



Mycological Profile of Infectious Keratitis in Tertiary Hospital of Kumaon, Uttarakhand

Dr Shanti Pandey

Associate Professor, department of ophthalmology, Government Medical College Haldwani, Nainital, Uttarakhand

Dr Vivekanand Satyawali

Associate Professor, department of medicine, Government Medical College Haldwani Nainital, Uttarakhand

Dr Govind Singh Titiyal

Professor, Department of ophthalmology, Government Medical College Haldwani Nainital, Uttarakhand

Dr Kalpana Kumari

Postgraduate (3rd year) Department of ophthalmology, Government Medical College Haldwani, Nainital, Uttarakhand

ABSTRACT

Background: Corneal infection because of fungal origin is common in India and the ocular morbidity is greater than bacterial keratitis and diagnosis is often delayed. **Methods:** A prospective study on mycological profile of fungal keratitis was done at a tertiary care centre of Kumaon region from November 2012 to November 2015. Socio-demographic data, information pertaining to the risk factors, clinical presentation and fungal species isolation by culture was recorded. **Results:** Out of 136 patients with infective corneal ulcer, majority 77 (56.6%) cases were pure fungal (*Aspergillus spp* in 49.3%, *Fusarium spp* in 31.2%) Most patients of fungal keratitis belong to age group of 21-45 years and were of rural origin. There was slight male preponderance (53.2%) and majority (62.3%) of the patients presented to hospital within 2-3 weeks of onset of symptoms in the month of April to June (44.2%). Ocular trauma by vegetative matter (37.6%) is most common predisposing factor in all patients with suspected infective mycotic keratitis. **Conclusion:** Mycotic keratitis is the most common type of infective keratitis in Kumaon region, Uttarakhand and it occurred most frequently after a trauma with vegetative matter.

KEYWORDS : Mycological, profile, infectious keratitis, kumaon

INTRODUCTION

Corneal blindness is a major public health problem globally and infectious keratitis is one of the major causes. The epidemiological pattern and causative agents for infective corneal ulcer fluctuates considerably from country to country, and even from region to region within the same country. It is imperative to determine the "regional" etiology within a given region for inclusive strategy for the diagnosis and management of corneal ulcer¹.

In a vast agricultural country like India, particularly where primary health care and referral systems are weak, minor eye injuries sustained in agricultural farms often lead to infectious corneal ulceration and loss of vision¹¹. Certain conditions like trauma to the ocular structures and therapy with antibiotics and corticosteroids render the eye susceptible to infection with various fungi specifically in tropical parts of the world².

The purpose of this study was to evaluate mycotic keratitis presented at Tertiary Care Center, Kumaon region, Uttarakhand over a period of 3 years from November 2012 to November 2015. There was also an attempt to search for the antecedent risk factors predisposing to the development of mycotic keratitis and to identify the specific fungi responsible for infections which will help us in effective management of such cases in this region.

MATERIAL AND METHODS

It is a prospective study by design and was conducted by Department of Ophthalmology, Government medical college, Haldwani during study period of 3 years from November 2012 to November 2015. All patients with infectious corneal ulcers presenting to the Eye OPD, Sushila Tiwari Memorial Hospital, Haldwani were included in the study and written informed consent was taken from each patient. Typical viral ulcers and non-healing ulcers were excluded as were Mooren's ulcers, marginal ulcers, interstitial keratitis, sterile neurotrophic ulcers, and any ulcers associated with autoimmune conditions.

Patient information was recorded in the form of a pre designed Proforma involving clinical information i.e. duration of symptoms, previous treatment, predisposing ocular conditions, and associated risk factors.

Patients underwent complete ophthalmological examination i.e.

visual acuity, slit lamp examination. Corneal scrapings were taken under slit lamp magnification with strict aseptic precautions which were further subjected to gram stain and 10 % KOH mount and sent to Microbiology laboratory for culture and sensitivity. Fungal cultures inoculated onto SDA were incubated at 27 °C, examined daily, and discarded at 2 weeks if no growth was present

Any associated ocular condition like Trichiasis/entropion, Blepharitis, Bell's palsy, lagophthalmos, chronic dacryocystitis, dry eyes, bullous keratopathy, spheroidal degeneration of the cornea, any surgery on the cornea, use of contact lens, or ocular leprosy was also noted. The use of topical medications including topical corticosteroids were also noted.

Results

136 patients with the clinical diagnosis of infective corneal ulcer with or without hypopyon were enrolled in this study. Majority of the cases were found to be of fungal origin n-77,(56.6%).(Table:1)

Table 1: Microbiological profile of infective corneal ulcers in the study population.

Type of micro-organism	No. of cases (%)
Definitive fungal	77 (56.6)
Definitive bacterial	51 (37.5)
Mixed	6 (4.4)
Others	0 (0)
Inconclusive	2 (1.4)
Total	136 (100)

Out of 77 fungal corneal ulcer cases, age wise distribution showed that majority of patients lie in the age group of 21-45 years and more prevalent in rural population. Gender distribution revealed that there was slight male preponderance (53.2%) and majority (62.3%) of the patients presented to hospital within 2-3 weeks after commencement of symptoms. Most of the patients to hospital in the month of April-June (44.2%) followed by October - December (30%).(Table:2)

Table 2: Demographic profile of study participants with fungal corneal ulcer

Demographic profile of fungal corneal ulcer	Particulars	N (%)
Age in years	< 20	3 (3.9)
	21-45	36 (46.7)
	46-60	28 (36.3)
	>60	10 (12.9)
Sex	Male	41 (53.2)
	Female	36 (46.7)
Region	Rural	57 (74)
	Urban	20 (26)
Time of presentation	1st week	5 (6.5)
	2-3week	48 (62.3)
	>3 weeks	24 (31.2)
Month of presentation	January-March	9(11.7)
	April-June	34(44.2)
	July-September	11(14.3)
	October-December	23(30)

Trauma with vegetative matter (37.6%) was the most common predisposing factor associated with the fungal corneal ulcer patients. Other significant agents involves animal (13%) and wood (7.8 %). Ocular conditions predisposing to fungal corneal ulcer were encountered in 8 (10.4%) patients.(Table:3)

Table 3: Predisposing factors associated with fungal corneal ulcers in study population.

Predisposing factors	n(%)
Trauma	
Vegetative matter	29 (37.6)
Animal	10 (13)
Stone	4 (5.1)
Wood	6 (7.8)
Miscellaneous	2 (2.6)
Coexisting ocular disorder	8 (10.4)
Coexisting systemic disease	3 (3.9)
Steroid use	4 (5.2)
No specific history	11 (14.3)

As per microbiological examination, *Aspergillus* was the most common (49.3%) fungal species isolated. Among which *Aspergillus flavus* was the most common sub-species identified followed by *Aspergillus fumigatus* and *Aspergillus niger* and *Aspergillus*. *Fusarium* was found in 24 (31.2%) and no growth was seen in 4 (5.2%) fungal corneal ulcer specimens.(Table:4)

Table 4: Identification of fungal isolates from corneal ulcer scrapings of study participants

Fungal Isolates	N (%)
Aspergillus	38
A.Fumigatus	11(14.3)
A.Flavus	13(16.9)
A.Niger	8(10.4)
A.Spp	6(7.8)
Fusarium	24(31.2)
Candida	1(1.3)
Penicillium	5(6.5)
Mixed	6(7.8)
No growth	4(5.2)
Total	77(100)

DISCUSSION

In this study, the commonest age group affected was 10-45 years (46.7%) which shows a considerable socioeconomic impact on the population. Similar results have been seen in the studies of South India and western Orissa^{3,4}.

Most of the fungal corneal ulcer patients belong to rural areas (74%) which may be due to their involvement in agricultural activities and cutting grasses from the forest for animals etc. Agricultural activity and related ocular trauma were principal causes of mycotic keratitis⁵. Comparable results were seen in other studies where labourers/farmers contributed to corneal ulcers ranging from 54-70%⁶⁻⁷. Ocular trauma, predominantly with vegetative matter (37.6%), was the most common predisposing factor for fungal ulcers, followed by trauma by means of animal, wood and stone. Unlike south India (13.4%), 62.3% patients in this study presented during the 2-3 week of their symptoms³. This may be because of the hilly terrain of this region and some kind of treatment with a local dai or quack in the initial week of presentation. Majority of the cases have presented in the months of April to June (44.2%) and the second peak (30%) as in the months of October to December similar results were observed by other studies during the dry, windy, harvesting seasons compared with the wet, humid months of the year⁸⁻¹⁰. And other studies have found an increase during the hot and humid months^{2,11,1}.

Among 136 cases, 77(56.6%) cases were positive for fungus. This is comparable to Srinivasan et al study³(51.9%) and Basak SK et al study⁶(59.3%) while slightly more than the south India reports by Leck et al,¹(44.1%) and Bharathi et al⁵The most commonly isolated fungal pathogens in the current series were *Aspergillus* spp. Of 77 fungal isolates, 49.3 % were *Aspergillus* spp, 31.2 % were *Fusarium* spp and 5 % were *Penicillium* spp. In our study, *Candida* spp (1%) was less compared to other studies^{5,13}. *Aspergillus* species were predominant in Mumbai, parts of south India, north India, Nepal and Bangladesh^{5,13-17}. Other studies in south India reported *Fusarium* spp to be more common than *Aspergillus* spp^{1,18-19}. *Fusarium* spp have also been found to be the principal fungal pathogen in Florida, Paraguay, Nigeria, Tanzania, Hong Kong and Singapore^{13,20-27}. These phenomenon may be explained by differences in climate and the natural environment.

CONCLUSION:

This study concludes that fungal keratitis is more prevalent in Kumaon region as compared to northern region and other parts of country as contributed by the hilly terrain of Kumaon region & agricultural practices involved at a large scale. Most predominant fungal isolates were found to be *Aspergillus* and *Fusarium*. This study aims towards judicious usage of resources and involvement of microbiological assessment of specimens which will further help us to combat these conditions in terms of diagnosis and management in an effective manner.

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