Clinico-etiological profile of microbial keratitis: A pilot study from the foothills of Himalayas

Dear Editor:

Microbial keratitis (MK) is known to be one of the most significant causes of monocular blindness in developing countries.[9] Therefore, the knowledge of etiology in a specific region is crucial for the optimal management of these infections. Hence, this study was undertaken to determine the etiology of MK at a tertiary health care institute and to explore epidemiological risk factors.

The age, sex, occupation, and various predisposing factors for suspected cases of MK were recorded for 120 patients. Corneal scrapings that were collected using a sterile Bard-Parker blade (N15) were inoculated on 5% sheep blood agar, chocolate agar, Sabouraud dextrose agar (SDA) (HiMedia, Mumbai). Smears were prepared for Gram staining and wet mount for 10% potassium hydroxide (KOH) and calcofluor white (CFW) staining (HiMedia Laboratories, Mumbai, India).

There was a male preponderance in the study, with a male to female ratio of 2:1. The mean age of patients was 48.9 years and a maximum number of patients, that is, 53% (64/120) belonged to 41–60 years age group. Among the participants, 72% (n = 86/120) belonged to the rural background and 52% (n = 63/120) had an agricultural occupation. Table 1 shows the demographic parameters of the patients enrolled in the study and associated predisposing factors if present. Corneal trauma was the chief predisposing factor documented in 39% (n = 47/120) of cases. Two cases of chemical exposure were noticed. One because of an occupational exposure to cement and the other one due to a broad fungicidal agent containing copper oxychloride (commercially available as Cutox by Gharda Chemicals Ltd., Mumbai, India).

Table 1: Demographic parameters of the patients (n=120) enrolled in the study and predisposing factors associated

| Demographics | Particulars                          | Number (%) |
|---------------|-------------------------------------|------------|
| Gender        | Male                                | 80 (67)    |
|               | Female                              | 40 (33)    |
| Age in years  | <20                                 | 6 (5)      |
|               | 21-40                               | 35 (29)    |
|               | 41-60                               | 64 (53)    |
|               | 61 onwards                          | 15 (13)    |
| Residence     | Rural                               | 86 (72)    |
|               | Urban                               | 34 (28)    |
| Occupation    | Agricultural                        | 63 (52.5)  |
|               | Non-agricultural                    | 57 (47.5)  |
| Predisposing factors (documented in 55/120, that is, 46% cases) | | |
| Corneal trauma |                                    | 47 (39)    |
| Preexisting illness |                                | 5 (4.2)    |
| Structural abnormality |                              | 2 (1.7)    |
| Use topical steroids |                                | 1 (0.8)    |
| Contact lens   |                                    | 0 (0)      |
| Traumatic agents (documented in 47/120, that is, 39% cases) | | |
| Vegetative matter/wooden stick |                  | 32 (27)    |
| Stone/particle |                                    | 5 (4)      |
| Chemical       |                                    | 2 (2)      |
| Rubbing of eyelid |                                | 2 (2)      |
| Nail           |                                    | 2 (2)      |
| Hair           |                                    | 2 (2)      |
| Occupational hazard |                          | 1 (1)      |
| Trauma by insect |                                  | 1 (1)      |

KOH mount/CFW staining was positive for fungal elements in 40% of cases (n = 48/120). On Gram staining, Gram-positive cocci in 7% (n = 8/120) of cases and Gram-negative bacilli in 2.5% (n = 3/120) of cases were seen. In one patient, on Gram stain, a cluster of ovoid spore-like structures was also seen resembling *Microsporidia* species. Growth in culture was obtained in 50% of cases (n = 60/120). Fungal growth in 26% (n = 31/120) of cases and bacterial growth in 22% (n = 27/120) of cases was obtained. In 2% (n = 2/120) of cases, scraping yielded significant growth of more than one species of fungi or growth of bacteria along with the fungus. Overall, infective etiology could be established in 51% (n = 61/120) of cases according to the predefined criteria. Table 2 summarizes identified causative micro-organisms responsible for the infection.

In the study, 41–60 was the most coon age group which is in concordance with studies from other parts of India.[2,3] There was a male predominance which can be attributed to outdoor work done by them. Similar findings were reported by many authors.[4-6] Patients engaged in agricultural work were more affected because of exposure to trauma. Trauma

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Table 2: Distribution of identified pathogens from microbial keratitis cases in 1 year study period (n=64)

| Pathogens                          | Identification by conventional method | Pure isolate in culture (number) | Mixed with other species in culture (number) |
|------------------------------------|--------------------------------------|----------------------------------|---------------------------------------------|
| **Fungal isolates (n=34)**         |                                      |                                  |                                             |
| Fusarium species                   | 18                                   | 16                               | 2                                           |
| Aspergillus flavus                 | 5                                    | 4                                | 1                                           |
| Aspergillus fumigatus              | 3                                    | 3                                | -                                           |
| Pseudallescheria boydii            | 3                                    | 3                                | -                                           |
| Curvalaria geniculata              | 3                                    | 3                                | -                                           |
| Curvalaria lunata                  | 1                                    | 1                                | -                                           |
| Geotrichum                         | 1                                    | -                                | -                                           |
| **Gram positive bacterial isolates (n=16)** |                                  |                                  |                                             |
| Staphylococcus epidermis           | 13                                   | 13                               | -                                           |
| Staphylococcus aureus              | 2                                    | 2                                | -                                           |
| Streptococcus pneumoniae           | 1                                    | 1                                | -                                           |
| **Gram negative bacterial isolates (n=13)** |                                  |                                  |                                             |
| Pseudomonas species                | 8                                    | 8                                | -                                           |
| Acinetobacter baumannii complex    | 3                                    | 3                                | -                                           |
| Klebsiella pneumoniae              | 1                                    | -                                | 1                                           |
| Escherichia coli                   | 1                                    | -                                | 1                                           |
| **Non-cultivable microorganism (identified on basis of direct microscopy)** |                                  |                                  |                                             |
| Microsporidia                      | 1                                    | -                                | -                                           |

was the most significant risk factor observed. Agricultural practices in rural areas and humid environment in the state of Uttarakhand is favorable for the development of MK from minor trauma.[4]

In our study, fungal pathogens outnumbered bacterial pathogens. Fusarium was the most common fungus isolated which is in contrast to other studies from north India.[6] Compared to other infective corneal ulcers, fungal corneal ulcers are difficult to diagnose as well as treat. Hence, rapid communication between microbiologists and ophthalmologists is of utmost significance.

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Conflicts of interest
There are no conflicts of interest.

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