www.jmscr.igmpublication.org
Impact Factor 5.84
Index Copernicus Value: 83.27
ISSN (e)-2347-176x ISSN (p) 2455-0450
crossref DOI: https://dx.doi.org/10.18535/jmscr/v5i2.148

IGM Publication
Journal Of Medical Science And Clinical Research
An Official Publication Of IGM Publication

Clinical and Microbiological Profile of Bacterial and Fungal Corneal Ulcers

Authors
Dr Manjusha N.S. Dr Manoj Venugopal
T.D.Medical College and Hospital, Vandanam, Alappuzha, Kerala India
Corresonding Author
Dr Manjusha N.S.
C/o Dr. M. Rajan, NMC 13/102, Railway station Road, Neyyattinkara, 695121
Email: *nsmanjusha@gmail.com, +919495520690, +919496297877*

ABSTRACT
The study was done to determine the predisposing factors, specific pathogenic organisms and visual outcome in patients presenting with corneal ulcers in Department of Ophthalmology, TDMCH, Alappuzha. Patients above the age of 12 years with bacterial or fungal corneal ulcer as confirmed by staining, from 1 January 2012 to 30 June 2013 were included in the study. The patients were examined and corneal scrapings were taken. A history of previous corneal injury with vegetative matter was present in 34% of subjects. Staining reports showed 76% of cases were fungal infection and 24% cases were bacterial infection. Culture positivity was obtained in 88% cases and 12 % were culture negative. Of those with positive culture 66% had fungal infection and 22% had bacterial infection. Among the bacteria isolated 20% were Staphylococcus aureus and among the fungi isolated 56% were Fusarium species. The best corrected visual acuity was recorded using Snellen's chart at the end of 3 months. 28% had vision in the range of 6/24 - 6/60. This study concludes that corneal ulceration most often occurs after a corneal injury with organic material, with fungal infections showing a marked preponderance over bacterial infection. Fusarium species in fungal infections and Staphylococcus aureus in bacterial infections were mostly isolated. The final visual outcome is good with early diagnosis and prompt treatment. These findings show the importance of early identification as well as treatment of corneal ulceration in the prevention of corneal ulceration in a developing world.
Keywords: *corneal ulcer, bacteria; fungi; visual outcome.*

INTRODUCTION

Blindness continues to be one of the major health problems in the developing countries, cataract and corneal diseases being the major causes.

In India it is estimated that there are approximately 6.8 million people with vision less than 6/6o in at least one eye due to corneal diseases and of these about 1 million are bilaterally involved. According to NPCB estimates, there are currently 120000 corneal blind people in India. The burden of corneal disease in our country is reflected by the fact that 90% of global cases of trauma and corneal ulceration leading to corneal blindness occur in developing nations

Avoidable corneal blindness

The term avoidable includes preventable and treatable causes. APEDS reported that a signif-icant number of corneal blindness in the rural population of Andhra Pradesh was avoidable. Of

the 0.66% prevalence of corneal blindness in at least one eye of the population of Andhra Pradesh, nearly 95% was avoidable. They included keratitis in childhood, trauma, keratitis in adulthood and post surgical severe astigmatism. It is estimated that 50% of corneal blindness are treatable. In corneal ulceration and scaring, vision can be restored by timely and prompt manage-ment, hence prompt diagnosis and treatment appropriate for corneal ulceration even in rural areas should be our aim. It is estimated that if methods are implemented successfully to prevent 90% of the preventable blindness due to corneal diseases by 2020, blindness in an additional 3.6 million people in 2020 would be prevented. Prevention and early treatment will prove to be more viable and cost-effective in the long term in reducing the burden of corneal blindness in our country.

WHO has recognised that corneal blindness resulting from microbial keratitis is an important cause of visual disability. Corneal ulceration is recognised as a silent epidemic especially in South East Asia region. Gonzales et al estimated that annual incidence of corneal ulcer in Madhurai district of South India was 1130 per million population.

Corneal infection following a trivial trauma is the leading cause of corneal blindness. Bacterial keratitis is the most common cause of suppurative corneal ulceration but fungal ulcers are equally important due to its sight threatening nature(Fig 1). Ocular fungal infections are being recognised as an important cause of morbidity and blindness in developing countries due to the fact that here the main working group is involved in agricultural sector where they are exposed to injury with vegetative matter and other organic contaminants.

The epidemiological pattern of corneal ulcer vary from region to region. To develop a comprehe-nsive strategy for the diagnosis, treatment and ultimately for prevention of corneal infections, the etiological factors predisposing to ulceration and pathogenic organism responsible has to be determined. This is important if a programme of prevention of corneal ulceration is to be consid-ered and if appropriate therapeutic measures need to be instituted at the earliest to decrease morbidity.

This study 'Clinical and Microbiological Profile of Bacterial and Fungal Corneal Ulcers' is an attempt to determine the clinical features, the predisposing factors, the specific pathogens responsible for corneal ulceration and visual outcome in patients presenting at TDMCH Alappuzha.

Photograph of patient showing active corneal ulceration (Fig1)

METHODOLOGY

Study design

Descriptive longitudinal study conducted from1 January 2012 to 30 June 2013; 50 patients satisfying the inclusion criteria were included.

Inclusion criteria: All patients above 12 years of age attending the eye OPD with bacterial and fungal corneal ulcers, as confirmed by staining, were included in this study.

Sampling technique

All patients attending the OPD with clinical features of corneal ulcer were subjected to corneal scraping and microscopic examination of specimen by Gram stain and KOH wet mount. Those patients in whom bacteria or fungi could be identified by staining were enrolled for the study. This came to 50 patients in total. They were admitted as in patients and specimen sent for culture analysis to isolate the organisms. Gram staining and KOH mounts are easy to do and interpret being reasons to select them for primary screening of patients.

Analysis: Data entered in Microsoft excel and analysed using appropriate statistical methods (SPSS version 16) and association was checked using Chi – square test and Fisher's Exact test.

Ethical consideration: Study initiated after the ethical clearance.

RESULTS

Age and sex distribution of Corneal Ulcer

The study included people above the age of 12 years. Majority were falling in the age group 46 – 55 years, constituting 48% of study subjects. Average age was 50.36 years with SD 12.573.

The study included 78% of males and 22% of females.

Comparison of corneal ulcer in various age groups:

The age group of subjects affected was compared with type of corneal ulcer, either fungal or bacterial. 76% of people had fungal infection and 24% had bacterial infection. The fungal infection was predominantly more among the age group 46 – 55 years(42%) whereas the bacterial infection was more among subjects of age group below 35 years(8%).Chi square value = 11.760 and p value = 0.019.

Predisposing factors of corneal ulcer

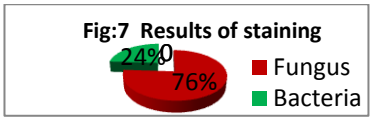
The study aims to throw light upon the various predisposing factors and it was found that injury with vegetative matter was the most common factor leading to corneal ulcer, which accounted for 34% of cases. Vegetative matter included leaf, rice grain, husk, fish fin, stick, mud, sand etc. Injury with foreign bodies which included injury with rust, tin, aluminium, stone piece etc constituted 26% of subjects. In patients with vegetative matter injury and associated diabetes mellitus, 30% developed corneal ulcer. Least common causes of corneal ulcer were ocular surface disorders, trauma due to other causes like finger nail injury and use of corticosteroids. These accounted for 2%, 4% and 2% of cases respectively.

Comparison of predisposing factors of corneal ulcer with type of ulcer

Among the study subjects who had various pre disposing factors, 76% developed fungal corneal ulcer and 24% developed bacterial ulcer. Most common predisposing factor for fungal corneal ulcer was injury with vegetative matter which formed 34% of cases and for bacterial corneal ulcer was injury with metallic foreign bodies forming 18% of cases. *The Chi square value was 34.818 and p value =0.000* and hence statistically this association is significant.

Results of staining of corneal ulcers

All patients presenting to the OPD with corneal ulcer were subjected to direct microscopic examination by staining. Patients who were stain positive for either bacteria or fungi were only included in the study,which constituted 50 patients.



Results of culture

The organisms responsible for corneal ulceration were isolated using various culture methods and the most common organism isolated was fungi, in 66% cases. Bacteria were isolated from 22% cases and in 12% cases no organism could be isolated.

The fungi most commonly isolated were Fusarium (56%) followed by Aspergillus (8%) and Curvularia (2%). Among the bacteria, Staphylococcus aureus was the most commonly isolated(20%) and Pneumococcus in 2% of cases. In 12% cases no organism was isolated.

Visual outcome

The best corrected visual acuity using Snellen's chart at the end of 3 months was taken as final visual outcome for this study.8% of patients had visual acuity in the range of 6/6 – 6/18, 28% had vision of 6/24 – 6/6, 44% had vision in the range of counting fingers at 5 meters to counting fingers at 1 meter, 16% had vision in the range of counting fingers close to face to perception of light and 4% had no perception to light.

DISCUSSION

The causes of microbial keratitis vary from country to country as well as from region to region. To develop a comprehensive strategy for diagnosis, treatment and ultimately prevention of this potentially blinding condition, it needs determination of the various etiological factors predisposing to corneal infection and the pathogenic organisms responsible for it.

The subjects included in this study are patients with clinical features suggestive of corneal ulcer, above the age of 12 years who were confirmed by staining as having bacterial or fungal infection. Because children may not co-operate for specimen collection, they were exempted from the study. The most common age group affected was between 46 – 55 years of age constituting 48% of study subjects and mean age was 50.36 years. Also an increased prevalence of corneal ulcer was noticed among the males compared to females; 78% of males as compared to 22% females had corneal ulceration. In a study conducted by Srinivasan M et al on the epidemiology and etiological diagnosis of corneal ulceration in Madurai, South India, 61.3% were males and 38.7% were females The increased prevalence of corneal ulcer in middle age group and in males must be due to the fact that they are occupationally more active and doing out door works predispose them to increased chance of corneal injury which leads to ulceration.

Of the total 50 cases included in the study an analysis on the predisposing factor shows that trauma due to various reasons predispose to corneal ulceration. Injury with vegetative matter constituted the majority of cases (34%). Alappuzha is a coastal area where agriculture and fishing form the main livelihood of people. The analysis of predisposing factors thus throws light upon the occupational hazard as well as need for proper protection and education of people for early consultation in such injuries to prevent this potentially sight threatening disease. In the study by Upadhyaya MP, Karmacharya PC, Koirala S et al.it shows that 52.8% had trauma with vegetative matter. Vegetative matter injury predominated in studies by Nath R and Baruah S et al also. The same was reported by Narsani AK et al in 29.5% cases. As reported by Gopinathan et al patients with agriculture based activities were 1.33 times (95% CI 1.16 – 1.51) greater risk of developing microbial keratitis. Thylefors confirms that superficial trauma at agricultural work frequently leads to progressive corneal ulceration and visual loss. Thylefors estimate that upto 5% of all blindness or at least half a million individuals worldwide have lost their sight secondary to trauma.

Staining was done for all cases at time of admission itself using Gram's stain and KOH wet mount. Only cases in which organism could be isolated were included in this study, which included 50 patients. Staining reports showed that 76% cases were fungal and 24% were bacterial. All cases were sent for culture on the same day before starting treatment. 66% cases were culture positive for fungi, 22% for bacteria and in about 12% cases no organism could be identified. This could be due to prior use of antibiotics by patient or very scanty specimen available in mild cases. Among the fungi, the most common species isolated was Fusarium (66%) followed by Aspergillus (8%) and Curvularia (2%). This is comparable to the study by Srinivasan M et al at Madurai where Fusarium species was 47.1% and Aspergillus was 16.1%. Kashinatha Shenoy et al showed that 33.33% cases were Fusarium and 15.55% were Aspergillus in their study. In south Florida 35% of the isolated organisms were fungi with Fusarium accounting for 61%. In Ghana fungi alone or in combination with bacteria were isolated from 56% of all culture positive patients and Fusarium accounted for 52% of all fungal isolates. The climate of south Florida and Ghana are similar to the climate of south India, which may explain the correspond-ding pattern of fungal organisms in the above studies. Among the bacterial isolates the most commonly isolated was Staphylococcus aureus (20%) followed by pneumococcus (2%), which corresponds to the study done by Kashinath Shenoy et al. In their study 43.47% of the isolates were Staphylococcus aureus. Tewari et al. in 2012 showed in their study that outof the total number of positive bacterial cultures, 60% were Gram-positive cocci and 40% were Gram-negative bacilli; no Gram-positive bacilli were obtained.

All patients included in this study were followed up till 3 months after discharge. At the end of three months the best corrected visual acuity using Snellen's chart was recorded, which showed that 44% patients had vision in the range of CF 1mt – CF 5mt, 28% had 6/24 – 6/60 vision and 16% had PL to CFCF. This decrease in vision was attributed to multiple factors like large size of ulcer with dense stromal infiltration, centrally located ulcers which on healing severely impairs vision, presence of corneal scars and the astigmatism induced by them. 8% subjects had good vision in the range of 6/6 – 6/18 and these were peripheral and small ulcers. 4% patients lost their vision during the study period. This was because the ulcer showed poor response to treatment and deteriorated very fast resulting in panophthalmitis which ultimately needed evisceration. In a study by Narsani et algood visual outcome was seen in 40% casesfollowing the treatment while a few worsened (4.78%).

CONCLUSIONS

- The most common age group of corneal ulceration is between 46 – 55 years as they are more involved in outdoor work and thus prone to corneal injuries.
- Males are more commonly affected than females because they are more involved in out door work
- Injury with vegetative matter is the most common predisposing factor for corneal ulceration in our study.
- Staining and culture reports shows fungi to be the most common pathogen responsible for corneal ulceration in this part of Kerala.
- Fusarium is the most common fungi isolated followed by Aspergillus and among the bacteria it is Staphylococcus aureus.
- The visual outcome in majority of cases started on treatment as early as possible was good with few going for serious complications.

RECOMMENDATIONS

- All cases of corneal injury should be evaluated and proper treatment started at the earliest to prevent corneal ulceration.
- Corneal scrapings for staining and culture are recommended in all cases of corneal ulceration prior to initiation of treatment.
- Judicious use of antibiotics and close monitoring of clinical response can go a long way in preventing this blinding disease

BIBLIOGRAPHY

1. Garg P, Krishna PV, Stratis AK, Gopinathan U. The value of corneal transplantation in reducing blindness. Eye (Lond) 2005;19:1106-14.
2. National Programme for Control of Blindness. Report of National Programme for Control of Blindness, India and World Health Organization; 1986-89
3. Dandona R, Dandona L. Corneal blindness in a southern Indian population: Need for health promotion strategies. Br J Ophthalmol 2003;87:133-41.
4. National Programme for Control of Blindness. Available from: http://pbhealth.gov.in/pdf/Blindness.pdf. Eye Donation. NPCB India Newsletter; Jul-Sep 2010. Available from: http://npcb.nic.in/writereaddata/mainlinkfile/File200.pdf.
5. Dandona L, Dandona R, John RK. Estimation of blindness in India from 2000 through 2020: Implications for the blindness control policy. Natl Med J India 2001;14:327-34.
6. Whitcher JP, Srinivasan M: Corneal ulceration in the developing world – a silent epidemic. Br J Ophthalmol 1997; 81:622-623.
7. Thygeson P, Acute Central[Hypopyon] Ulcers Of Cornea, Calif Med 1948;69:18
8. Srinivasan, Gonzales et al, Epidemiology And Aetiological Diagnosis Of Corneal

Ulceration In Maurai South India BJO 1997;81:965-971
9. Upadhyay MP et al, Epidemiologic charecteristics, predisposing factors and etiologic diagnosis of corneal ulceration in Nepal, Am.J.ophthal, 1991;111:92
10. Benson WH and Lanier JD, Comparison of techniques for culturing corneal ulcers. Ophthalmology 1992, 9:800
11. McClellan KA, Bernad PJ, Billson FA, Microbial investigations in keratitis at Sydney Eye Hospital Aust NZ J Ophthalmol 1989, 17:413 -6
12. Gopinathan U, Garg P, Fernandez M. The epidemiological features and laboratory results of fungal keratitis: a ten year review at a referral eye center in South India.Cornea 2002;21[6]:555 - 59
13. Srinivas M: Fungal Keratitis. Current OpinOphthalmol 2004;15:321-327
14. Bharathi MJ, Ramakrishnan R, Vasu S, et al: Epidemiological characteristics and laboratory diagnosis of fungal keratitis. A three-year study. Indian J Ophthalmol 2003; 51:315-321
15. Guidelines for management of corneal ulcer at primary, secondary and tertiary health care facilities in SEAR 2004: SEA/ophthal/126
16. Tewari A, Sood N, Vegad MM, Mehta DC. Epidemiological and microbiological profile of infective keratitis in Ahmedabad. Indian J Ophthalmol 2012;60:267-72.
17. Nath R, Baruah S, Saikia L, Devi B, Borthakur A K, Mahanta J. Mycotic corneal ulcers in upper Assam. Indian J Ophthalmol 2011;59:367-71.
18. Kashinatha Shenoy. Epidemiological pattern and risk factors of corneal ulcer in Malabar region of coastal Kerala. Res. J. Pharm. Biol. Chem. Sci. April – june 2013;4(2):1479 – 88.
19. Narsani AK, Jatoi SM, Lohana MK, Dabir SA, Gul S, Khanzade MA. Hospital based epidemiology, risk factors and microbiological diagnosis of bacterial corneal ulcer. Int J Ophthalmol 2009; 2(4): 362:366.
20. Thylefors B. Present challenges in global prevention of blindness. Aust NZ J Ophthalmol 1992;20:89 -94.