

Study of clinical and microbiological profile of infective corneal ulcers at a tertiary care hospital in western Maharashtra

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Introduction: Infective corneal ulcer is an important cause of visual impairment in developing countries. The present study was conducted to know demographic, clinical, and microbiological patterns of infective corneal ulcers in a tertiary hospital in western Maharashtra. **Materials and Methods:** This is a retrospective analytical study involving 68 eyes of 68 cases of infective corneal ulcer visited in the last two years. From medical records of all cases, details of history, clinical findings, and investigations were noted and data were analyzed. **Results:** Male to female ratio of study cases was 1.61:1 with age groups ranging between 18 to 90 years (mean 50.81 years). The main occupations of study cases were farming (28 i.e. 41.17%) and construction work (12 i.e. 17.64%). Thirty-two (47.05%) cases had to present BCVA of <6/60. Corneal ulcers of size < 5 mm were seen in 37 (54.41%) cases and 19 cases (27.84%) had hypopyon. Central and paracentral ulcers were seen in 57 cases (83.82%). On Gram stain and 10% KOH mount, fungal etiology (26.92%) was seen more frequently than bacterial etiology (20.51%) and 4 (5.88%) showed mixed organisms. **Conclusion:** Infective corneal ulcers mainly affected working males involved in farming. Gram stain and KOH mount analysis showed fungal etiology more frequently than bacterial. Detailed history, clinical examination, and lab investigations of scrapings in cases of infective corneal ulcers are essential to know the clinical and microbiological pattern.

Keywords: Corneal ulcer, Demographic, Gram stain, Keratitis, Microbiological profile

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Introduction

Corneal infections can lead to corneal scarring and blindness if not diagnosed quickly and managed appropriately. Injuries, lid malpositions, topical medications like steroids, contact lens wear, and autoimmune diseases like rheumatoid arthritis are the various factors responsible for corneal ulcers [1,2]. A corneal ulcer is the second most important cause of infective blindness throughout the world, after trachoma. Also, it is the main cause of visual impairment and ocular morbidity in developing countries. Monocular blindness due to corneal diseases is seen in 1.5-2 million new cases annually worldwide. In India, about 6.8 million are blind because of corneal diseases [3,4].

Farming is the main occupation in rural parts of India, where accidental vegetative trauma to the cornea is common. Persons involved in other occupations like factory work, construction work, carpentry, and stone cutting are also more prone to corneal injuries.

Majority patients of infectious keratitis present as a corneal ulcer with complaints of redness, pain, watering, photophobia, and diminution of vision. These cases pose a challenge to treating ophthalmologist as far as diagnosis and management are concerned. Thus optimal treatment in time can reduce serious complications like corneal perforation, endophthalmitis, or even panophthalmitis [5].p>

The prevalence of corneal ulcers varies according to the climatic conditions, occupations, and socioeconomic status of the people in different parts of the world [6].

The present study was conducted to know the demographic, clinical, and microbiological pattern of infective corneal ulcers in patients presented to our institute. This study highlights the importance of demographic risk factors, typical presenting features with diagnostics involved in infective corneal ulcer cases in western Maharashtra region.

Material and Methods

It was a retrospective analytical study done at a tertiary care hospital. The study involved 68 eyes of 68 patients, presented with an infective corneal ulcer from May 2017 to April 2019(2 years). The medical records of patients with infective corneal ulcers were analyzed.

Aim: To study the clinical and microbiological pattern of infective corneal ulcer cases.

Objectives: To study demographic details, clinical features, and type of causative microorganisms detected on the laboratory analysis of infective corneal ulcer cases.

Setting: Study was done at the Department of Ophthalmology, Bharati Vidyapeeth (Deemed to be University) Medical College and Hospital, Sangli, Maharashtra, India

Duration of Study: 6 months

Study Design: A retrospective analytical study

Sampling Method: Purposive

Sample size: 68 eyes of 68 patients

Ethical consideration and permission: Ethical permission from the institutional ethical committee of Bharati Vidyapeeth (Deemed to be University) medical college and hospital, Sangli was taken. (Approval letter no. BV (DU) MC and H Sangli/IEC/372/19)

Inclusion Criteria: All Patients with infective corneal ulcers above 18 years of age.

Exclusion Criteria: Neurotrophic keratitis

Exposure keratitis

Keratoconus and corneal dystrophies

Mooren's ulcer

Perforated corneal ulcer, panophthalmitis

Data Collection Procedure: Data collected from medical records of infective corneal ulcer patients which includes demographic details, clinical and microbiological findings of corneal scrapings, etc.

The history included symptoms of redness, pain, photophobia, watering, history of (h/o) trauma, contact lens use, prolonged use of any eye drops, h/o use of herbal medications, h/o swimming in the pool and h/o diabetes mellitus, Rheumatoid arthritis, etc. The details of examinations included visual acuity by Snellen's chart (unaided and aided), corneal sensation testing, anterior segment examinations by slit lamp, IOP measurement by non-contact tonometry, sac syringing, fundus examination by indirect ophthalmoscopy, etc. Routine lab investigations and microbiological findings of corneal scrapings were noted.

The corneal ulcer was diagnosed by slit-lamp examination showing greyish haze or loss of clarity in cornea and epithelial defect after staining with fluorescein strip. Slit-lamp photographs and color-coded diagrams were recorded for documentation and to assess the progress. It is also important in medicolegal cases with h/o trauma

Then after putting 0.5 % proparacaine eyedrop to anesthetize the eye, corneal scraping was taken by an ophthalmologist under a slit lamp view. By using a 15 no. surgical blade the edge of the ulcer was scrapped and the sample was collected on two glass slides. One slide was sent for Gram staining to detect bacterias and other for 10% KOH mount for the detection of fungal hyphae. The viral corneal ulcer was diagnosed clinically if characteristic dendritic or geographic pattern associated with loss of corneal sensations and the presence of skin lesions were seen. Acanthamoeba ulcer is diagnosed if ring-shaped stromal infiltrates with hypopyon are observed [7].

Statistical analysis: The data was arranged in an MS Excel sheet and statistical analysis was done. The number and percentage of patients according to age groups, gender and occupations were calculated. Also, the percentage of patients with different clinical features of corneal ulcer and microbiological etiology was calculated.

Results

Sixty-eight eyes of 68 patients with infective corneal ulcers were included in this study. The age group of patients involved in the study ranged from 18 to 90 years. The majority (62 i.e. 88.23%) patients were in the age group of 26 to 70 years (Table 1), mean age was 50.81 years and male to female ratio was 1.61:1 (Table 2). Twenty-eight patients (41.17%) were farmers by occupation and 12 patients (17.64%) were construction workers (Table 3).

Thirty-two patients (47.05%) had to present best-corrected visual acuity (BCVA) of less than 6/60 and only 6 patients had BCVA of 6/9 to 6/6 (Table 4). Most of the patients 37 (54.41%) were presented with corneal ulcers of size less than 5 mm and hypopyon was seen in 19 (27.84%). Central and paracentral ulcers were seen in 57 patients (83.82%) (Table 5).

Out of 68 eyes, 41 eyes had conclusive scraping reports on Gram stain and 10% KOH mount. Fungal etiology was found in 21 (26.92%) compared to bacterial etiology in 16 (20.51%) and 4 cases

(5.88%) showed mixed organisms. No organisms were detected in the corneal scrapings of 37 patients (54.41%), out of which 6 had clinical features of viral keratitis (Table 6).

Table-1: Age-wise distribution of study patients.

Age of patients	No. of patients	%
18-25 years	04	5.88
26-40 years	16	23.52
41- 55 years	20	29.41
56-70 years	24	35.29
Above 70 years	04	5.88
Total	68	100

Table-2: Gender wise distribution of study patients.

Gender	No. of patients	%
Males	42	61.76
Females	26	38.23
Total	68	100

Table-3: Occupations of the study patients.

Occupation	No. of patients	%
Farmer	28	41.17
Construction worker	12	17.64
Factory worker	04	5.88
Other	24	35.29
Total	68	100

Table-4: Best-corrected visual acuity (BCVA) of corneal ulcer patients at presentation.

BCVA	No. of eyes of patients	%
Perception of light to 6/60	32	47.05
6/36 to 6/24	16	23.52
6/18 to 6/12	14	20.58
6/9 to 6/6	06	8.82
Total	68	100

Table-5: Clinical profile of infective corneal ulcer cases.

Clinical features		No. of eyes of patients	Percentage
Size	less than 5 mm	37	54.41%
	More than 5 mm	31	30.88%
Location	Central	26	38.23%
	Paracentral	31	45.59%
	Peripheral	11	16.17%
Hypopyon	Present	19	27.84%
	Absent	39	57.35%

Table-6: Distribution of patients according to the type of causative microorganism on Gram stain and KOH mount.

Microbial Profile	No. of patients	%
Only bacteria	16	20.51
Only Fungi	21	26.52
Mixed	04	5.12
No organisms detected (clinically Viral ulcer)	37 (06)	39.74 (7.69)

Discussion

Infective corneal ulcer causes significant ocular morbidity and often blindness. A proper history and clinical examination in detail are very important for the diagnosis and management of corneal ulcers [7].

In the present study, male preponderance was seen for infective corneal ulcers. Male to female ratio of 1.61:1 was seen. The age group most affected for infective corneal ulcers was 26 to 70 years which is comparable with other similar studies by Katara RS et al, Ranjini CY et al and Gopinathan U et al. [4,7,8].

By occupation, the majority of patients in the present study were farmers (28 i.e. 41.17%) followed by construction workers (12 i.e. 17.64%) and factory workers (4 i.e. 5.88%). So occupational injuries were seen in the majority of the patients (44 i.e. 64.7%). In similar studies by Mohod et al and Srinivasan et al, farming was found to be the main occupation in the majority of patients with corneal ulcers [10,11]. Gopinathan U et al reported that agricultural workers have 1.33 times greater risk of developing infective Keratitis. Farmers are more prone to vegetative trauma, which is the leading predisposing factor of infective corneal ulcers in developing countries [12]. Also, construction workers, factory workers, and welders are prone to accidental superficial and stromal corneal foreign bodies leading to infective corneal ulcers.

Thirty-two patients (47.05%) at presentation had BCVA below 6/60. A similar study by Khadka S et al had 41% of patients with microbial keratitis BCVA of below 6/60 [18].

In the present study, 37 eyes (54.41 %) had corneal ulcers measuring less than 5 mm and 31 (30.88%) had more than 5 mm. Khare P et al and Puri LR et al in their study noted corneal ulcer of less than 5 mm size in 74.53 % and 78.3% respectively and more than 5mm seen in 20.37% and 21.60% respectively [13,14]. In the present study, the involvement of central and paracentral cornea was seen in 57 (83.83%) patients, while peripheral corneal involvement was noted in

11(16.17 %) patients. Khare P et al noted the involvement of central and Para central regions of the cornea in 76.15 % patients and peripheral involvement in 2.1% patients [13]. Puri LR et al noted central and Para central involvement in 45.2% patients while peripheral involvement in 7% patients [14].

In this study, corneal scrapings from the corneal ulcer site sent for microbiological examination for gram stain and 10% KOH mount revealed presence of bacteria in 16 (20.51 %) patients, fungal hyphae in 21 (26.52%), mixed organisms in 4 (5.2 %) and no organisms were detected in 37 (39.74 %) patients.

Waghmare et al found bacteria in 35%, fungi in 30%, mixed organisms in 5%, and no organisms in 30 % patients [15]. A study by Amrutha KB et al noted the detection of bacteria in 67.17%, fungi in 25.37%, and mixed growth in 7.46% and no organisms in 33% patients [16].

The findings of these two studies differ from the present study regarding the percentage of bacterial and fungal etiologies. In the present study fungal etiology was detected more than bacterial etiology. This can be related to the farming occupation of the people in this region of western Maharashtra where vegetative trauma is more common.

The causes of non-detection of microorganisms on gram stain and KOH mount in the present study included viz initiating topical antimicrobials before corneal scraping, the faulty technique of corneal scraping, and inadequate sample.

Limitations: The sample size was comparatively small in the present study and the study did not include culture and sensitivity of corneal scrapings to isolate the specific microorganisms. So future studies with larger sample sizes involving culture and sensitivity of corneal scrapings will help in finding specific microorganisms with their sensitivity to antimicrobials. Also, other microorganisms causing keratitis like acanthamoeba and microsporidia should be kept in mind and searched accordingly. Seasonal occurrences of specific keratitis patterns will further help in formulating new practice protocols in cases of infective keratitis

Conclusion

Infective corneal ulcers are more common in working males.

In western Maharashtra, as farming is the main occupation where vegetative injuries are more common, the prevalence of fungal corneal ulcers is more compared to other causative microorganisms. People working at construction sites and in factories are also prone to ocular injuries leading to an infective corneal ulcer. Gram stain and KOH mount of corneal scrapings are simple and quick OPD investigations helpful in the detection of the type of microorganisms.

Detailed history, clinical examination, and lab investigations of scrapings in cases of infective corneal ulcers are essential to know the clinical and microbiological pattern.

What does the study add to the existing knowledge?

The people working in fields, factories, and construction should be educated regarding the protection of eyes and need of urgency to visit an ophthalmologist in case of any eye injury. In suspected infective corneal ulcer patients whenever possible anti-microbials should not be started before gram stain and KOH mount of corneal scraping to avoid masking of infection. Self-treatment and home remedies should be avoided in any eye complaint.

Author's contributions

Dr. Rajesh B. Gotekar: Concept, design, the definition of intellectual content, literature search.

Dr. Hanumant R. Mandlik: Statistical analysis, manuscript preparation. **Dr. Rasika D. Konduskar:** Data acquisition, Data analysis. **Dr. Ajit K. Joshi:** Manuscript editing and manuscript review

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