



STUDY OF EPIDEMIOLOGICAL FEATURES, MICROBIOLOGICAL DIAGNOSIS AND TREATMENT OUTCOME OF INFECTIVE KERATITIS

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ABSTRACT

Introduction; Keratitis is an inflammations of the cornea and Microbial keratitis is a most common type. Potentially sight threatening ocular infection are known to be the second most significant cause of monocular blindness rated after cataract in some developing nations in particular. The aetiology of microbial keratitis varies significantly from country to country. **Objective;** To determine the epidemiological features, microbiological diagnosis and treatment outcome of infective keratitis. **Methods:** This hospital based prospective study conducted on 75 patients with clinical diagnosis of corneal ulceration at ophthalmology department, RNT Medical College and Hospital Udaipur, over a period of 18 months. **Result:** majority of cases were from 41-60 age group and most common factor was ocular vegetative trauma. Microorganisms were isolated from 75.86% of the 58 corneas that were cultured. culture proven bacterial keratitis. 58 patients taken for the laboratory investigation by smears and culture. Pure bacterial growth was present in 21 (36.2%) pure fungal growth was present in 19 (32.8%) mixed growth was present in 4 (6.9%), 14 (24.1%) were not showing any culture growth. Out of 75, 19 (25.33%) were viral keratitis.

KEYWORDS : Bacterial Keratitis, Microbial Keratitis, Ocular Vegetative Trauma, Viral Keratitis

INTRODUCTION

Keratitis is the term applied for inflammations of the cornea. Microbial keratitis is a common, potentially sight threatening ocular infection are known to be the second most significant cause of monocular blindness rated after cataract in some developing nations in particular and in the tropics in general. The aetiology of microbial keratitis varies significantly from country to country.

Mostly Infective keratitis are superficial but can later become deep. Morphologically corneal infection can be suppurative (purulent) or non suppurative (non-purulent) depending upon whether pus is formed or not.

Pain, foreign body sensation, watering from the eye, photophobia, blurring of vision and redness of eyes are the most common symptoms of infective keratitis. Swollen Lids, Blepharospasm, Conjunctival chemosis, conjunctival hyperaemia with ciliary congestion, Epithelial defect and Infiltrates around the area of defect are the most common.

Objective of the study to determine the epidemiological features, microbiological diagnosis and treatment outcome of infective keratitis.

MATERIAL AND METHODS:

This hospital based prospective study conducted at ophthalmology department, RNT Medical college and Hospital Udaipur, over a period of 18 months. (May 2020 – Nov 2021)

All patients with infectious corneal ulcers and suspected viral keratitis irrespective of age, sex included in this study. Patients of keratitis or corneal ulcers associated with severe systemic illness, pre-existing inflammation of eye, Patients with glaucoma or any anti-glaucoma medications and patients with one of the following condition like Healing ulcers, Mooren's ulcers, marginal ulcers, interstitial keratitis, sterile neurotrophic ulcers, and any ulcers associated with autoimmune conditions were excluded from the study

Patients were enrolled after clinical diagnosis of corneal ulceration or viral keratitis was made. Ulceration was defined as a loss of the corneal epithelium with underlying stromal infiltration and suppuration associated with signs of inflammation with or without hypopyon. A standardised form was filled out on each patient documenting socio-demographic information as well as clinical information including duration of symptoms, previous treatment, predisposing ocular conditions, associated risk factors, history of recurrence and history of systemic illness.

Treatment Strategy:

Started empirically same day of presenting the patient at OPD but after taking the corneal scraping.

- Suspected bacterial keratitis: Mild and peripheral keratitis- treatment started with monotherapy e.g. fluoroquinolones.
- Moderate to severe with central keratitis: cefazoline 1 hourly + Fortified amikacin 1 hourly + e/d atropine b.d. + Symptomatic .
- Suspected fungal keratitis: e/d natamycin 1 hourly + e/d atropine b.d. + Symptomatic
- Suspected viral keratitis: e/o int acyclovir 5 times a day + e/d cyclopentolate b.d. + Symptomatic Smear (Gram and KOH) results used to be reported on same day and t/t started according to smear results or continue with same empirical t/t when no conclusive results found in smear.
- From 4 day: Treatment continued or changed according to bacterial culture and sensitivity. From 7 day: Bacterial keratitis patients if shifted to monotherapy.
- Patients were given treatment and followed up on 4th day when culture and sensitivity for bacteria reported, 7th day, 14th day; and on 28th day when fungal culture used to be reported.

OBSERVATION AND RESULT

The study contain 75 newly diagnosed patients with infective keratitis during the study period.

Sociodemographic distribution; out of total, 65.3% were male

and majority of patients from 41-60 year age group. As per distribution of cases in relation to the mean age of patients: 48.14 ± 14.66 years was for bacterial keratitis, 50.10 ± 16.20 years for fungal keratitis and 37.94 ± 15.57 years for viral keratitis indicating a relatively increased occurrence of corneal infections (irrespective of the etiological agents) in the middle age group.

Maximum number of the patients with fungal keratitis and poly-microbial keratitis were found to be involved in agricultural related activities as compared to other occupations. (Table no.1)

Etiological And Clinical Characteristics Of The Patients.

Most common predisposing factor for keratitis was trauma (66.7%). Other complicating conditions like entropion (1.3%), steroid uses (1.3%), dacryocystitis (1.3%), foreign body (8.0%) and folliculitis (1.3%).

The most common offending agent causing trauma leading to ulceration was vegetative matter. Out of 33 cases of trauma with vegetative matter, 16 patients developed fungal keratitis, whereas 7 patients developed bacterial keratitis.

Hypopyon seen in only 70.7% patients and distribution of cases according to hypopyon in relation to diagnosis depicts in table no. 2.

77.3% patients clinically fulfilled the criteria for diagnosis of ulcerative keratitis which is corneal epithelial defect with underlying stromal infiltration and suppurative with signs of inflammation, rest 22.7% were presented as non-ulcerative keratitis. Type of ulcer diagnosed depicts in figure no.2. So these 58 patients taken for the laboratory investigation by smears and culture. Pure bacterial growth was present in 21(36.2%) pure fungal growth was present in 19 (32.8%) mixed growth was present in 4 (6.9%), 14(24.1%) were not showing any culture growth. Out of 75, 19 (25.33%) were viral keratitis.

Antibiotic sensitivity pattern of bacteria isolated depicts in table no.4

DISCUSSION

In the present study infective keratitis was seen in all age groups with preponderance among physically active adults; higher in males (65.3%) as observed in study of Bashir et al. (65%), Bharthi MJ et al. (65%) and Hagan M et al. (69.3%)

In our study trauma was the most common predisposing factor (66.7%) matching other studies from study of Srinivasan M et al. Madurai (65.4%) and more than in study of Hagan M et al. Ghana (39%)

Corneal injury with vegetative matter was the most common followed by unknown trauma and iron foreign body. Basak et al also found that vegetative material as the principal traumatic agent responsible for developing infective keratitis. There was higher incidence in outdoor worker. However study of Aarti Tewari et al. at shows that highest incidence of keratitis among housewives [21.3%] followed by farmers and labourer injury with vegetative material and wooden objects.

Microorganisms were isolated from 75.86% of the 58 corneas that were cultured. culture proven bacterial keratitis found in 21/58 (36.2%) which compares well with other studies across in India like done by Basak SK et al⁸(24.8%), Bharathi MJ et al. done at south India (3.9%).

Bacteria are responsible for a larger proportion of corneal ulceration in temperate climates than in tropical regions such as South India. The incidence of Gram-positive cocci (88.0%) of bacterial etiology, 22/58 (37.93%) of total corneal ulcers. coincides with studies of Basak et al.⁸ (71%) and Shrinivasan

et al. (79%) , predominance of coagulase negative staphylococcus [36.36% of total gram +ve cocci isolates] coincides well with the study done by Hagen et al⁸ (43%).

In other studies like study done by Basak et al⁸ (42.6%) at west Bengal show predominance of Staphylococcus aureus. These figures differ from our study as Staphylococcus aureus cultured in 36.36% of total gram +ve cocci. Streptococcus pneumoniae was the predominant species viz. Bashir et al Kashmir; Bharti MJ et al [41.85%] and Shrinivasan et al.¹¹ (44.3%) done at South India. But only two str. pneumoniae isolated in this study and not a single pneumococci isolate was found in Ahmedabad study Aarti Tewari, Nidhi Sood et al which could be due to regional variation in the occurrence of corneal pathogens. Another significant reason could be that lacrimal sac pathology was not observed as a major risk factor in this study.

Gram-negative bacilli were not observed in the present study. This differs from various studies which have demonstrated a 4.0-12.5% incidence. Only one isolate of gram -ve bacillus pseudomonas was found in our study (4.0%) which was as low as in study done by Bashir et al³ in Kashmir (12%) .But this finding differ from other studies of Ahmedabad, west Bengal, southIndia.

Fungal growth seen in 20.0% of total keratitis patients, 25.86% in the corneal ulcer patients. Almost half (44.11%) of all corneal ulcers with positive cultures were fungal in origin. approaches the fungal isolation rate in study of Hagan et al. at Ghana cultured fungi from 56% and study of Shrinivasan et al at.¹¹ (57%) and Basak et al.⁸ west Bengal (62.7%). Aspergillus species (56.52% of total fungal etiology) in the present study matches other studies at west Bengal (59.8%)⁸ and Kashmir (40%)³.

As in our study all the patients of keratitis started with the medical treatment initially showing results that (41.3%) healed with the corneal scar. Most of the viral keratitis 14/17 (82.3%) healed with the clear cornea but almost all ulcerative keratitis of bacterial and fungal origin with the scar. Out of 7 patients, 1 bacterial, 3 fungal, 1 mixed and 2 non-specific were not responding to medical treatment. Most of the fungal keratitis patients taken longer duration to heal than bacterial keratitis and most fungal keratitis were unresponsive to treatment . This study shows that although bacterial keratitis can be treated effectively, the treatment of fungal keratitis remains a challenge supported by study done by Usha Gopinathan et al.

CONCLUSION

- Male affected more than female with infective keratitis.
- Middle age group is more prone to infective keratitis than children and older age group.
- Agricultural activity and related ocular trauma were principal causes of fungal keratitis in this Udaipur region.
- Eyedrop Mofloxacin monotherapy and fortified antibiotic vancomycin, cefazoline and amikacin eyedrops were equally and 100% effective in bacterial keratitis patients.

Conflict of interest- No

Acknowledgment- No

Table no. 1 Distribution of patient's diagnosis according to the occupation

Occupation	Diagnosis					Total	P value
	Bacterial	Fungal	Mixed	Viral	Non-specific		
Farmer	4	9	1	0	2	16	0.611
	5.3%	12.0%	1.3%	0.0%	2.7%	21.3	
Labourer	3	5	2	2	2	14	
	4.0%	6.7%	2.7%	2.7%	2.7%	18.7%	

Businessmen/office worker	4	1	0	5	4	14
Housewife	5.3%	1.3%	0.0%	6.7%	5.3%	18.7%
Student	3	2	0	3	4	12
Unemployed	4.0%	2.7%	0.0%	4.0%	5.3%	16.0%
Other	2	2	1	4	2	11
Total	2.7%	2.7%	1.3%	5.3%	2.7%	14.7%
	3	0	0	2	0	5
	4.0%	0.0%	0.0%	2.7%	0.0%	6.7%
	2	0	0	1	0	3
	2.7%	0.0%	0.0%	1.3%	0.0%	4.0%
	21	19	4	17	14	75
	28.0%	25.3%	5.3%	22.7%	18.7%	100%

Table No. 2 Distribution Of Cases As Per Diagnosis

Hypopyon	Diagnosis					Total	P value
	Bacterial	Fungal	Mixed	Viral	Non-specific		
Present	10	10	2	0	0	22	0.0039
Absent	11	9	2	17	14	53	
Total	21	19	4	17	14	75	

Table No. 3 Microorganism Isolated From Corneal Ulcer

Bacterial micro-organism (N=25) Including mixed		Pure isolate	Mix with fungi	Total
Gram +ve cocci	Staph aureus	7(28%)	1(4%)	8(32.0%)
	Coagulase -ve staph	5(20%)	3(12%)	8(32.0%)
	Pneumococci	6(24%)	0	6(24 %)
Gram -ve bacilli	Pseudomonas	1(4%)	0	1(4%)
	Unidentified	2(8%)	0	2(8%)
Total		21(84.0 %)	4(16%)	25(100%)
Fungal micro-organism (N=23) Including mixed		Pure Fungal	Mixed with bacteria	Total
Filamentous hyphae	Aspergillus	10(43.5 %)	3(13.04 %)	13(56.52 %)
	Fusarium	5(21.17 %)	1(4.3%)	6(21.17 %)
Unidentified		4(17.4%)	0	4(17.4%)
total		19(82.6 %)	4(17.39 %)	23(100%)

Table No.4 Antibiotic Sensitivity Pattern Of Bacteria Isolated

	Amoxicillin	Oxacillin	Cefazolin	Vancomycin	ciprofloxacin	Moxifloxacin	Amikacin	Gentamicin	Azithromycin
Staph aureus (8) Sensitive/Resistant	6/2	8/0	8/0	8/0	6/2	8/0	8/0	2/6	6/2
Coagulase -ve staph (8)	5/3	7/1	8/0	8/0	5/3	8/0	8/0	6/2	6/2
Pneumococci (6)	6/0	6/0	6/0	6/0	4/2	6/0	6/0	1/5	6/0
Pseudomonas (1)	0/1	0/1	1/0	1/0	0/1	1/0	1/0	0/1	1/0

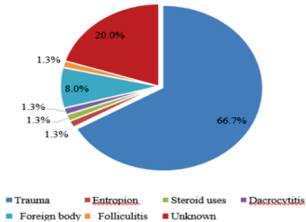


Figure-1 Predisposing factors associated with corneal ulcer

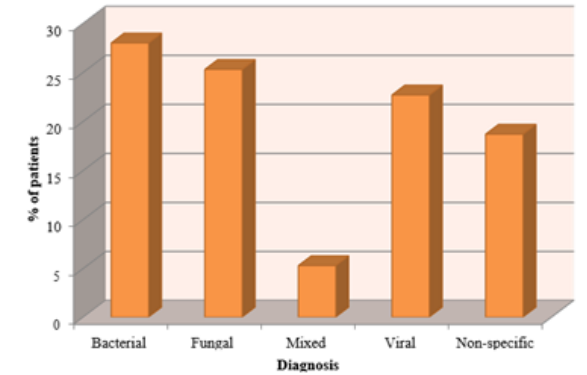


Figure no.2 Type of ulcer diagnosed

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