



ETIOLOGICAL & MICROBIOLOGICAL PROFILE OF INFECTIVE KERATITIS - A HOSPITAL BASED STUDY

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ABSTRACT

INTRODUCTION: Microbial keratitis is a potentially serious corneal infection and a major cause of visual impairment worldwide. A conservative estimate of the number of corneal ulcers occurring annually in the developing world alone is 1.5-2 million. Permanent visual dysfunction has been reported in a significant proportion of patients in both developing and developed countries. Srinivasan et al comment that ulceration of the cornea in south India 'is a blinding disease of epidemic proportions'.¹

AIM: To study epidemiological, etiological & microbiological factors associated with the patients with infective keratitis attending the hospital.

MATERIALS & METHODS: A Retrospective study of the patients who attended Ophthalmology Dept. of Gayatri Vidya Parishad Institute of Health Care & Technology Marikavalasa Visakhapatnam for Infectious Keratitis. A total of 83 corneal scrapings from patients presenting with infective keratitis were evaluated from Dec 2014 to Jan 2018. Scrapings were subjected to Gram stain KOH preparation and culture for bacterial and fungal pathogens on suitable media.

RESULTS: About 55% of the patients with corneal ulcer presenting to this hospital were inflicted with trauma prior to the onset of keratitis. Injury with vegetable matter followed by injury with wooden particles and stones were the major cause of corneal insult. Microbiological etiology was established in 90% of cases (75 of 83 cases). Out of 75 positive cultures 64% were bacterial and 36% were fungal. Among the bacteria most common organism grown was Pseudomonas, Staph aureus followed by coagulase negative staphylococcus. Among Fungal isolates Fusarium followed by Aspergillus were seen.

CONCLUSIONS: In our study trauma with vegetable matter was the most common causative factor, followed by wooden particles and stones. This may be because most of the patients are agricultural laborers. Males are more commonly affected than females. Bacterial ulcers are slightly more common than fungal & Pseudomonas and Aspergillus were the most common pathogens.

KEYWORDS : Suppurative Keratitis, Microbiology, Corneal Ulcer.

INTRODUCTION:

Keratitis is the inflammation of cornea due to various etiological factors. Corneal blindness due to corneal infiltration is known to be the second most common cause for monocular blindness after cataract in developing countries². Potential vision threatening ocular infections are caused by Bacteria, fungus, viruses & parasites.

The etiological & epidemiological factors of corneal ulceration were found to vary with standard of living of patient population; health of cornea, climate of the region³. It is desirable to have a clear understanding of the epidemiological factors, risk factors involved in causation, prompt institution of therapy. In order to initiate specific therapy it is essential to have meticulous laboratory investigations, microscopy & culture of corneal scrapings from lesion for identification of causative organism.

Several investigators have reported the prevalence of bacterial and fungal pathogens isolated from ulcerated corneas,^{4, 5, 6, 7, 8} and ⁹; however, there are few population-based studies demonstrating the true incidence of microbial keratitis in developing countries. Since the microbiological etiology varies from region to region and in different climates the present study gains significance on the backdrop of similar articles from other regions both from India and abroad.

AIM: The purpose of the study was to identify the etiology of Suppurative keratitis and enlighten the risk factors and advise the district administration & district health authorities for prevention of this preventable blindness.

MATERIALS & METHODS:

The study was conducted in Ophthalmology dept. of Gayatri Vidya Parishad Institute of Health Care & Technology Visakhapatnam from Dec 2014 to Jan 2018 on 83 patients. The samples were collected from the corneal lesions of these patients.

Ulcers suspected to be of Microbiological etiology were included in the study. Suspected viral corneal ulcers, Moorens ulcer, Marginal Keratitis, Interstitial keratitis were excluded. All the patients presenting with corneal ulcer were examined by ophthalmologist with slit lamp biomicroscopy. Corneal scrapings were taken from the base of the ulcer and edge of the ulcer under strict aseptic conditions using No.15 sterile blade or modified Kimuras spatula under 4% preservative free topical anesthesia. The material was smeared onto 2 slides – one for Gram stain and one for 10% KOH preparation and also material was inoculated onto blood agar, chocolate agar, nutrient agar and Sabouraud's Dextrose agar, glucose broth. All laboratory investigations were done using standard protocols and inoculated material on various media was incubated at 37 for 24 hrs. If no growth was obtained they were incubated for a further period of 24 hrs. Identification of bacterial colonies was done on the basis of Gram Staining and biochemical properties using standard laboratory criteria. The inoculated SDA media were incubated at 270 c and were examined after 3 weeks for growth. Fungi were identified basing on their colony characteristics and by morphological appearance of hyphae and spores in the Lactophenol cotton blue stain. The sample was considered positive if any one of the following criteria were met:

1. Growth of the same organism was demonstrated on 2 or more media.
2. The same organism was grown from repeated scrapings.
3. Correlates with the clinical signs.
4. Smear results confirmed with culture findings

RESULTS:

A total of 83 patients were compatible with the diagnosis of microbial keratitis for a study period of 3 years. 56 cases were examined in our OP department of our hospital and 27 cases were referred by general practitioners and already using antibiotics. Out of 27 patients, 6 patients were treated with corticosteroids drops .Self medication was noted in 2 cases. Keratitis was noted in OD 48% of cases (40) & OS 52 % (43).Out of 83, 50 were males and 33 were females (P- 0.92). There were 62 patients from rural origin and 21 patients from urban areas and the difference was statistically significant(P- 0.5). Patients below 60 years were 59 and above 60 years were 24.(P-0.06)

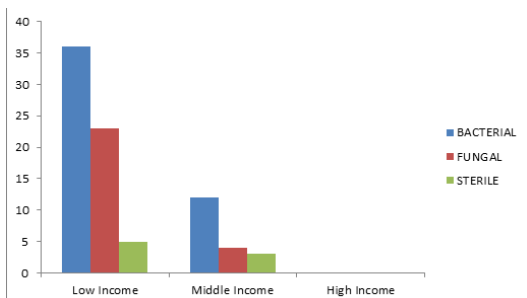
Age wise distribution of corneal ulcer:

AGE	BACTERIAL%	FUNGAL%	STERILE%
0-20	5	—	3
21-40	14	5	—
41-60	16	12	4
61-80	13	10	7
Total	48	27	8

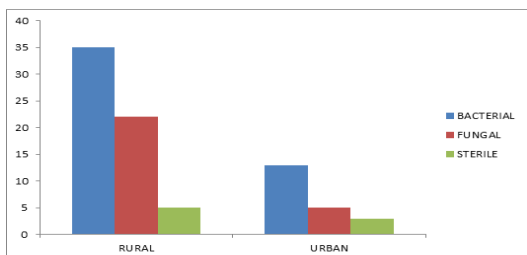
Gender distribution of Infective Keratitis

GENDER	BACTERIAL	FUNGAL	STERILE
MALE	28	17	5
FEMALE	20	10	3
TOTAL	48	27	8

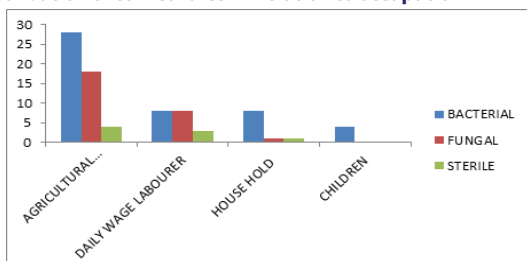
Distribution of corneal ulcer in socioeconomic group (P-0.35)



Distribution of corneal ulcer in relation to area of residence

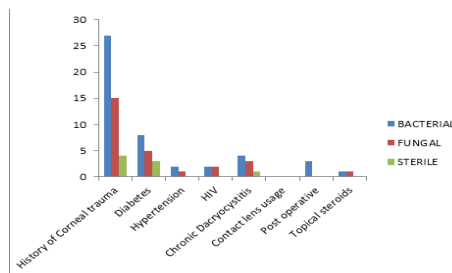


Distribution of corneal ulcer in relation to occupation



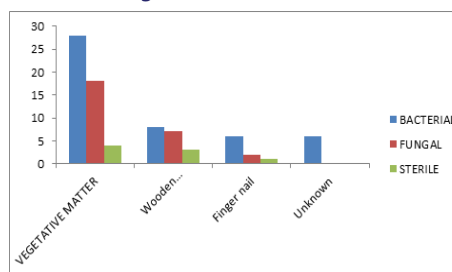
Agricultural laborers contributed to maximum number of bacterial and fungal corneal ulcers followed by daily wage laborers. (P-0.26)

Predisposing factors associated with corneal ulcer



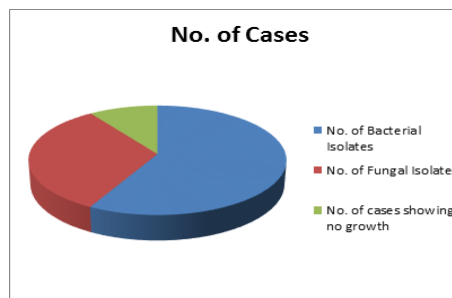
History of corneal trauma predisposing to corneal ulceration was the most frequent predisposing factor. Out of systemic diseases predisposing to corneal insult Diabetes outnumbered other causes. Chronic Dacryocystitis was another contributing factor.(P-0.94)

Type of Traumatic agent associated with corneal ulcer

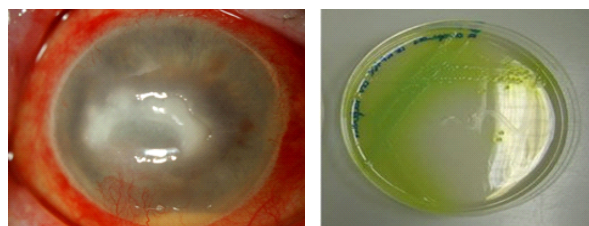


History of injury with vegetative matter was the most common injury followed by wooden particles sand and finger nail. (P-0.33)

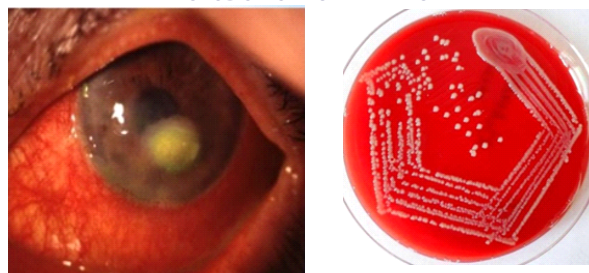
Microbiological Characteristics



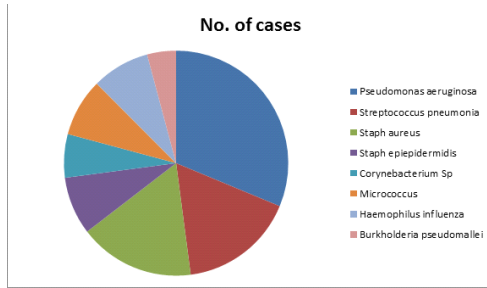
Bacterial Isolates from Corneal Ulcer



PSEUDOMONAS KERATITIS

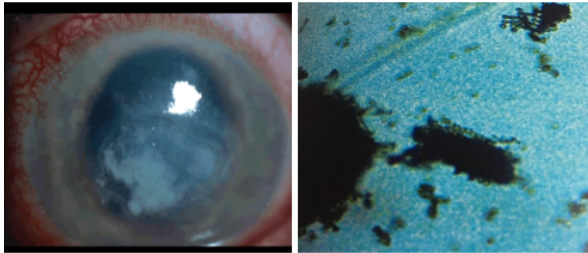


STAPHYLOCOCCAL KERATITIS

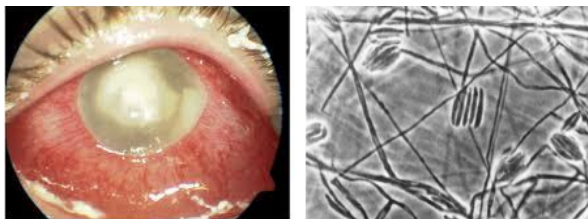


Fungal isolates from corneal ulcer

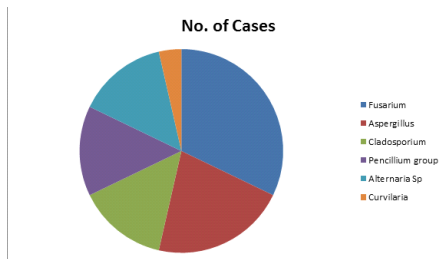
The clinical diagnosis of fungal corneal ulcer was done on the basis of its clinical appearance on slit lamp biomicroscopy – Dry looking ulcer, rolled out margins, feathery finger like extensions & satellite lesions.



ASPERGILLUS KERATITIS



FUSARIUM KERATITIS



The predominant fungal isolate was Fusarium 29% followed by Aspergillus 22%, Cladosporium 14%, Pencillium 14%, and Alternaria Sp. 14%.

Antibiotic sensitivity to Bacterial Isolates

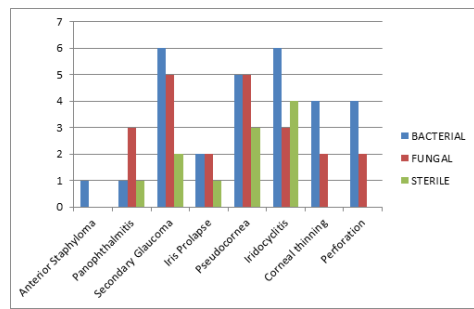
Pseudomonas aeruginosa resistant to Ampicillin but sensitive to Amikacin(90.9%) Gentamycin(81.8%) Gatifloxacin (82%). Haemophilus influenza were sensitive to Amikacin (100%) Gentamycin (100%) Gatifloxacin & Moxifloxacin..

Streptococcus pneumonia were sensitive to Amoxycillin, Ampicillin, Amikacin. Staph. Aureus were sensitive 20% to Ampicillin, 100% to Amikacin 80% to Gentamycin. Corynebacterium species were 100% sensitive to Ampicillin, Amoxicillin, Amikacin.

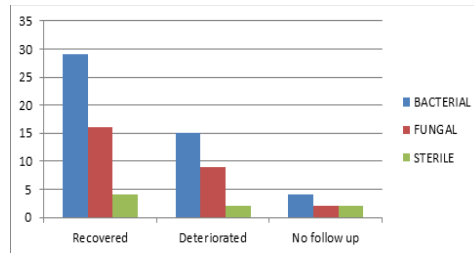
Direct smear examination for bacteria was done by Gram stain & for fungi by 10% KOH. Both culture & smear positivity was seen in 39 out of 48 cases. KOH preparation was positive in 28 cases.

The clinical diagnosis of fungal corneal ulcer was done on the basis of its clinical appearance on slit lamp biomicroscopy – Dry looking ulcer, rolled out margins, feathery finger like extensions & satellite lesions.

Complications of Corneal Ulcer(P - 0.87)



Response to Treatment



Average follow up was for 4 months . 60% of cases had good visual outcome than at the time of presentation. Final outcome was poor in 35% of cases. 43% of fungal ulcer improved with prompt treatment. 57% deteriorated inspite of treatment with cicatrization and scarring of cornea. (P- 0.65).Statistical analysis revealed very poor visual prognosis with ocular surface disorder , association of systemic diseases, diffuse , central and infero nasal location of infiltrate , severe anterior chamber inflammation & depth of penetration of ulcer.

SUMMARY & CONCLUSION:

1. In the present study 83 persons with corneal ulcers were studied for bacteria and fungi.
2. In the study group bacteria was isolated in 48 cases, fungi in 27 cases and no growth in 7 cases.
3. Pseudomonas aeruginosa was the predominant bacterial isolate followed by streptococcus and staph aureus.
4. Fusarium was the predominant fungal isolate followed by Aspergillus.
5. Age wise incidence showed bacterial ulcer more common between 20-60 age group and fungal ulcers between 40-60 ages.
6. Both bacterial & fungal ulcers were common in low socioeconomic group.
7. Both bacterial & fungal ulcers were more common in males when compared to females.
8. Rural folks more affected than urban.
9. Agricultural laborers more commonly affected in the present study.
10. Injury is most common predisposing factor especially vegetative matter, stone, wood particles.

DISCUSSION:

At birth the eyes are sterile and soon they become invaded by various bacteria and microorganisms. Bacterial keratitis rarely occurs in normal eyes because of resistance of human cornea to infections. However predisposing factors such as corneal injury, contact lens wear, dacryocystitis, systemic diseases & immunosuppression may alter the defense mechanism & permit bacteria to invade.

Fungal keratitis is common in 30- 40% of cases. Filamentous fungi are responsible for a larger proportion of cases in tropical climates than temperate climates particularly following trauma with vegetative matter. In the present study corneal injury was found as the risk factor associated with 55 (46 out of 83 cases) cases of infective keratitis. Similar findings were obtained in other studies

(65.4% in Madurai, 71.5% in Tirunelveli, South India, 82.9% in East India, 72% in North India, 60% in Nepal, 49.96% in Vietnam) In our study, majority of the ulcer patients were agricultural workers, homemakers, or laborers (80%), an occupation profile similar to Nepal (72%)^[9] and South India Madurai (78.8%),^[1] but in marked contrast with Ghana where only 16.1% of the patients were involved in agriculture activity^[10]

The present study describes features of 75 culture proven microbial keratitis diagnosed at GVPIHC&MT over a period of 38 months. Bacterial keratitis accounted for 64% of cases and fungal isolates were seen in 36% of cases. This is in contrast to the reports in South India as reported by Leck et al. and Bharathi *et al.* where 10 (44.1%) of the cases were positive for fungal pathogens.^[11,12]

Among the bacteria most common organism grown was *Pseudomonas*, *Staph aureus* followed by coagulase negative staphylococcus similar to the study conducted in Ghana and South India^[10], but studies conducted by Derek *et al.* suggest that *Staphylococcus epidermidis* (31.1%), filamentous fungi (25.7%), *Corynebacterium* species (16.3%), *S. pneumoniae* (13.5%), and *Pseudomonas aeruginosa* (13.5%) are the leading etiological microbes of microbial keratitis in the elderly.¹³ In the developing world, *S. pneumoniae* should always be considered as the most likely cause of bacterial corneal ulceration until proved otherwise, even though *pseudomonas* species has been identified as a frequent cause of corneal ulceration in some developing countries.^{[17][8],[9]}

Among Fungal isolates *Fusarium*(29%) followed by *Aspergillus* (22%) were seen^[14]. In the present study an increased incidence of infective keratitis was seen in the age group of 40-59 years, which is supported by similar study in South Kerala^[15]

Male preponderance (60%) was seen in our study. Males were affected 1.9 times more than females (65.93% vs 34.07%) which can be explained by the nature of their work profile. This is in accordance with prior studies by Geethakumari et al., Shafi T et al. and Gopinathan U et al.,^[16].

The incidence of Microbial keratitis was 26% in urban and 74% in rural areas.

CONCLUSION

In summary microbial keratitis is rare in the absence of predisposing factors. The epidemiology & etiology is specific to the particular region. Screening patients for predisposing factors, advising people at risk regarding protective aspects such as goggles to agricultural laborers during harvest season, treating the coexisting ocular & systemic diseases and educating them regarding risk of infection may reduce the occurrence of microbial keratitis. It is necessary to have the knowledge of risk factors, have a good microbiological work up for establishing timely institution of therapy in need to preserve vision

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