Steroid usage	02	4.1	01	2.7	01	6.6	04	4.0
Lid disorder	03	6.3	01	2.7	00	00	04	4.0
Contact lens	00	00	00	00	00	00	00	00
None	03	6.3	01	2.7	09	60.0	13	13.0
Total	48	100	37	100	15	100	100	100

- According to this table trauma was the most common predisposing factor for both bacterial and fungal keratitis. 62.5 % cases of bacteria and 89.2% of fungal keratitis were due to trauma.

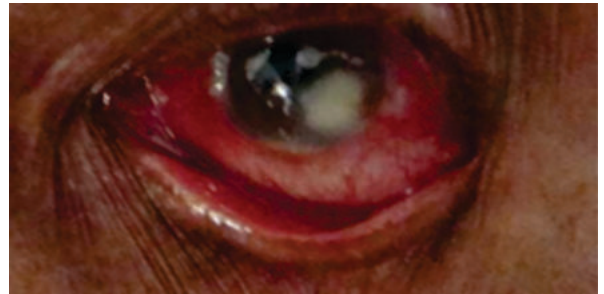


Figure - 1 : Bacterial Ulcer

- The most common offending agent causing trauma leading to ulceration was vegetative matter. Out of 44 cases of trauma with vegetative matter 26 (56.09%) patients developed fungal keratitis, whereas 16 (36.36%) patients developed bacterial keratitis. Direct smear examination was done by gram's staining and for fungi by 10% KOH mount and gram's stain. Both smear and culture positivity was noted in 36 out of 48 bacterial ulcers by gram's stain giving a sensitivity of (75%). KOH mount was positive in 31 out of 37 fungal ulcer giving a sensitivity of (83.80%). 12 bacterial ulcers and 06 fungal ulcers showed smear examination to be negative but positive by culture
- A clinical diagnosis of bacterial corneal ulcer was put on the basis of presence of corneal ulcer, conjunctival hyperaemia, ciliary congestion, mucopurulent exudates and presence of hypopyon. 48 out of 63 clinical diagnosed microbial corneal ulcers yielded growth in culture, thus giving a sensitivity of 59.4%

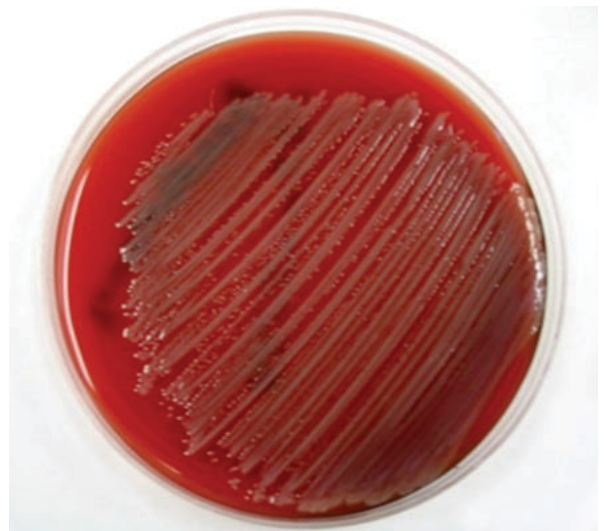


Figure 02 : Pseudomonas Aeruginosa On Trypicase Soya Agar (tsa)

Table No. – 3bacterial Isolates

Sr. No.	Isolates	No.	Percentage
1.	Staphylococcus aureus	12	25.0
2.	Pseudomonas aeruginosa	11	22.9
3.	Streptococcus pneumoniae	08	16.7
4.	Staphylococcus epidermidis	05	10.4
5.	Corynebacterium sp.	04	8.30
6.	Micrococcus sp.	03	6.25
7.	Haemophilus influenzae	03	6.25
8.	Moraxella sp.	02	4.20
Total		48	100

- Staphylococcus aureus was the predominant bacterial isoaltes (25.0%), followed by Pseudomonas aeruginosa (22.90 %), Streptococcus pneumoniae (16.7 %), Staphylococcus epidermidis (10.4 %), Corynebacterium sp. (8.30%), Micrococcus sp. (6.25%) Haemophilus influenzae (6.25%), Morexella sp. (4.20%).

Table No. – 4 Fungal Isolates From Corneal Ulcers

Sl. No.	Isolates	No. of cases	Percentage
1.	Fusarium sp.	12	32.4
2.	Aspergillus sp.	10	27.1
3.	Cladosporium sp.	03	8.10
4.	Pencillium sp.	03	8.10
5.	Bipolaris sp.	02	5.40
6.	Alternaria sp.	01	2.70
7.	Acremonium sp.	01	2.70
8.	Paecilomyces sp.	01	2.70
9.	Curvularia sp.	01	2.70
10.	Rhodoturula sp.	01	2.70
11.	Unidentified	02	5.40
	Total	37	100

- The predominant fungal isolates was Fusarium sp. (32.4%) followed by Aspergillus sp. (27.1%), Cladosporium sp. and Pencillium sp. (8.10%) and Bipolaris sp. (5.40%), Alternaria sp., Acremonium sp., Paecilomyces sp., Curvularia sp. and Rhodoturula sp. (2.70%) each. 5.40% of the isolates remained unidentified all which were hyaline fungi. Filamentous fungi accounted for 95.5 % of total 37 cases of fungal keratitis.

Table No. – 05 Complications

Sr. No.	Complications	Bacterial (48)		Fungal (37)		Viral (15)		Total	
		No	%	No	%	No	%	No	%
1.	Anterior staphyloma	01	5.30	01	4.40	0	0.0	02	4.65
2.	Panophthalmitis	01	5.30	02	8.70	0	0.0	03	6.97
3.	Secondary glaucoma	04	21.2	03	13.0	0	0.0	07	16.3
4.	Iris prolapse	01	5.30	02	8.70	0	0.0	03	6.97
5.	Pseudo cornea	02	10.4	03	13.0	0	0.0	05	11.6
6.	Irido cyclitis	03	15.8	03	13.0	1	6.66	07	16.3
7.	Corneal thinning	02	10.4	03	13.0	0	0.0	05	11.6
8.	Bleeding /Hyphaema	01	5.30	01	4.40	0	0.0	02	4.65
9.	Adherent leucoma	01	5.30	01	4.40	0	0.0	02	4.65
10.	Perforation	03	15.8	04	17.4	0	0.0	07	16.3
	Total	19	39.6	23	63.0	1	6.66	43	43.0

- In the above table secondary glaucoma was the most frequently observed complication followed by iridocyclitis, perforation, pseudo-cornea and corneal thinning.

DISCUSSION

- Patients below the age of 50 years were 77 (77.0%) while 33 (33%) patients were above the age of 50 years. Bacterial corneal ulcer showed a higher prevalence i.e., 31 cases in the economically active age group (21-50 years) representing 64.58 % of the bacterial isolates⁶
- Fungal corneal ulcer showed a higher prevalence i.e., 27 cases in the later working age group (31-60 years) representing 72.97 % of the bacterial isolates
- Out of 100 patients 63 (63.0%) patients were male and 37 (37%) were female. Male were more predisposed to bacterial and fungal infections 70.84% and 62.16 % respectively, whereas viral was seen more in female i.e., 09

cases out of 15 (60%) occurred in females.⁶

- Bacterial, fungal and viral keratitis, all there showed maximum incidence in the socio-economically disadvantageous group (Upper lower and low class) i.e., 40 cases of bacterial keratitis (83.33% of bacterial isolates) and 34 cases of fungal keratitis (91.89 %)
- Out of 100 patients 60 (60.0%) were from rural areas and 40 (40.0%) were from urban residents⁷
- Farmers and agricultural labourers constituted 19 cases of bacterial keratitis (39.58%) and 29 cases of fungal keratitis (78.37%).
- Peak incidence of corneal ulceration was seen during the months of July to October representing a total 46.40% of bacterial and 36.00% of fungal corneal ulcers of total 41 keratitis cases in this period. This period coincides with rainy season in this place. This was followed by second higher peak in harvest season of Tur Dal from November to February 33.33 % cases of bacterial and 37.83 % cases of fungal corneal ulcer were seen during this period out of total 35 keratitis cases in this period.
- History of corneal trauma predisposing to corneal ulceration was the most frequent predisposing factor noted, representing 30 cases of bacterial (62.50%) and 33 cases of fungal (89.20%) corneal ulcers respectively.^{6,7}
- The most common offending agent causing trauma leading to ulceration was vegetative matter. Out of 44 cases of trauma with a vegetative matter 36.36% developed bacterial keratitis whereas 59.09% developed fungal keratitis.
- Complications of microbial keratitis were noted in 43 cases. Among them there were 07 cases of secondary glaucoma, 05 cases of Pseudocornea, 07 cases of iridocyclitis and 07 cases of perforation. 05 showed corneal thinning, 03 showed iris prolapse, 02 cases showed anterior Staphyloma and other 02 showed adherent leucoma, 02 cases showed hyphaema

CONCLUSION

Trauma is the most common predisposing factor for infectious keratitis. Staphylococcus aureus is most common bacterial and Fusarium sp. is the most common fungal isolate. Response to treatment is good if diagnosis was made and treatment started early. In complicated cases secondary glaucoma is the most frequent complication.

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