 DOI: 10.18231/2395-1451.2017.0057

Microbial pattern of corneal ulcer in semi-rural South India

Vijay Kumar Srivastava

Professor & HOD, Dept. of Ophthalmology, MVJ Medical College and Research Hospital, Bangalore

Email: vks_4186@rediffmail.com

Abstract

Aim: To Study the Pattern of corneal ulcers in patients in semirural south India.

Methods and Materials: It was a hospital based descriptive cross-sectional study carried out from April to December 2016. Patients reporting with non-viral corneal ulcers were studied for finding microbiological etiology such as bacterial and fungal; and standard laboratory methods were used. Data was analyzed by Statistical Package for Social Sciences (SPSS) version 16.0 and Chi-square test was used to test significance of attributes.

Results: Out of 58 cases of microbial keratitis, all were sent for culture - 39 (67.24%) were culture-proven. 19 (48.71%) showed fungus, 17 (43.58%) were positive for bacteria, 3(7.69%) showed mixed growth, whereas 19(32.75% showed no growth. Patients with agriculture-based work had more risk of development of microbial keratitis.

Conclusion: These results highlight the current trend in the microbiological aetiology of corneal ulcers in semi-rural south India. In rural background the prevalence of fungal keratitis is more, despite there being advanced diagnostic tools and treatment methods, results are still suboptimal in fungal corneal ulcers.

Keywords: Microbial keratitis, Corneal ulcer, Bacterial ulcer, Fungal ulcer, Mixed ulcer.

Introduction

Corneal ulcer is a condition of cornea where there is infection as well as loss of continuity of epithelium and involvement of stroma. It is one of the major causes of monocular blindness after un-operated cataract in most of the developing nations in Asia, Africa and the Middle East.[1,2] This is despite the fact that various advanced treatment options are available.[3] A 10 years study in USA from 2002-2012 was undertaken to analyse the trends and association of corneal ulcer leading to hospitalisation, it was found that hospitalisation rate with corneal ulcer was 4.9 per million of population in 2003, whereas it was 2.7 per million in 2012.[4]

The incidence of infection by an organism varies by geographic location. Northern regions of USA have higher incidence of bacterial keratitis, whereas, the southern region shows higher incidence of fungal keratitis. In comparison the incidence of Gram-negative organisms causing keratitis is more in southern USA than north.[5]

In blindness studies in Nepal it has been shown that ulcers and trauma of cornea are the leading cause of unilateral blindness second to cataract only; they account for 11.85% in the spectrum of blindness.[6] Corneal ulcers can be caused by bacteria, fungi, viruses or protozoa. Symptomatology includes pain, congestion of conjunctiva, ulceration and infiltration of cornea. Improper or inadequate treatment may result in corneal perforation, scarring, endophthalmitis and loss of vision.

Environmental factors such as climate, flora and fauna and also socio-economic conditions affect the variance in prevalence of different causative agents mentioned before. In hot and humid climate, together with agriculture being the major occupation, fungal corneal infection may be the main cause.[7] Bacterial keratitis is more common in temperate climates, mixed infections create diagnostic problem.

Apart from environmental and occupational conditions there are other factors which predispose an individual to corneal ulcers, these include: use of steroids, use of contact lenses especially extended wear, trauma, diseases of ocular surface such as dry eye and systemic disease like diabetes.

Lot of advancement has arrived in the management of infectious keratitis over the past decades with the advent of newer and rapid diagnostic modalities such as PCR and Confocal microscopy. These have the capability of detecting the causative microorganism more easily and quickly than conventional culture techniques.[8] Laser scanning in vivo confocal microscopy (IVCM) if handled by experienced confocal operator can give high specificity and enhanced sensitivity for detection of both fungal hyphae and cysts of Acanthamoeba in moderate to larger corneal ulcers in India. This was especially handy for organism detection in deep ulcers where light microscopy and culture give negative results.[9] In a 10 year study in Taiwan it was found that the average length of hospital stay for microbial keratitis was 13.7±11.5 days.[10]

In this study we aim to find the pattern of corneal ulcers in rural south India in respect to its demography, etiology and epidemiology.

Materials & Methods

This study was undertaken in the Ophthalmology Department of a Medical College located in semi-rural area of south India from 1st April 2016 to 31st December 2016. Patients presenting in outpatient department with symptoms and signs of microbial keratitis were included in the study. Viral ulcers were

not included and other non-microbial keratitis like Mooren's ulcer and neurotrophic ulcers were also excluded. Demographic data were entered in a systematic format and risk factors were also documented. Detailed examination of each patient was conducted including slit lamp bio microscopy. Details of corneal ulcer were documented. Whenever patient gave history of trauma the object of trauma was enquired and recorded.

Corneal scrapings were performed from the edge of the ulcer using a Bard Parker blade No. 15 after instillation of Proparacaine drops. Two glass slides were used: one for Grams staining and other for KOH mounting. Scrapings were inoculated on Blood agar, Chocolate agar, MacConkey agar and also on Sabaroud's dextrose agar (SDA) in C-streak fashion. We looked for bacterial growth after incubation of 24 hours. After gross examination standards biochemical tests were performed as per the clinical and laboratory standards institute (CLSI) guidelines. SDA was observed daily for 10 days and then discarded in case of negative growth. To identify fungi firstly gross examination was done for morphology and production of pigment on reverse. Lacto-phenol cotton blue staining and microscopy was done. The following any one criteria was used for diagnosis: (a) Correlating growth on SDA and KOH mount(b) Growth seen on more than one C streak lines and (c) More than one media showing similar growth.

Results

During the period of the study58 suspected cases of corneal ulcer were studied and evaluated.41 were male and 17 were female. Maximum number of patients was in the age group of 25 – 50 years. Lower and upper age groups were less frequently involved. 55% of patients were from agricultural occupation whereas 45% from non-agricultural background. 51.72% patients gave history of some injury to the eye. Out of 58 cases of microbial keratitis, 39 (67.24%) were culture-proven. 19 (48.71%) showed fungus, 17 (43.58%) were positive for bacteria, 3(7.69%) showed mixed growth, whereas 19(32.75% showed no growth. The final outcome of treatment was healed scar in 77.58% cases, adherent leucoma/perforation in 8.62% cases and the ulcer remained non-healing in 13.7% cases.

Table 1: Age and sex distributions

Age group	Male	Female	Total
Up to 25 years	2	-	2 (3.44%)
25 - 50 years	32	15	47 (81.03%)
>50 years	7	2	9 (15.51%)
Total	41(70.69%)	17(29.31%)	58(100%)

Table 2: Occupation

Occupation	No. of cases	% of cases
Agricultural	32	55.17%
Non Agricultural	26	44.82%
Total	58	100%

Table 3: H/O Trauma

Vegetative Material	18 (31.03%)
Non-vegetative	12 (20.68%)
No H/O trauma	28 (48.27%)

Table 4: Growth pattern

Growth type	No. of cases	% of cases
Fungal	19	48.71
Bacterial	17	43.58
Mixed	3	7.69%
Culture positive cases	39	67.24
Culture negative cases	19	32.75

Table 5: Response to treatment

Healed scar	45 (77.58%)
Perforation or Adherent leucoma	5 (8.62%)
Non-healing	8 (13.7%)

Discussion

Proper management and treatment of corneal ulcers, a major cause of blindness worldwide requires precise identification of the etiology so that an appropriate antimicrobial agent targeting the organism responsible can be administered on time. India is a developing country and like other similar countries corneal ulcers are one of major causes of blindness. Incidences of trauma are common in our country especially in rural and agricultural background. We found that 52% of our cases had trauma as predisposing factor for corneal ulcers. In finding similar to our study Norina found history of trauma in 61% of their cases.[11] In our study history of injury with vegetative material was in 31.03% cases and with non-vegetative material in 20.68% cases. There was no history of trauma in 48.27% cases. Injury by vegetative material was commonly associated with fungal ulcers. In our study 55.17% of patients were from agricultural background: these findings were similar to study by Bharathi who had 64% of patients who were farmers.[12] However, may be due to the size of sample, no statistical significance ($p>0.05$) was seen between the occupation and corneal ulcer in our study.

In our study, males 41 (70.69%) were affected more than females 17 (29.31%). This may be due to more requirement of males in outdoor activities usually in rural areas. This observation is similar to the study of Norina[11] and Behboody[13] who reported 61% and 64.2% male cases respectively. In our study we found that 81.03% patients were from younger age group of 25-50 years ($p<0.05$). This finding is similar to study by

Bharathi[12] who found 66.85% of their patients in the age group of 21-50 years.

Norina[11] Basak,[14] and Gopinath[15] found 69%, 67% and 60.4% cases of overall culture positivity respectively (Bacterial, fungal and mixed infection combined). We also had a similar incidence of 67.24% of culture positivity. Out of culture positive cases in our study 48.71% cases were fungal, 43.58% cases were bacterial and 5.12% cases were of mixed infection. These findings are similar to study done by Rajini[7] and Kibret.[16] Out of our 39 positive cultures cases commonest fungal agent was Aspergillus (20.51%), followed by Fusarium (17.94%) and commonest bacterial agents were staphylococcus aureus (15.38%), streptococcus pyogenes (12.82%) and Pseudomonas aeruginosa (7.69%).

These findings are similar to other studies.[14,17] Suwal et al in a recent study from Nepal showed that the commonest bacteria involved in Microbial keratitis were streptococcus pneumoniae and most common fungus is fusarium.[18]

Lin TY[10] et al in their study found that contact lens wear was predisposing factor in development of corneal ulcer in 31.4% of their cases. The study being in semi-rural area we did not have contact lens wearers in our study and we also did not have Acanthamoeba cases too.

Patients were given appropriate treatment as the condition demanded. In 77.58% cases the ulcers healed and a healed scar was the outcome. 8.62% cases showed perforation at some stage of healing and 13.4% ulcers did not heal in the study period and were advised keratoplasty. Exact cause of non-healing ulcers could not be ascertained but it was assumed to be due to associated uncontrolled diabetes mellitus, very poor personal hygiene, noncompliance of medication and possible undetected mixed infection.

The final visual outcome depends upon the size of the ulcer, on the causative agent and predisposing factors.

Conclusion

Occurrence of corneal ulcers was more in males between 25-50 age groups. In rural and agricultural background the prevalence of fungal keratitis is more, despite there being advanced diagnostic tools and treatment methods, results are still suboptimal in fungal corneal ulcers.

References

1. Chirambo MC, Tielsch JM, West KP, Katz J. Blindness and visual impairment in southern Malawi. Bull WHO1986;64:567–72.
2. Chirambo MC. Causes of blindness among students in blind school institutions in a developing country. Br J Ophthalmol1976;60:665–8.
3. Tananuvat N, Suwanniponth M. Microbial keratitis in Thailand; a survey of common practice patterns. J Med Assoc Thai 2008;91:316-22.
4. Lee R, Manche EE. Trends and Associations in Hospitalizations Due to Corneal Ulcers in the United States, 2002-2012. Ophthalmic Epidemiol. 2016 Aug;23(4):257-63. doi: 10.3109/09286586.2016.1172648. Epub 2016 Jun 27.
5. Estopinal CB, Ewald MD. Geographic Disparities in the Etiology of Bacterial and Fungal Keratitis in the United States of America. Semin Ophthalmol. 2016;31(4):345-52. doi: 10.3109/08820538.2016.1154173. Epub 2016 Apr 21.
6. Brilliant LB, Pokhrel RP, Grasset NC, Lepkowski JM, Hawks W et al. Epidemiology of blindness in Nepal. Bull WHO 1985;63:375-86.
7. Ranjini CY, Waddepally VV. Microbial Profile of Corneal Ulcers in a Tertiary Care Hospital in South India. J Ophthalmic Vis Res. 2016 Oct-Dec;11(4):363-367
8. Solanki S, Rathi M, Khanduja S, Dhull CS, Sachdeva S, Phogat J. Recent trends: Medical management of infectious keratitis. Oman Journal of Ophthalmology. 2015;8(2):83-85. doi:10.4103/0974-620X.159104
9. Chidambaram JD et al., Prospective Study of the Diagnostic Accuracy of the In Vivo Laser Scanning Confocal Microscope for Severe Microbial Keratitis. Ophthalmology. 2016 Nov;123(11):2285-2293. doi: 10.1016/j.ophtha.2016.07.009. Epub 2016 Aug 15.
10. Lin TY et al. Risk Factors and Microbiological Features of Patients Hospitalized for Microbial Keratitis: A 10-Year Study in a Referral Center in Taiwan. Medicine (Baltimore). 2015 Oct;94(43):e1905. doi: 10.1097/MD.0000000000001905.
11. Norina TJ, Rainan S et al. Microbial keratitis aetiological diagnosis and clinical features in patients admitted to Hospital University Sains Malaysia. Singapore Med J 2008;49(1):67.
12. Bharathi MJ, Ramakrishnan R, Vasu S, Meenakshi R, Palaniappan P. Epidemiological characteristics and laboratory diagnosis of fungal keratitis; a three year study. Indian J. ophthalm 2003;51:315-321.
13. Behboody H, Mohammedi MJ. Epidemiology of bacterial keratitis in Toetoonkaran hospital Rasht, Iranian J Ophthalmology Bina2001;7(1):3-90.
14. Basak SK, Basak S, Mohanta A et al. Epidemiological and microbiological diagnosis of suppurative keratitis in Gangetic West Bengal, Eastern India. Indian J Ophthalm 2005;53:17-22.
15. Goppinathan U, Sharma S, Garg P, Rao GN. Review of epidemiological features, microbial diagnosis and treatment outcome of microbial keratitis. Experience over a decade. Indian J Ophthalm 2009;57:273-9.
16. Kibret T, Bitew A. Fungal keratitis in patients with corneal ulcer attending Minilik II Memorial Hospital, Addis Ababa, Ethiopia. BMC Ophthalmol. 2016 Aug 30;16(1):148. doi: 10.1186/s12886-016-0330-1.
17. Anil Kumar, Snehal Pandya, Ghanshyam Kavathia, Sejul Antala, Molly Madan, Tanuja Javdekar. Microbial keratitis in Gujarat, Western India: findings from 200 cases. The Pan African Medical Journal. 2011;10:48.
18. Suwal et al. Microbiological profile of corneal ulcer cases diagnosed in a tertiary care BMC Ophthalmology (2016)16:209.