

Clinical and microbiological profile of infectious keratitis and its association with predisposing factors, treatment response and final visual outcomes: A prospective observational study

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Abstract

Background: Infectious keratitis is an important cause of corneal morbidity and visual impairment. Its clinical presentation, causative microorganisms, treatment response, and visual outcomes vary according to predisposing factors and local epidemiological patterns.

Objective: To evaluate the clinical and microbiological profiles of infectious keratitis and their associations with predisposing factors, treatment response, and final visual outcomes.

Materials and Methods: A prospective observational study was conducted among 80 patients with infectious keratitis at the Department of Ophthalmology, Subbaiah Institute of Medical Sciences, Shivamogga, Karnataka, from January 2025 to September 2025. Detailed clinical

evaluation and assessment of predisposing factors were performed. Corneal scrapings were subjected to direct microscopy and microbiological culture. Patients were followed to assess treatment response and final visual outcome.

Results: Among 80 patients, males constituted 61.3%, and the 41–60-year age group was most commonly affected. Ocular trauma (43.8%) was the most frequent predisposing factor. Bacterial growth was identified in 38.8%, fungal growth in 26.3%, mixed growth in 3.8%, while 31.3% showed no growth. Staphylococcus aureus was the commonest bacterial isolate and Fusarium spp. the commonest fungal isolate. A favourable treatment response was observed in 72.5% of patients, while

13.7% required therapeutic surgical intervention. Final visual improvement was observed in 70% of patients.

Conclusion: Ocular trauma was the predominant predisposing factor, with bacterial and fungal infections representing the major microbiological causes. Early microbiological evaluation and appropriate treatment may improve clinical response and visual outcomes in infectious keratitis.

Keywords: Infectious Keratitis; Corneal Ulcer, Bacterial Keratitis, Fungal Keratitis, Ocular Trauma, Microbiology, Visual Outcome.

Introduction

Infectious keratitis is a potentially sight-threatening corneal infection caused by bacteria, fungi, viruses, and other microorganisms. It remains an important cause of corneal morbidity and visual impairment, particularly in developing countries. The epidemiology and causative organisms vary according to geographical location, environmental exposure, and patient-related risk factors.^{1,2}

Ocular trauma, particularly trauma involving vegetative matter, contact-lens use, ocular surface disorders, previous ocular surgery, topical corticosteroid use, and systemic diseases such as diabetes mellitus are recognized predisposing factors for infectious keratitis.^{1,3} In tropical and agricultural regions, fungal keratitis is particularly important because of frequent exposure to soil and vegetative material.⁴

Microbiological investigation of corneal scrapings by direct microscopy and culture helps identify the causative organism and facilitates appropriate antimicrobial therapy. Bacterial and fungal organisms constitute the major microbiological causes, although culture-negative cases are also frequently encountered.^{2,5} The clinical severity, causative organism, predisposing

factors, and delay in presentation may influence treatment response and final visual outcome.^{6,7}

Therefore, the present study was undertaken to evaluate the clinical and microbiological profile of infectious keratitis and its association with predisposing factors, treatment response, and final visual outcomes among patients attending a tertiary care hospital in Shivamogga, Karnataka.

Materials and Methods

Study Design and Setting

A prospective observational study was conducted in the Department of Ophthalmology, Subbaiah Institute of Medical Sciences, Shivamogga, Karnataka. The study was carried out from January 2025 to September 2025 and included 80 patients diagnosed with infectious keratitis.

Study Population

Patients presenting with clinical features of infectious keratitis were enrolled consecutively. A detailed history regarding duration of symptoms and predisposing factors such as ocular trauma, contact-lens use, previous ocular surgery, topical steroid use, and systemic diseases was recorded.

Clinical Evaluation

All patients underwent comprehensive ophthalmic examination, including visual acuity, slit-lamp examination, ulcer location and size, stromal infiltrate, hypopyon, and anterior chamber reaction. Visual acuity was recorded at presentation and at the final follow-up.

Microbiological Evaluation

Corneal scrapings were obtained from the base and edge of the ulcer under aseptic precautions. Specimens were examined by Gram staining and 10% KOH mount and cultured on appropriate bacterial and fungal culture

media. Isolated organisms were identified using standard microbiological methods.

Treatment and Follow-up

Patients were treated with appropriate topical antimicrobial therapy based on clinical findings and microbiological results. Follow-up examinations were performed to assess healing, infection progression, complications, and treatment response. Cases with inadequate response or complications were managed with appropriate surgical intervention when required.

Outcome Measures and Statistical Analysis

The primary outcomes were microbiological profile, treatment response, and final visual acuity. Associations between predisposing factors, causative organisms, treatment response, and visual outcomes were analysed using appropriate statistical tests. A p-value <0.05 was considered statistically significant.

Ethical Consideration

Institutional Ethics Committee approval was obtained, and written informed consent was obtained from all participants.

Results and Observations

A total of 80 patients with infectious keratitis were included in the study. The clinical profile, predisposing factors, microbiological findings, treatment response, and final visual outcomes were evaluated.

Table 1: Demographic characteristics of study participants

Variable	n (%)
Age group (years)	
≤20	6 (7.5)
21–40	24 (30.0)
41–60	32 (40.0)
>60	18 (22.5)
Sex	

Male	49 (61.3)
Female	31 (38.7)
Laterality	
Right eye	39 (48.8)
Left eye	41 (51.2)

Table 2: Predisposing factors associated with infectious keratitis

Predisposing factor	n (%)
Ocular trauma	35 (43.8)
Vegetative/foreign body trauma	24 (30.0)
Diabetes mellitus	12 (15.0)
Contact-lens use	8 (10.0)
Previous ocular surgery	6 (7.5)
Topical steroid use	5 (6.3)
No identifiable factor	14 (17.5)

Some patients had more than one predisposing factor.

Table 3: Clinical characteristics of infectious keratitis

Clinical finding	n (%)
Corneal ulcer with stromal infiltrate	80 (100)
Pain	72 (90.0)
Redness	69 (86.3)
Photophobia	56 (70.0)
Reduced vision	74 (92.5)
Hypopyon	22 (27.5)
Corneal thinning	9 (11.3)
Anterior chamber reaction	31 (38.8)

Table 4: Microbiological findings

Microbiological finding	n (%)
Bacterial growth	31 (38.8)
Fungal growth	21 (26.3)
Mixed bacterial and fungal growth	3 (3.8)
No growth	25 (31.3)
Total	80 (100)

Table 5: Distribution of isolated microorganisms

Organism	n (%)
Staphylococcus aureus	9 (11.3)
Pseudomonas spp.	8 (10.0)
Coagulase-negative Staphylococcus	6 (7.5)
Streptococcus spp.	5 (6.3)
Other bacteria	3 (3.8)
Fusarium spp.	10 (12.5)
Aspergillus spp.	7 (8.8)
Other fungi	4 (5.0)
Mixed growth	3 (3.8)

Table 6: Treatment response among study participants

Treatment response	n (%)
Favorable response	58 (72.5)
Partial response	13 (16.3)
Treatment failure	9 (11.2)
Total	80 (100)

Table 7: Treatment modality and outcome

Treatment modality	n (%)
Medical treatment only	69 (86.3)
Therapeutic surgical intervention	11 (13.7)
Total	80 (100)

Table 8: Final visual outcome

Final visual outcome	n (%)
Improved vision	56 (70.0)
No significant improvement	17 (21.3)
Worsened vision	7 (8.7)
Total	80 (100)

Table 9: Association of predisposing factors with treatment response

Predisposing factor	Favorable response n (%)	Poor/partial response n (%)	p-value
Present	39 (59.1)	27 (40.9)	0.018
Absent	19 (95.0)	1 (5.0)	

Table 10: Association between microbiological findings and final visual outcome

Microbiological finding	Improved vision n (%)	No improvement/ worsened n (%)	p-value
Bacterial	25 (80.6)	6 (19.4)	0.041
Fungal	12 (57.1)	9 (42.9)	
Mixed	1 (33.3)	2 (66.7)	
No growth	18 (72.0)	7 (28.0)	

Discussion

The present prospective observational study evaluated 80 patients with infectious keratitis with respect to their clinical characteristics, predisposing factors, microbiological profile, treatment response, and final visual outcome.

In the present study, males constituted 61.3% of cases, while the 41–60-year age group was most frequently affected. A male predominance has also been reported in previous Indian studies of infectious keratitis.^{5,8} This may partly reflect greater occupational exposure to outdoor activities and ocular trauma.

Ocular trauma was the most commonly identified predisposing factor in the present study, occurring in 43.8% of patients. Vegetative or foreign-body trauma accounted for 30% of cases. Trauma is a well-established risk factor for infectious keratitis, particularly in agricultural populations, and has been strongly associated with fungal infection in South Asian studies.^{1,3,9}

Microbiological examination showed bacterial growth in 38.8% and fungal growth in 26.3% of cases, while 31.3% showed no microbial growth. Both bacterial and fungal organisms are major causes of infectious keratitis, with considerable geographical variation in their relative

frequency.^{1,4} In the present study, *Staphylococcus aureus* was the commonest bacterial isolate, whereas *Fusarium* spp. was the predominant fungal isolate. The predominance of *Fusarium* among fungal keratitis cases is consistent with previous Indian literature, where filamentous fungi, particularly *Fusarium* and *Aspergillus*, are frequently reported.^{2,4}

Most patients in the present study showed a favorable response to treatment, with 72.5% demonstrating clinical improvement. Medical treatment alone was sufficient in 86.3% of patients, whereas 13.7% required therapeutic surgical intervention. Previous studies have also reported that most cases can be managed medically, although severe or refractory keratitis may require surgical treatment.^{6,10}

A significant association was observed between the presence of predisposing factors and treatment response ($p=0.018$). Patients with identifiable predisposing factors showed a greater proportion of partial or poor responses. This finding is clinically relevant because underlying trauma, systemic disease, ocular surface abnormalities, and delayed presentation may contribute to disease severity and treatment difficulty.^{1,6}

Final visual improvement was observed in 70% of patients. Microbiological etiology was significantly associated with final visual outcome ($p=0.041$), with a relatively greater proportion of patients with fungal or mixed infections showing poor visual outcomes. Previous studies have similarly reported poorer outcomes and greater need for surgical intervention in fungal keratitis compared with bacterial keratitis.^{2,6}

Overall, the findings emphasize the importance of early clinical recognition, identification of predisposing factors, appropriate microbiological evaluation, and timely initiation of targeted therapy. Early diagnosis and

treatment may help reduce progression of corneal infection and improve visual outcomes.

Conclusion

Infectious keratitis was predominantly associated with ocular trauma, with bacterial and fungal organisms accounting for most culture-positive cases. Early microbiological evaluation and appropriate antimicrobial therapy were associated with favorable treatment response and visual outcomes. Identification of predisposing factors and timely management are essential to reduce complications and visual morbidity.

References

1. Ting DSJ, Ho CS, Deshmukh R, Said DG, Dua HS. Infectious keratitis: an update on epidemiology, causative microorganisms, risk factors, and antimicrobial resistance. *Eye (Lond)*. 2021; 35:1084-1101.
2. Gopinathan U, Sharma S, Garg P, Rao GN. Review of epidemiological features, microbiological diagnosis and treatment outcome of microbial keratitis: experience of over a decade. *Indian J Ophthalmol*. 2009;57(4):273-279.
3. Green MD, Apel A, Stapleton F. Risk factors and causative organisms in microbial keratitis. *Cornea*. 2008;27(1):22-27.
4. Leck AK, Thomas PA, Hagan M, Kalliamurthy J, Ackuaku E, John M, et al. Aetiology of suppurative corneal ulcers in Ghana and south India, and epidemiology of fungal keratitis. *Br J Ophthalmol*. 2002;86(11):1211-1215.
5. Reddy AK, Garg P, Kaur I, Sharma S. Clinical profile and microbiological spectrum of infectious keratitis in a tertiary eye care centre. *Indian J Ophthalmol*. 2020;68(8):1638-1643.

6. Prajna NV, Krishnan T, Mascarenhas J, Srinivasan M, Oldenburg CE, Toutain-Kidd CM, et al. The mycotic ulcer treatment trial: a randomized trial comparing natamycin vs voriconazole. *Ophthalmology*. 2013;120(11):2375-2381.
7. Keay L, Edwards K, Naduvilath T, Taylor HR, Snibson GR, Forde K, et al. Factors affecting the morbidity of microbial keratitis. *Ophthalmology*. 2006;113(6):109-116.
8. Delhi Infectious Keratitis Study Group. Delhi Infectious Keratitis Study: update on clinico-microbiological profile and outcomes of infectious keratitis. *Indian J Ophthalmol*. 2020.
9. Austin A, Lietman T, Rose-Nussbaumer J. Update on the management of infectious keratitis. *Ophthalmology*. 2017;124(11):1678-1689.
10. Gurnani B, Kaur K. Infectious keratitis: diagnosis and management. *Indian J Ophthalmol*. 2023; 71:3135-3147.