

Original article:

Evaluation of Microbial Profile of Corneal Ulcer at a Tertiary Care Centre

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ABSTRACT

Background: To evaluate the micro-organisms in corneal ulcer at a tertiary care centre.

Materials & Methods: A total of 40 subjects were enrolled. Patients with ulcerative keratitis were selected. Complete ophthalmic evaluation was done including the history taking and examination. Samples were collected as form of scrapings with the help of surgical blades no: 15. Multiple scrapings were taken. Identification of the samples was done with various biochemical tests. Data was collected and Chi square test was done. Result was analysed using SPSS software.

Results: 20 (50%) of the 40 corneal ulcers showed significant growth of microorganisms. Rest (50%) showed no growth. 14 (35%) exhibited pure bacterial growth while pure fungal growth was seen in 6 (15%). None of the scrapings grew a mixture of organisms. Of the 14 bacterial isolates, 11 were gram positive cocci and 6 gram negative bacilli. Streptococcus pneumoniae was the most commonly isolated bacterium in the series, accounting for 45.5% of all bacterial cultures.

Conclusion: Streptococcus pneumoniae is the most common bacteria causing corneal ulcer.

Key words: Streptococcus, Corneal Ulcer, Aspergillus.

INTRODUCTION

Corneal ulceration and subsequent corneal scarring are at present a leading cause of ocular morbidity and unilateral blindness in developing countries.¹ In response to the findings of the Bhaktapur Eye Study in Nepal,² prevention studies were initiated in three countries in Southeast Asia (Bhutan, Burma and India) to validate the hypothesis that corneal ulcers which occur after traumatic abrasions can be prevented in the setting of diverse health care systems and in populations with different prevalence's of bacterial and fungal pathogens causing ulceration. The recently completed 18-month study in Bhutan³ validated the findings of the Nepal study by demonstrating that bacterial ulcers that occur after traumatic corneal abrasion can be effectively eliminated by a grass roots public health approach, even under the conditions that prevail in isolated rural villages. Corneal ulcer prevention in Bhutan, where 98% of the ulcers are caused by bacterial pathogens, was accomplished by a simple public health strategy that local volunteer village health workers were taught to employ within the existing healthcare structure.⁴

Corneal scar is a significant cause of visual impairment and blindness in the developing world. Corneal infections are responsible for a large proportion of this scarring. A review of the data on indications for corneal

transplantation in the developing world revealed that corneal scar was the most common indication (28.1%), of which keratitis accounted for 50.5%. Besides this, about 12.2% of all grafts were done for active infectious keratitis.⁵

The importance of corneal disease as a major cause of blindness in the world today remains second only to cataract, but the epidemiology of corneal blindness is complicated and varies from country to country and even from one population to another, depending on a number of risk factors.⁶ The commonly cited causes of corneal blindness in developing countries include trachoma, onchocerciasis, xerophthalmia, and leprosy, but another cause, which has been frequently unrecognised, is corneal trauma.^{7,8} Unlike corneal injuries in the industrialised world that are usually treated as ophthalmic emergencies, minor corneal trauma in developing countries is often considered to be trivial and is frequently ignored. In the absence of appropriate prophylactic treatment, the corneal stroma can quickly become infected, an ulcer develops, and the ultimate result is severe scarring and loss of vision.⁹ It is a documented fact that the majority of corneal ulcers in developing countries occur after minor ocular trauma sustained during agricultural work or in the home, but the incidence of corneal ulceration following these superficial corneal abrasions remains unknown because control studies are ethically inappropriate. Hence, this study was conducted to evaluate the micro-organisms in corneal ulcer at a tertiary care centre.

MATERIALS & METHODS

A total of 40 subjects were enrolled. Patients with ulcerative keratitis were selected. Complete ophthalmic evaluation was done including the history taking and examination. Samples were collected as form of scrapings with the help of surgical blades no: 15. Multiple scrapings were taken. Each scraping was inoculated onto blood agar and then the material was spread evenly on two glass slides for Gram and Giemsa staining. Identification of the samples was done with various biochemical tests. Data was collected and Chi square test was done. Result was analysed using SPSS software.

RESULTS

20 (50%) of the 40 corneal ulcers showed significant growth of microorganisms. Rest (50%) showed no growth. 14 (35%) exhibited pure bacterial growth while pure fungal growth was seen in 6 (15%). None of the scrapings grew a mixture of organisms. Of the 14 bacterial isolates, 11 were gram positive cocci and 6 gram negative bacilli. *Streptococcus pneumoniae* was the most commonly isolated bacterium in the series, accounting for 45.5% of all bacterial cultures. Other gram-positive organisms isolated were *Staphylococcus epidermidis* (27.7%) followed by *Staphylococcus aureus* (18.2%) and *Micrococcus* (9.09%). *Pseudomonas aeruginosa* was the most frequently isolated gram-negative bacterium accounting for 66.7% of all bacterial cultures. This was followed by *Klebsiella aerogenes* (33.4%).

6 fungi isolated were filamentous. They included 3(50%) isolates of *Aspergillus fumigatus* and 33.4% *Fusarium* sp. and 16.6% of *Curvularia* sp.

Table 1: Bacterial micro-organisms

Bacterias	Percentage
Gram positive cocci	
<i>Streptococcus pneumoniae</i>	45.5%
<i>Staphylococcus epidermidis</i>	27.7%
<i>Staphylococcus aureus</i>	18.2%
<i>Micrococcus</i>	9.09%

Table 2: Fungal micro-organisms

Fungus	Percentage
<i>Aspergillus fumigatus</i>	50
<i>Fusarium</i>	33.4
<i>Curvularia</i>	16.6

DISCUSSION

Despite the growing success of refractive surgery, contact lenses remain an important option for the correction of refractive errors. Research into the development of new lens materials and care systems is ongoing; findings show that there is a marked tendency towards shorter renewal periods. Recent studies, however, have continued to report the occurrence of complications in lens wearers, the most severe and vision threatening of which is infectious keratitis. Several surveys have been conducted to investigate potential risk factors, of which poor compliance and extended wear have emerged as the most important.^{10,11} In the present study, 20 (50%) of the 40 corneal ulcers showed significant growth of microorganisms. Rest (50%) showed no growth. 14 (35%) exhibited pure bacterial growth while pure fungal growth was seen in 6 (15%). None of the scrapings grew a mixture of organisms. Of the 14 bacterial isolates, 11 were gram-positive cocci and 6 gram-negative bacilli. *Streptococcus pneumoniae* was the most commonly isolated bacterium in the series, accounting for 45.5% of all bacterial cultures. Other gram-positive organisms isolated were *Staphylococcus epidermidis* (27.7%) followed by *Staphylococcus aureus* (18.2%) and *Micrococcus* (9.09%). *Pseudomonas aeruginosa* was the most frequently isolated gram-negative bacterium accounting for 66.7% of all bacterial cultures. This was followed by *Klebsiella aerogenes* (33.4%).

A study by Vedantham et al, performed a retrospective chart analysis of the clinical and microbiological data of 97 consecutive patients with post-traumatic endophthalmitis presenting to a tertiary eye care hospital in South India. Thirty-nine (40.2%) cases were culture-positive, Gram-positive cocci (n=24/42, 57.1%) being the commonest isolates. *Staphylococcus epidermidis* and *Pseudomonas aeruginosa* were the commonest single isolates (n=10; 23.8%). Majority of the organisms were sensitive to chloramphenicol (n=27) or ciprofloxacin (n=26). Susceptibility to vancomycin (n=3) and amikacin (n=4) was poor. Cases with negative cultures at presentation were more likely to have improvement in visual acuity compared with culture-positive cases (on multivariate analysis, OR: 3.2, 95% CI: 1.1, 9.0). In the series of post-traumatic endophthalmitis, a high prevalence of resistance of the culture isolates to vancomycin and amikacin was observed.¹²

In the present study, 6 fungi isolated were filamentous. They included 3(50%) isolates of *Aspergillus fumigatus*

and 33.4% *Fusarium* sp. and 16.6% of *Curvularia* sp. Another study by Maung N et al, studied topical antifungal and antibiotic prophylaxis distributed by grass roots village health workers (VHWs) in Burma is an effective public health intervention for the prevention of post-traumatic microbial keratitis in a population where the majority of ulcers are fungal. Three villages in Bago District with a combined population of 16 987 were selected for the study. This defined population was followed prospectively for 12 months by 15 VHWs who were trained to identify post-traumatic corneal abrasions with fluorescein dye and a blue torch and to administer 1% chloramphenicol and 1% clotrimazole ointment three times a day for 3 days to the eyes of individuals who fulfilled the eligibility criteria. During the 12-month period 273 individuals reported to VHWs with an ocular injury and 126 were found to have a corneal abrasion. All 126 were treated with 1% chloramphenicol and 1% clotrimazole ointment three times a day for 3 days, and all healed without sequelae.¹³

CONCLUSION

Streptococcus pneumoniae is the most common bacteria causing corneal ulcer.

REFERENCES

1. Resnikoff S, Pascolini D, Elya'ale et al Global data on visual impairment in the year 2002. Bull World Health Org 2004; 82: 844–855.
2. Upadhyay M P, Karmacharya P C, Koirala S. et al The Bhaktapur Eye Study: ocular trauma and antibiotic prophylaxis for the prevention of corneal ulceration in Nepal. Br J Ophthalmol 2001; 85: 388–92.
3. Getshen K, Srinivasan M, Upadhyay M P. et al Corneal ulceration in Southeast Asia. I: A model for the prevention of bacterial ulcers at the village level in rural Bhutan, Br J Ophthalmol 2006; 90: 276–8.
4. Tun Aung Kyaw A study of ocular trauma and corneal ulcer in Myanmar. Paper presented at an international workshop on corneal ulcer prevention, New Delhi, India: World Health Organization/Southeast Asia Regional Office, November, 1999.
5. Dandona L, Krishnan R, Janarathanan M, et al. Indications for penetrating keratoplasty in India. Indian J Ophthalmol. 1997;45:163–8.
6. Whitcher J P, Srinivasan M, Upadhyay M. Prevention of corneal ulceration in the developing world. Int Ophthalmol Clin 2002; 42: 71–7.
7. Smith G T H, Taylor H R. Epidemiology of corneal blindness in developing countries. Refract Corneal Surg 1991; 7: 436–9.
8. Upadhyay M D, Karmacharya P C, Koirala S. et al Epidemiologic characteristics, predisposing factors, and etiologic diagnosis of corneal ulceration in Nepal. Am J Ophthalmol 1991; 11: 92–9.
9. Srinivasan M, Gonzales C A, George C. et al Epidemiology and etiological diagnosis of corneal ulceration in Madurai, south India. Br J Ophthalmol 1997; 8: 965–71.

10. Nilsson SE & Montan PG. The annualized incidence of contact lens-induced keratitis in Sweden and its relation to lens type and wear schedule: results of a 3-month prospective study. *CLAO J* 1994; 20: 225–230.
11. Radford CF, Minassian DC & Dart JK. Disposable contact lens use as a riskfactor for microbial keratitis. *Br J Ophthalmol* 1998; 82: 1272–75.
12. Vedantham, Vasumathy; Nirmalan, Praveen K; Ramasamy, Kim; Prakash, Karthik; Namperumalsamy, Perumalsamy. Clinico-microbiological profile and visual outcomes of post-traumatic endophthalmitis at a tertiary eye care center in South India. *Indian Journal of Ophthalmology*: Jan–Mar 2006; 54(1): 5-10.
13. Maung N, Thant CC, Srinivasan M, Upadhyay MP, Priyadarsini B, Mahalakshmi R, Witcher JP. Corneal ulceration in Southeast Asia. II: a strategy for the prevention of fungal keratitis at the village level in Burma. *Br J Ophthalmol*. 2006 Aug;90(8):968-70.