Section Microbiology

Original Research Article

A STUDY ON MICROBIAL ETIOLOGY OF KERATITIS IN A TERTIARY CENTRE IN SOUTH INDIA

Chinnusajeev[1], Greeshma Hareendranath[1], Parvathy V Das[2], Sija S[3]

[1]Assistant Professor, Department of Microbiology, Govt medical college, Allepey, Kerala, India.
[2]Assistant Professor, Dept of microbiology, Govt Med college, Allepey (Currently PhD Student)
[3]Assistant Professor, Department of Ophthalmology, Govt medical college, Allepey, Kerala, India.

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Corresponding Author:
Dr. Chinnusajeev,
Email: chinnusajeev@yahoo.com

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Abstract

Background: To identify the microbiological and clinical profile of patients admitted with keratitis and the drug sensitivity pattern of isolates from corneal sampling of these patients. **Materials and Methods:** A one year study was done and 92 corneal samples were received in our laboratory. This was done as a prospective study with the inclusion of patients presenting with keratitis attending the Ophthalmology department. Samples were collected aseptically by the ophthalmologist and directly inoculated into the culture media plates and also as slide mounts were send to the lab on the same day. Isolates were identified by fungal and bacterial culture methods and sensitivity testing done. **Result:** Most of the isolates (71%) were fungal followed by bacterial pathogens. and the main risk factor was found to be due to trauma. Among the isolates, Aspergillus and Fusarium were noted to be the most frequent isolates. With the bacterial isolates, streptococcus species was found to be the most common. **Conclusion:** Based on this study, fungal aetiology was more common in causing keratitis but due to early empirical treatment in trauma cases, most of the samples turned out to be sterile. Most of the patients after treatment had good visual acuity which may be due to early and correct empirical treatment. Welding occupation was more commonly isolated with trauma in our cases which may be attributed due to lack of proper usage of personal protective equipment.

INTRODUCTION

Keratitis is an inflammatory condition of the cornea than can occur due to injury, infection or prolonged use of contact lens. Infectious causes of keratitis include bacteria, fungi, parasites and also viruses. The risk factors of keratitis include trauma, prolonged use of contact lens, ocular surgeries, blepharitis, keratoconjunctivitis, defects of eyelids, chronic illness (diabetes, leprosy, rheumatic diseases) and medications (topical steroids). Previous studies have shown that infectious keratitis were common in young men involved in agriculture and with a previous history of trauma.[1]

Patients present with acute pain, discharge and inflammatory lesions in the eye. Most patients have a defect in the corneal epithelium. The condition requires aggressive management to prevent disease progression, corneal scarring and blindness. This study aims to isolate the etiological agents and their susceptibility pattern in a case of keratitis.

Annual incidence of keratitis it was estimated as 11.3 per thousand population, which is 10 times more frequent than a developed country like USA.[2] There was another study by Gonzales et al conducted in south India to find out the incidence of corneal infection in Madurai, Tamil nadu.[3]

Corneal opacity is the second leading cause, after cataract, in causing blindness in most cases throughout the world [4,5] Incidence in south India is 113 per one lakh population per year.[3] Timely preventive measures adopted to avoid corneal abrasion from developing into an ulcer can be done by giving therapy like chloramphenicol ointment as done in a study by Upadhyay et al in Nepal.[6]

The morbidity varies between mild and severe corneal ulcers. Geographic factors also affect the etiology of these ulcers. The profile of organisms, efficacy of the drug used and resistance change over the time, necessitating standard protocols for diagnosing and treating infections.[7]

MATERIALS AND METHODS

All patients who were admitted in ward with keratitis in ophthalmology department were included in the study. Samples were collected by ophthalmologist after instilling topical anaesthetic into the eye.

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Sample collection and processing

Material was scraped from both leading edge and deep in the ulcer base. Material was spread on a dry clean microscopic slide using a sterile No:15/11 blade. The ulcer was again scraped with the sterile blade. This material obtained was streaked on blood agar, chocolate agar and also on Sabouraud's dextrose agar for fungal etiology. Then the patient was started on empirical antibiotic treatment especially for trauma cases on first day of presentation.

The blood and chocolate agar plates were incubated for 48 hours at 37ºC.Sabourad's agar was incubated at 25 and 37 º C for 7 to 14 days.

Scrapings were also sent as smears on microscopic slide, those were treated with KOH and looked for fungal elements.

Contact lens placed directly on culture plate, their impression smear made on plates and were kept for 48 hours. Alternatively it was inoculated into the Brain heart infusion broth and incubated this broth and then subcultured.

Lactophenol cotton blue staining of the fungal isolates and gram staining of bacterial isolates were done from colonies that were grown in the culture plates. Bacterial isolates were further subjected for biochemical reactions, identification and sensitivity.

Patient was followed up from admission to discharge and also on further out patient visits.

Data was entered in excel and analysed using SPSS software. Quantitative variables are expressed as percentages.

Study was approved by institutional research and ethics committee.

RESULTS

In our study, 92 corneal samples were received in laboratory during the time period . Most of the cases who presented with keratitis were males (74%) and the age group of 30 to 60 years were found to be more affected(Table 1). Only 23 % of the corneal samples yielded isolates(Figure 1). Welding was the most common occupation risk factor observed(figure 2).Among the isolates, 12 (71 %) were fungal pathogens(figure 3). Diabetes and hypertension were noted to be the common co-morbities.

Table 1: Demographic Data

Patient	**(%)**
GENDER	
Male	68 (74%)
Female	24 (26%)
AGE	
<30 Years	12 (13%)
30- 60 Years	43 (47%)
>60 Years	37 (40%)
Isolate wise distribution	
Sterile	72
Fungal	12
Bacterial	8
RISK FACTOR	
Trauma	26
Surgery	2
Occupation Skilled labour Unskilled labour (farming) Not occupation associated	 6 5 81

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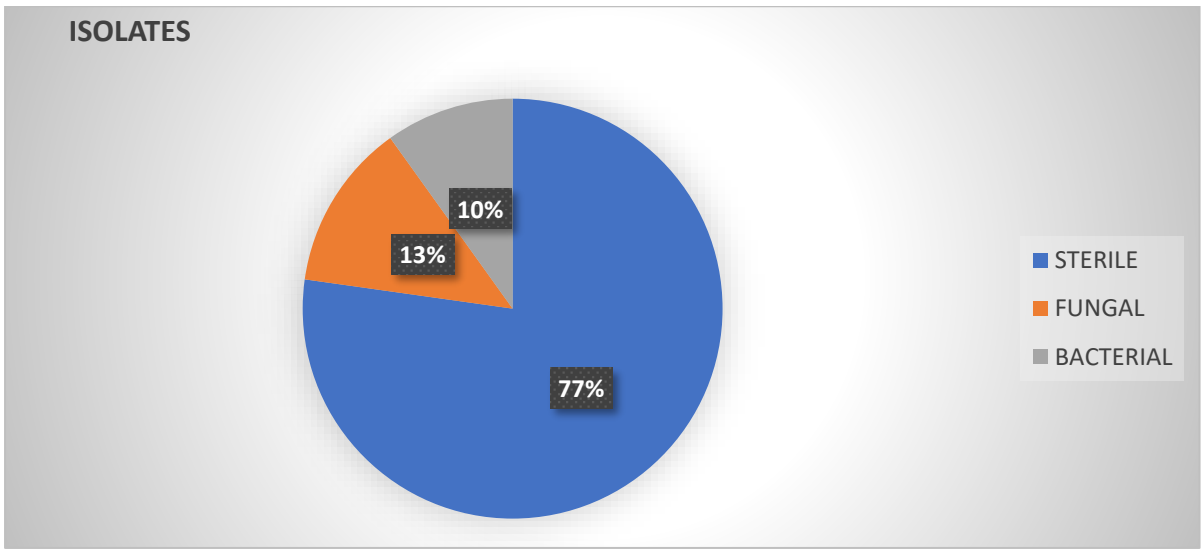

Figure 1: Proportion of Isolates Obtained

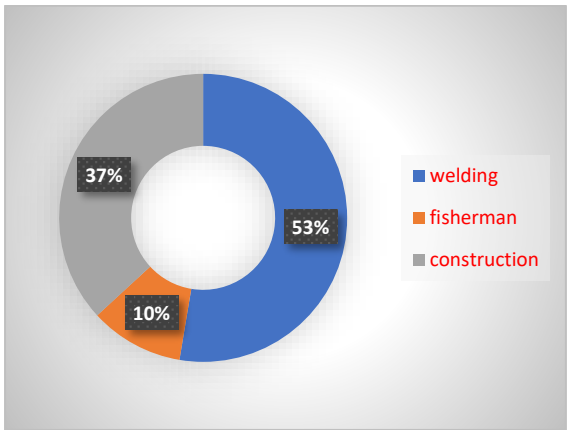

Figure 2: Occupation Related Risk

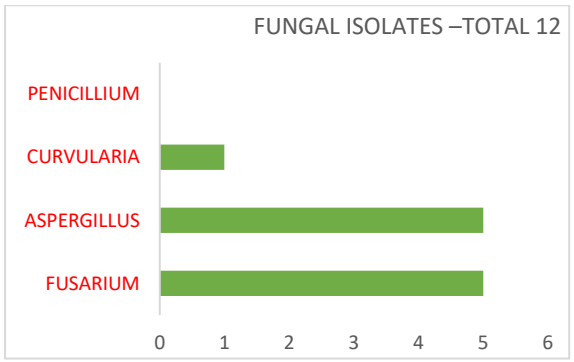

Figure 3: Fungal Isolates Obtained

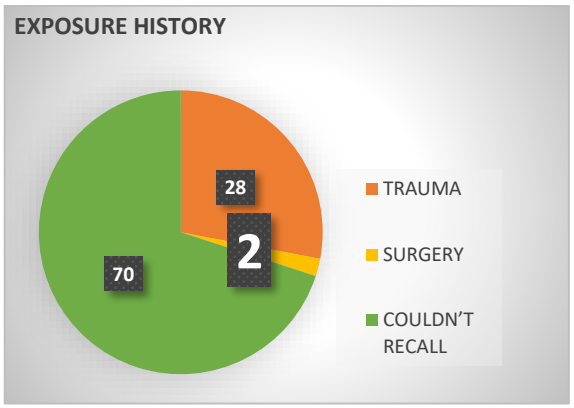

Figure 4: Exposure History

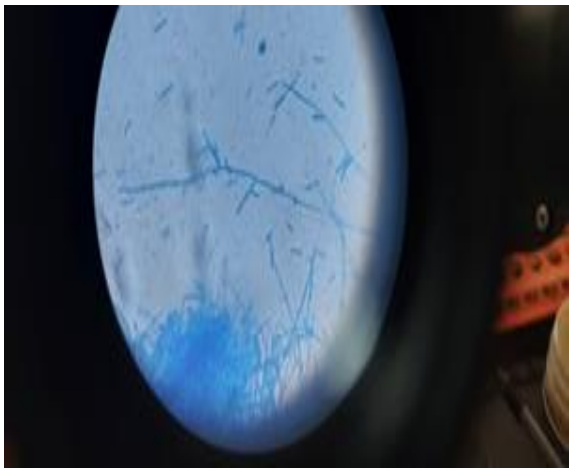

Figure 5: Fusarium Growth On Blood Agar(Direct Inoculation With Surgical Blade)

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Figure 6: Fusarium On Blood Agar (Direct Inoculation with Surgical Blade)

DISCUSSION

In our study, most of the cultures were sterile especially those with trauma history(Figure 4). Many factors could aggravate keratitis. About 92 patients with the clinical diagnosis of corneal ulceration were examined at the hospital. All met the criteria for clinical diagnosis of keratitis. For those patients with trauma history even before ulcer formation they were started on antibiotics. After obtaining the corneal scraping, patients were empirically started on fortified tobramycin, fortified gentamycin or vancomycin. Those patients suspected of fungal etiology, were started on natamycin and if severe then for these cases, voriconazole was also started. Mild cases were given broad spectrum coverage for bacteria. Those suspected of viral etiology were given acyclovir. Almost 77 % of the cultures were sterile. Among the 17 isolates obtained,71% were fungal isolates-fusarium most common along with aspergillus –(Figure 5,Figure 6) and the rest 29 % were bacterial. Of the bacterial causes, equal number of gram positive and negative isolates were obtained and the predominant gram-positive isolate was streptococcus.

In a similar study done at Madras at Aravind eye hospital by Sreenivas et al, streptococcus was the common bacterial isolate which was similar to our study. Almost half of corneal cultures were fungal in origin. In a study conducted in Ghana by Hagan et al, 56% of isolates were fungal in origin.[8]

In another similar study conducted at Madras among bacterial isolates, streptococcus was the most commonly isolated bacterial pathogen like in our study. The only difference was that, it was streptococcus pneumonia which was the commonest bacterial isolate while in our study it was streptococcus pyogenes. In a developing country unlike the industrialised world, pseudomonas was found to be common in contact lens wearers and streptococcus in those without any history of use of contact lens until proven otherwise.[8-12]

In our study, treatment was given after collection of clinical specimens, with empirical antibacterial therapy when the patients came to ophthalmology department. Those patients who presented with a history of trauma on the first day, empiric treatment was given even before ulcer was formed, which might have resulted in the cultures turning out to be sterile. Vegetative matter was the most common cause of trauma, and South India being an agricultural hub, this has been an expected trend.

CONCLUSION

In our study, we obtained more fungal isolates compared to bacterial and the prognosis after treatment was better in patients who were given empirical antibiotic treatment on the first day of admission. Most of the patients after treatment had good visual acuity, which may be due to early and correct empirical treatment. Welding occupation was more commonly associated with trauma in our study which may be attributed due to lack of proper usage of personal protective equipment.

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