



EPIDEMIOLOGICAL AND MICROBIOLOGICAL PROFILE OF MYCOTIC KERATITIS IN THAR DESERT

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ABSTRACT

Introduction: Fungal keratitis is a suppurative and sight-threatening infection of the cornea that sometimes leads to loss of the eye. Study was done to know the epidemiology and risk factors of fungal keratitis in north western Rajasthan. **Methodology:** In this hospital based prospective cohort study a total of 50 fungal corneal ulcer cases attending the ophthalmology outpatient department of a tertiary care center. After clinical and slit-lamp biomicroscopic examination in all suspected cases, smears and culture examination for fungus was done to establish the etiology. Demographic information and associated probable risk factors of individual cases were noted in a predesigned questionnaire. **Results:** 60% patients were males and 40% females. Agricultural workers were most commonly affected and most common cause of injury was vegetative matter (40%). Aspergillus was the most common fungal species (46%). **Conclusion:** Ophthalmic mycosis is emerging as a major cause of vision loss and morbidity and can be life-threatening. Ocular trauma was the commonest cause of fungal corneal ulcer and Aspergillus was the commonest species responsible for it. Most of the mycotic ulcer cases come from rural areas.

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INTRODUCTION

Corneal ulcer is one of the important ophthalmic conditions causing significant morbidity especially in the developing countries. Most microorganisms can invade the corneal stroma if the normal corneal defense mechanisms are compromised^[1] Being in the subtropical region, the western part of India has conducive environmental conditions like dusty environment for corneal ulcer. Moreover, the majority of the people are engaged in agriculture. These make them more vulnerable for fungal infection. However, systemic studies on fungal corneal ulcer from this region are scanty. In the above context, the present study was undertaken to know the risk factors and other epidemiological variables of fungal corneal ulcer cases reporting to a tertiary referral hospital of Rajasthan.

MATERIALS AND METHODS

It was a single centre prospective tertiary care hospital based study conducted in the Department of Ophthalmology of S.P. Medical College & PBM Hospital and Associated group of hospitals. It included 50 corneal ulcer patients of any age group and either sex who had Culture and/or smear positive fungal corneal ulcer. Patients not willing to give informed consent or having impending or frank corneal perforation,

concomitant endophthalmitis and immunocompromised patients were excluded from study. Cases on the basis of sign and symptoms, with or without history of trauma by vegetative matter were clinically suspected as mycotic keratitis. After obtaining informed consent patient underwent routine clinical and ophthalmological examination. All patients subjected to routine laboratory investigations including LFT and RFT and special tests like KOH and microbial culture, HIV, HBsAg and VDRL testing. Demonstration of fungal elements on corneal scraping and/or culture was regarded as confirmatory criterion for mycotic ulcer. Corneal scrapes were taken by applying topical anesthesia (0.5% proparacaine) with a sterile Bard Parker blade (no. 15). Materials obtained were processed for direct 10% potassium hydroxide (KOH) mount examination, Gram stain and for culture in blood agar, chocolate agar, Sabouraud's dextrose agar. Topical antifungal therapy was started as soon as fungus was identified by KOH wet-mount preparation. The topical therapy included voriconazole 1% w/v every two hours, drops of 1% atropine thrice a day and tablet fluconazole 150mg od. Patients were examined every day when admitted in hospital and then at interval of one week, 15, 30, 45 and 60 days and response to the therapy was recorded, including best corrected visual acuity (BCVA) and measurement of size of abscess on slit-lamp biomicroscopy. The infection was considered resolved when there was complete healing of the epithelial defect with resolution of corneal abscess and scar formation. If no objectively

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demonstrable response to therapy was seen in 14 days or if infection shows the signs of worsening, voriconazole was injected intrastromally around the fungal abscess. Post-intrastromal injection, all patients were continued voriconazole 1%w/v every two hours, drops of 1% atropine thrice a day and tablet fluconazole 150mg od and followup was done in same schedule of topical voriconazole.

RESULTS

Age range of the study population was 11-75 years with 60 percent patients being male. There was no statistical difference between male and female groups with respect to age. Keratomycosis is seen mostly in farmers (46%) followed by students (16%) and (14%) labourer (Table 1).

Table 1 Distribution of patients according to their occupation

Occupation	Male N (%)	Female N (%)	Total N (%)
Farmers	12 (24%)	11 (22%)	23 (46%)
labour	6 (12%)	1 (2%)	7 (14%)
House wives	0	5 (10%)	5 (10%)
Students	5 (10%)	3 (6%)	8 (16%)
Shopkeeper	3 (6%)	0	3 (6%)
Driver	3 (6%)	0	3 (6%)
Army personal	1 (2%)	0	1 (2%)
Total	30 (60%)	20(%)	50(%)

In majority of the cases corneal injury was an important predisposing factor. Most common cause of injury was vegetative matter (40%) followed by sand trauma (16%) and insect trauma (12%) (Table2).

Table 2 Distribution of patients of keratomycosis by etiology

Etiology	N (%)
Vegetative Matter	20 (40%)
Insect Trauma	6 (12%)
Sand	8 (16%)
Fingernail	3 (6%)
Cow tail	3 (6%)
Stone	1 (2%)
Rope	1 (2%)
Steroid use	4 (8%)
No	4 (8%)
Total	50 (100%)

In majority of keratomycosis *Aspergillus* (46%) species was observed followed by *Fusarium* species (30%). Other less common species were *Candida* (12%), *Alternaria* (6 %), *Curvularia*, *Epicoccum* and *Rhizopus* 2 % each (Table 3).

Table 3 Distribution of patients with type of fungi

Types Of Fungus	Male N (%)	Female N (%)	Total N (%)
<i>Aspergillus</i>	11 (22%)	12 (24%)	23 (46%)
<i>Fusarium</i>	12 (24%)	3 (6%)	15 (30%)
<i>Candida</i>	3 (6%)	3 (6%)	6 (12%)
<i>Curvularia</i>	1 (2%)	0	1 (2%)
<i>Epicoccum</i>	1 (2%)	0	1 (2%)
<i>Rhizopus</i>	1 (2%)	0	1 (2%)
<i>Alternaria</i>	1 (2%)	2 (4%)	3 (6%)
Total	30 (60%)	20 (40%)	50 (100%)

The size of the ulcer varied from 2.0 to 8.3 mm, and the size of infiltrate varied in .5 to 3.5 mm area around the ulcer. Out of total 45 patients, 50% of patients were categorized under moderate group, followed by severe (42%) and mild (8%). In majority of the cases (80%) the ulcer depth was 1/4th to 2/3rd of cornea i.e. moderate followed by mild (14%) and severe

(6%). Hypopyon was present in 25 patients. As soon as the therapy started, out of 50 patients 45 patients get symptomatic relief and by the end of first week reduction in the ulcer size and infiltration noted. Rest five patients, even after 2 weeks of use of voriconazole eye drops either remains stationary or get worsened. These 5 patients were treated with one injection of intrastromal voriconazole and then continued with voriconazole eye drops till the complete healing of ulcer. The intrastromal voriconazole injection and voriconazole eye drops helped in early and complete resolution of the ulcer with no adverse effects in our study. At the end of the healing of ulcer corneal opacity remains which is mainly of macular type. Average duration of healing is 5.5 weeks.

DISCUSSION

Mycotic keratitis is an infection of the cornea by the fungus that causes ulceration and inflammation, usually following trauma or prolong use of steroid drops, contact lens use. Due to increasing incidence in past three decades and insignificant responses to antifungal agents, fungal keratitis has become one of the leading causes of visual loss in many developing countries. The difficult matters lie in isolating the etiologic fungal organisms in the laboratory, and treating the keratitis effectively with available old topical antifungal agents.

Approximately, 49 percent of the patients are in the age group 21 to 50 years, although it has been reported in extremes of age also. The age group of patients included in our study ranged from 12 year to 75 years. Most common age group affected was 6th decade (24.40%). Our results correlated with study of Suman Saha *et al*⁽²⁾ where the mean patient age was 53 years. It is mainly due to poor general health condition and less medical attention. In our study, out of 45 patients 27 patients were male (60%) and 18 patients were females (40%). Male: female ratio was 3:2. Similar results were found in study done by Varsha Tukaram *et al*⁽³⁾ where 24(60%) were males and 16(40%) were females. Our results also correlated with study of Gopinathan Usha *et al*⁽⁴⁾, who also reported that males (962) were affected significantly more ($p < 0.0001$) than females (390). Higher incidence of keratitis in males can be attributed to more outdoor activity of males in field activities related to agriculture and farming.

Our study data showed that keratomycosis is seen mostly in farmers both in males (20%) and females (20%). The other less common involved occupations are labours (15.6%) in males and housewives (22.22%) in females. Our results correlated with study of M Jayahar Bharathi *et al*⁽⁵⁾, who also reported farming (64.75%) as most common occupation in their study population. Sathyanarayan M.S *et al*⁽⁶⁾ also observed agricultural occupation (52.94%) to be most commonly involved in their study population. This is attributed to ubiquitous fungal spores and presence of these on senescent plant material.

Most common etiology implicated in our study was trauma with vegetative matter (37.8%) followed by sand (15.6%) and insect trauma (13.3%). Panda Anita *et al* also observed that vegetative trauma (60.5%) was the most common causative factor in their study population⁽⁷⁾. M Jayahar Bharathi *et al* also identified vegetative trauma (61.28%) as the predominant predisposing factor for fungal corneal ulcer.⁽⁵⁾

Contact lens wear was reported one of the major associated conditions in industrial countries in many studies but there was

no case of contact lens wear in our study^(8,9). The possible reason is that the habit of wearing contact lens is not common in rural background, particularly in the poor farmers.

This study data showed that *Aspergillus* (40%) was the most common fungal species followed by *Fusarium* species (33.3%). Other less common fungal species were *Candida* (13.3%), *Alternaria* (6.7%), *Curvularia*, *Epicoccum* and *Rhizopus* 2.2% each. Our results correlated with study of Jagdish Chander *et al*⁽¹⁰⁾, who also reported *Aspergillus* ((41.18%), as the commonest fungal species followed by *Fusarium* species (23.53%). These results were also consistent with the study done by Bibhudutta Rautaraya *et al*⁽¹¹⁾. *Aspergillus* species (27.9%) and *Fusarium* species (23.2%) were the major isolates in their study population. Sathyanarayan M.S *et al*⁽⁶⁾ also observed that *Aspergillus* spp. was the commonest isolates (16/23 isolates- 69.56%), followed by *Fusarium* spp., and dematiaceous fungi.

In our study the size of the ulcer varied from 2.0 to 8.3 mm, and the size of infiltrate varied from .5 to 3.5 mm area around the ulcer and depth of ulcer varied from <1/4th cornea to >2/3rd cornea. Majority of patients were categorized under moderate group both according to size (55.6%) and depth of ulcer (77.7%). This is mainly because of that most of the patients presented within 2nd and 3rd week (62%). Results of study done by YJ Reddy *et al*⁽¹²⁾ were also consistent with our study.

Standard treatment protocols were followed in treating the cases including oral antifungals. Most of the cases (45 cases) showed good response to treatment with topical voriconazole. . These cases were either admitted to the hospital or were in regular follow-up for monitoring. Some (5 patients) did not responded with topical voriconazole were treated with one injection of intrastromal voriconazole.

CONCLUSION

Ophthalmic mycosis is emerging as a major cause of vision loss and morbidity and can be life-threatening. Ocular trauma was the commonest cause of fungal corneal ulcer and *Aspergillus* was the commonest species responsible for it. Most of the mycotic ulcer cases come from rural areas.

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