



Int. J. Modn. Res. Revs.

Volume 3, Issue 10, pp 861-864, October, 2015

ISSN: 2347-8314

ORIGINAL ARTICLE

CLINICAL STUDY OF VARIOUS FACTORS IN ETIOPATHOGENESIS AND MANAGEMENT OF MICROBIAL KERATITIS

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Article History: Received 4th October,2015, Accepted 18th October, 2015, Published 19th October,2015

ABSTRACT

Purpose:The aim is to study various factors in etiopathogenesis and management of microbial keratitis in 50 consecutive patients attending the department of Ophthalmology, Raja Muthiah Medical College & Hospital(RMMCH) during the period from April 2014 to October 2015.**Design:**Prospective, observational case series.**Methods:**All the patients presenting with corneal stromal infiltrate underwent standard microbiologic evaluation of their corneal scrapings, with smear and culture-guided antimicrobial therapy.**Results:**The mean time from first symptoms or signs and presentation to hospital was 5-10days. The majority of subjects, had at least one of the risk factors commonly associated with infective keratitis was previous ocular trauma (78%).The majority of patients were found in the age group of 50 years and above. Male patients (64%) showed higher prevalence than the female patients(36%).Most of the patients are agricultural labourers (64%) with significant p value of <0.01. In the present study, the patients gave history of injury with stick, thorn, paddy husk and other vegetable matter. Ulcers measuring upto 6mm were found to be in majority 96%.Corneal scraping was obtained aseptically with a sterile No.15 parker surgical blade from the base and edges of each ulcer. Bacteria were majority isolated in all these cases, of which majority being Gram positive organisms (72%). The most common isolates identified were pseudomonas aeruginosa(21%), Staphylococcus aureus(16%) and Streptococcus pneumoniae (63%). The most common fungal isolates are Fusarium(73%) and Aspergillus(27%).Poor prognosis was associated with the presence of hypopyon, larger ulcers, previous ocular surgery, and poor visual acuity.

.Keywords: Microbialkeratitis, eyes, epidemiology, India

1.INTRODUCTION

Microbial keratitis is a serious ocular infectious disease that can lead to significant visual loss and ophthalmic morbidity. Bacteria is the most Common infective organism responsible for this morbidity. The severity of corneal infection depends on the underlying condition of the cornea and pathogenicity of the infecting bacteria. The Predisposing factors are ocular trauma, ocular surface disease and the use of contact lenses. Untreated infective keratitis may lead to perforation of the cornea. The associated morbidity is lack of diagnostic

facilities and appropriate treatment. Specific treatment requires accurate identification of causative microorganisms. This study is an effort to analyze the factors of etiopathogenesis and management of microbial keratitis.¹. Emphasizing the importance of corneal ulceration as an important cause of visual loss, many studies have reported the prevalence of microbial pathogens and identified the risk factors predisposing a population to corneal infection in India ^{2,3,4,5,6,7,8,10} and abroad¹⁴.

2.MATERIALS AND METHODS

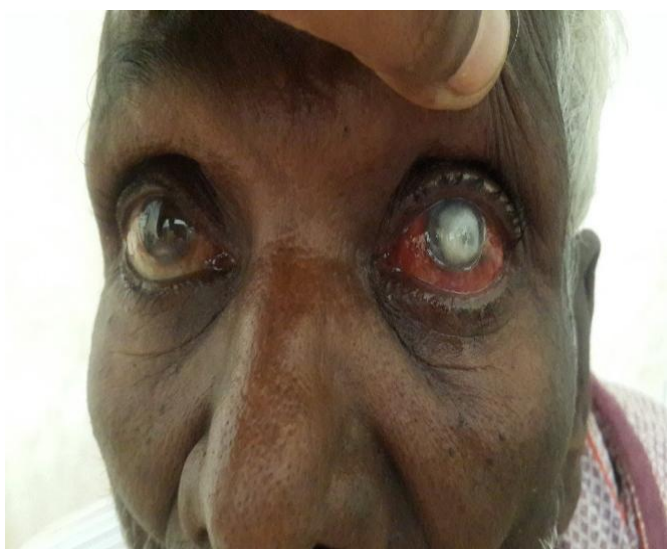
This is a prospective clinical study of various factors in etiopathogenesis and management of microbial keratitis on the group of patients attending Ophthalmology department, RMMCH for 18 months.50 consecutive patients diagnosed as microbial keratitis was taken into study. On the basis of

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clinical symptoms, patients were included and selected with inclusion and exclusion criteria which is as follows. Inclusion criteria: Suspected microbial keratitis with Irrespective of age, sex. Exclusion criteria: Mooren's ulcer, Neurotrophic ulcer, Herpes simplex keratitis, typical or suspected viral ulcers, healing ulcers, marginal keratitis, interstitial keratitis, atheromatous ulcer, neurotrophic keratitis.

Written consent was obtained from all above patients a standardized proforma was used to record the data. Detailed history and examination of the patients was taken regarding demographic features, time of onset of symptoms, predisposing factors including corneal injuries (agriculture, non agriculture, foreign bodies), contact lens wear, keratopathies, dry eye, Bell's palsy, lagophthalmos, chronic dacryocystitis, corneal anaesthesia, bullous keratopathy, spheroidal degeneration of the cornea, any surgery on the cornea, use of contact lens, or ocular leprosy was also noted.

The use of topical medications including topical corticosteroids and their duration were also noted. Visual acuity was measured with Snellen chart. All patients underwent thorough slit lamp examination to locate the site, size, surface, dry/moist, floor, edge and depth of ulcer. Ulcer was stained with 2% fluorescein to know the extent and details of ulcer. Corneal vascularization & corneal sensation were also noted. The amount of hypopyon anterior chamber was measured, its type, colour, consistency is noted. Lacrimal sac patency was checked by doing syringing. Intraocular pressure was checked by Non contact tonometer.



After the instillation of local anaesthetic 5g/L Proparacaine hydrochloride, corneal scraping was obtained aseptically with a sterile No.15 Parker surgical blade from the base and edges of each ulcer.^{2,3,6,7,9} By using 26 gauge needle the smear was taken from the margin of ulcer and the specimen collected was sent for preliminary microscopy and culture studies.

A portion of each scraping was examined microscopically for the presence of bacteria, fungi or acanthamoeba by using Gram's staining, 10% KOH and Giemsa staining methods. Another portion was inoculated on to blood agar,

chocolate agar, Sabouraud's agar, brain heart infusion broth, in C-shaped streaks and cultured for the potential growth of bacteria, fungi or acanthamoeba.

For bacterial cultures, the materials were inoculated aerobically at 37°C onto blood agar, chocolate agar, and potato dextrose agar (PDA). Cultures on blood agar and chocolate agar were evaluated after 24 hours and 48 hours, and then discarded if there was no growth. For fungal cultures the materials were inoculated on to Sabouraud dextrose agar (SDA) and incubated at room temperature, examined daily, and discarded after 2 weeks if there was no growth. When KOH smears were positive for amoebic cysts, a further corneal scraping was performed and the material was inoculated onto non-nutrient agar overlaid with *Escherichia coli*; this was discarded if there was no growth after 7 days. Bacterial cultures were considered positive only if growth of the same organism was demonstrated on both media or there was semi confluent growth at the site of inoculation on one media with identification of morphological characteristics of similar organism in Gram's Stain. The specific identification of bacterial colonies was performed on the basis of Gram's staining by microscopy and biochemical properties using standard laboratory criteria. The inoculated SDA media were incubated at 27°C and were examined daily until three weeks for growth.^{2,6,7,8} Fungi were identified by their colony characteristics on SDA and by the morphological appearance of the hyphae and spores in lacto phenol cotton blue stain.^{2,6,7} The growth of the same organism was demonstrated on two or more media.

The criteria adopted for microbial evaluation was that the sample would be considered positive if any one of the following were met.^{3,7,8,9}

- The growth of the same organism was demonstrated on two or more media.
- The same organism was grown from repeated scrapings.
- It was consistent with clinical signs.
- Smear results confirmed the finding from cultures.^{3,7,9}

The culture were examined daily for growth, colony characteristics, pigmentation and rapidity of growth. All results were recorded in master chart. Further the bacteria were tested for their resistance against the following ocular antibiotics: Cefuraxime, Moxifloxacin, Gentamycin, Tobramycin, Ceftazidime, Gatifloxacin.

Treatment was initiated by debridement of necrotic tissue for better antibiotic penetration. The ulcer was thoroughly scraped and washed with normal saline. Cycloplegics, antibiotics or fortified antibiotics, antifungals, analgesics were given. Patients were advised to report everyday to the hospital for review until a clinical healing of ulcer were achieved. Improvement of visual acuity, decrease in ulcer size along with, infiltration, hypopyon, congestion and subjective symptomatic improvement were taken as a positive response to therapy and were recorded.

3.RESULTS

50 patients with the clinical diagnosis of corneal ulcer with or without hypopyon were enrolled for this study. 32(64%) patients were males and 18 (36%) were females. keratitis occurred most frequently in the age group > 50 years. Most of the patients were from rural areas. The majority (64%) were farmers or agricultural workers, usually working in paddy field of which p value (<0.01).As for the laterality of the eye involved right eye (66%) is more affected than left (36%).Probably because majority of patients are right handed. The contamination is also more easily transfers to the right eye.A majority of the patients (86%) were seen between 5-10 days of their illness at our hospital and 5 (10%) patients reported after 10 days. 54% Delay in hospitalization leads to delay in treatment. The main cause of delay was the economic status of the individual and ignorance of the people. Primary care was sought by 76% patients before their first visit to us. A small number of patients 24% had used a medication that includes both steroids and antibiotics. Especially the fungal keratitis was aggravated on use of steroids.In the study ulcers measuring upto 6mm were found to be in majority 96% of the patients. Among them, a few patients were seen by ophthalmologists, received advice from ophthalmic assistants, went to general physician, received advice from chemists and patients went to physicians of alternative medicine (Homeopathy,Ayurveda), village healers.

Table 1. Distribution of keratitis by occupation

Occupation	Number Of Cases	Percentage
Agricultural	32	64
Non-Agricultural	18	36

p<0.01, Significant.

Table 2. Type of Injury

Type of Injury	No Of Cases	Percentage
Contact lens	2	4
Cow tail	2	4
Dust	4	8
Leaf	4	8
Paddy husk	6	12
Stick	12	24
Thorn	6	12
No injury	14	28

A history of recent corneal injury was obtained in 36 (72%) patients. (64%) patients had corneal injury with vegetative matter; mostly stick(12;24%), followed by thorn (6; 12%) paddy or paddy stalk(6; 12%), leaf (2;4%), dust (2;4%). Ocular problems predisposing to corneal ulcer were present in 14 (28%) patients. Among them, 6 (12%) patients had chronic dacryocystitis, 2 (4%) had dry eyes 2 (4%), blepharitis 2 (4%) diabetes mellitus 2(4%).

Cultures were positive in 50 corneal ulcers. 31(62%) patients had pure fungal growth, 19(38%) had pure bacterial growth, Streptococci pneumoniae was the most commonly

isolated bacterial organism (12; 63%) of all positive bacterial cultures), Staphylococcus aureus(3;16%).Pseudomonas species, was the gram-negative organism was isolated(4;21%). There were 30 fungal isolates in 50 patients of which 22 (73%) grew Fusarium spp, Aspergillus spp, 8(27%).

4.DISCUSSION

In the present study, corneal ulceration was seen in all age groups with preponderance among physically active adults; higher in males (64%) than in females (32%) as observed in Kashmir (65%),⁵ South India (65%⁷ and 56.7%⁸) and Ghana (69.3%).^{9,10} In this study, the majority of the corneal ulcer patients (70.7%) were agricultural workers similar to south Indian study,^{7,8} Gangetic West Bengal, Madurai, India(64%) but in contrast to Ghana, where only 16.1% of the patients were agricultural workers.⁹ ocular injury with thorn, stick, or its stalk was the most common predisposing factor in this study(78%), another important crop in Gangetic West Bengal. Before their first presentation at our hospital, 12(24%) patients had consulted health-care providers of some kind or consulted ophthalmic personnel. Similar to the south India, most eye medications are sold over the counter without a prescription in the rural set up in south India^{7,8} and it is not a surprising observation that 8 patients received some form of topical medication from a chemist before their first consultation. It was matter of serious concern that patients were on topical corticosteroids for variable duration. This was in contrast to the reports of 8% and 1.1% from south India.^{7,8}

Culture and/or smear- positive fungi were identified as the principal aetiologic agent in 30 (60%) patients of all corneal ulcers.. This figure was higher than the south Indian reports by Srinivasan et al,⁷ (51.9%) Leck et al,¹⁰ (44.1%) Bharathiet al.⁸ It was also higher than the study from Assam, eastern India where the incidence of fungal keratitis was 32%.

Of the various bacterial isolates, 42.6% was Staphylococcus aureus, which was similar to the early study from Bengal.² The most common infecting bacteria was Streptococcus pneumoniae in Nepal and south India,^{3,7,8} and Pseudomonas spp in Ghana.¹⁰ The most commonly isolated fungal pathogens in the current series were Fusarium spp. Aspergillus species were known to predominate in east India, parts of south India, north India, Nepal and Bangladesh. Other studies in south India have reported Fusarium spp to be more common than Aspergillus spp.[6],[8] Fusarium spp have also been found to be the principal fungal pathogen in Florida, Paraguay, Nigeria, Tanzania, Hong Kong and Singapore.[4], This phenomenon may be explained by differences in climate.

In conclusion, this study of 50 cases carried out at RMMCH, (rural setup). The study shows that trauma due to stick, thorn, saw dust, paddy husk or vegetative matter appears to be the most common predisposing factor in causing suppurative keratitis. Fungi are found to be responsible to a greater extent than bacteria with Fusarium being the predominant fungal pathogen and streptococcal pneumonia being the predominant bacterial

agent. While the findings of this study show similarities with other studies from across India and some from abroad, important differences were also observed. The microbial etiology thus exhibited regional variations. From the limited samples studied, Moxifloxacin monotherapy was considered as a first line of treatment in RMMCH rural set up.

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