

IJMSIR : A Medical Publication Hub Available Online at: www.ijmsir.com

Volume – 2, Issue – 3, May – June - 2017, Page No. : 72 -77

Epidemiology and Aetiological Diagnosis of Keratomycosis in Patients Attending Ophthalmology Department of

#### **SMS Hospital Jaipur**

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Conflicts of interest: None to Declare

### Abstract

**Background:** Keratomycosis is a common cause of corneal blindness and requires prompt diagnosis for early initiation of antifungal treatment.

**Methods:** The present study has been carried out on 100 patients of confirmed keratitis or suspected keratitis in the department of Microbiology and department of Ophthalmology, SMS Hospital, Jaipur (Rajasthan) from January 2015 to December 2016

**Results:** Fungal culture was positive in 39(39%) patients. Out of 100 patients,62(62%) were male and 38(38%) patients were females with the Male and Female ratio of 1.6:1. Most of the patients were farmers(43%). Majority of patients were in the age group of working population i.e., from 21-40 years. Out of 100 patients, 74 patients gave history of trauma to the eye with various agents.

Conclusion: Rural population, especially males in the active working age group and those involved in agriculture were found to be predisposed to the development of fungal corneal ulcers. Rapid and reliable detection of presence of fungal elements in suspected cases of keratomycosis can be done using direct microscopy with KOH preparations of corneal scrapings. Fusarium species were found to be the commonest isolates in patients presenting with keratomycosis in Jaipur.

**Keywords:** Keratomycosis, KOH preparation, Gram stain, Culture, Aspergillus spp.

## Introduction

The term 'keratomycosis' refers to invasive infection of corneal stroma caused by a variety of fungal species and is frequently encountered in many tropical countries including India and is a significant cause of infective monocular blindness. The precipitating event for fungal keratitis is often trauma with a vegetable / organic matter, seen mostly in agricultural workers. Implantation of fungus directly in the cornea by trauma leads to slow growth and proliferation to involve the anterior and posterior stromal layers. The fungus can penetrate the descemet's membrane and pass into the anterior chamber. The patients present a few days or weeks later with fungal keratitis. Keratomycosis is reported to be very common, representing 40%-50% of all cases of culture-positive infectious keratitis in India.<sup>1,2</sup>

In mycotic keratitis, two types have been recognised: Keratitis due to filamentous fungi (especially *Fusarium* and *Aspergillus*), which commonly occurs in tropical and subtropical zones, and associated with corneal trauma (and concurrent contamination with

plant material); and keratitis due to yeast-like and related fungi particularly *Candida*; and mostly associated with corneal disease, local immunosuppression caused by chronic corticosteroid use and systemic disease states that lower host resistance. All the more, the protean appearances of mycotic keratitis might be indistinguishable from a bacterial ulcer.

#### **Material and Methods**

The present study has been carried out on 100 patients of keratitis or having suspicion of keratitis in the department of Microbiology and department of Ophthalmology, SMS Hospital, Jaipur (Rajasthan) from January 2015 to December 2016.

Patients which were attending ophthalmology OPD, after obtaining their informed and written consent and filling of Performa any eligible patients fulfilling inclusion criteria; patient willing to participate in study and with corneal ulcer eligible for providing corneal scraping in opinion of ophthalmologist were subjected for detailed sociodemographic & clinical history. A sample of corneal scraping was taken by expert ophthalmologist and were submitted to the laboratory for microbiological investigations. The patients age, gender, occupation, history of any predisposing factor like trauma, past and current use of topical medicines or use of contact lens were meticulously recorded.

Sample was inoculated on Sabouraud's Dextrose Agar with and without antibiotics and incubated at 25° C for 21 days and examined daily for first week then weekly upto 21 days. The growth was observed for rate of growth, colony morphology, texture and pigmentation.

### Results

Table 1: Total cases of fungal keratitis from OPDpatients

S.No.	Samples	No.	%
1.	Total corneal scraping samples collected for examination	100	
2.	Total no. of fungal culture positive cases	39	39%
3.	Total no. of KOH positive cases	25	25%
4.	Total no.of KOH+CFW positive cases	29	29%

Out of the 100 corneal scraping samples that were received during study period,39(39%) samples were fungal culture positive.Among the positive culture samples,25(25%) were KOH positive and 29(29%) were KOH+CFW positive.

Table 2: Distribution of various fungus present inOPD patients corneal scraping samples.

Species	No.of isolates	Percentage
Fusarium species	17	43.58%
Aspergillus fumigatus	6	15.38%
Aspergillus flavus	3	7.69%
Aspergillus niger	1	2.56%
Curvularia species	3	7.69%
Alternaria species	3	7.69%
Penicillium species	1	2.56%
Non-albicans Candida	3	7.69%
Dreschlera species	1	2.56%

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Fonsaceae species	1	2.56%
Total	39	100%

Fungal culture was positive in 39(39%) patients. After 21 days of inoculation of the SDA medium in 17(43.58%) patients, *Fusarium* species was isolated. In 6(15.38%) patients *Aspergillus fumigatus* was isolated. In 3(7.69%) patients, *Aspergillus* flavus was isolated. In 4(7.69%) patients *Alternaria* species was isolated. In 3(7.69%) patients *Non-albicans Candida* and in 1 (2.56%) patients *Fonsaceae* species was isolated. *Penicillium* species (2.56%) and *Dreschlera* species (2.56%) were isolated in one patient each.

Table 3:	Residence	of patients.
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Rural/Urban	No. of cases	Percentage
Rural	76	76%
Urban	24	24%
Total	100	100

As shown in the table above 76 patients (76%) were from rural areas whereas the rest of the 24 patients (24%) were from urban areas.

Sex	No.of cases	Percent
Male	62	62%
Female	38	38%
Total	100	100



M:F:: 1.6:1

Out of 100 patients,62(62%) were male and 38(38%) patients were females with the Male and Female ratio of 1.6:1.

<b>Fable 5</b>	: Distribution	of patients	according t	to age.
Fable 5	: Distribution	of patients	according t	to ag

Age(Yrs)	No. of cases	Percentage
<20	2	2%
21-30	21	21%
31-40	40	40%
41-50	14	14%
51-60	11	11%
>60	12	12%
Total	100	100

## Most common age group=31-40 yrs

Out of 100 patients, majority of patients were in the age group of working population i.e., from 21-40 years. It was less in very young and old patients.

Table	6:	Distribution	of	patients	according	to
occupa	tion					

Occupation	No. of cases	Percentage
Farmer	43	43
Housewives	13	13
Carpenter	7	7
Manual labourers	8	8
Student	5	5
Jeweller	2	2
Service	11	11
Others	11	11
Total	100	100

The above table shows that most of the patients were farmers(43%),followed by housewives (13%),patients in service(11%),manual labourers (9%), carpenters (6%), students(5%) and two jewellers in that order.11 (11%)patients were in others category which were not working.

Table 7: Distribution of patients according topredisposing factor.

Predisposing	No. of cases	Percentage
		(70)
Trauma	74	74
Tropical steroids	7	7
Diabetes mellitus	6	6
Use of Contact lenses	0	0
Impacted foreign body	4	4
Use of herbal medicine	4	4
Unknown	5	5
Total	100	100

Out of 100 patients 74(74%)patients gave history of trauma.7(7%) patients gave history of use of topical steroids.6(6%) patients had diabetes mellitus.4(4%) patients had history of use of herbal medicine and 4(4%) had history of impacted foreign body.5(5%) patients had not known any reason for having corneal ulcer.

#### Table 8: History of trauma to the eye.

Nature	of	No. of cases Percentage
trauma		

Vegetative matter	33 (44.59%)
Paddy	12 (16.21%)
Wooden sticks	19 (25.67%)
Foreign body	10 (13.51%)
a.stone	5
b.Dust	4
c.finger nail	1
injury	
Total	74

Out of 100 patients, 74 patients gave history of trauma to the eye with various agents. The majority of patients 33(44.59%) had trauma with vegetative matter followed by 12 patients (16.21%) which gave history of trauma from paddy.19 (25.67%) had history of trauma from wooden object.10 patients(13.51%) patients had history of trauma with other agents like stone, dust and finger nail. Only 26(26%) patients gave no history of trauma.

Table 9: Duration	of symptoms	at presentation.
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Duration (days)	No.of Cases	Percentage
1-5	38	38
6-15	41	41
16-30	18	18
>30	3	3
Total	100	100

In this study, 41 patients presented after 6-15 days of having symptoms like pain,redness,diminution of vision and watering of eyes. 38 Patients presented after 1 to 5

days of symptoms and 18 patients after 16 to 30 days of

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symptoms. There were 3 patients who reported after 1 month.

#### Discussion

In our study the magnitude of fungal keratitis was 39% from OPD patients which were almost similar to study of Usha Gopinathan et al<sup>3</sup> and Verenkar et al<sup>4</sup> of 38.2% and 38.9% respectively.

In our study the patient presenting with suspected fungal keratitis were from less than 20 years of age to 60 years of age group but majority of the patients presenting with fungal keratitis were between 21-40 years of age. This indicates that most affected patients in our study are from working population. This higher proportion of this age group can be explained by the fact that fungal keratitis is more common among the patients doing agricultural work and household work where majority of the involved working population is younger as compared to children and old people. Aarti tewari et al<sup>5</sup> found highest incidence in 21-40 years of age group which were similar to our study. Ragini Tilak et al<sup>6</sup> and Shukla Das et al<sup>7</sup> found highest incidence in 31-40 years of age group which is similar to our study.

In the present study male to female ratio of patients was around 1.6:1 which correlates well with Srinivasan et  $al^6$  and Gupta et  $al^8$  with the male to female ratio1.6:1 and 1.75:1 respectively. Similar findings were reported by Anusuya Devi et  $al^9$ . This is probably due to the fact that the male are more prone to ocular trauma due to their more involvement in field activities related to agriculture and farming.

In our study trauma (74%) was found to be the most important risk factor for development of fungal keratitis. Among these patients around 61% patients had history of ocular trauma from vegetative matter while wooden stick injury (25.67%) and corneal foreign body due to occupational exposure (13.51%) were other significant associations with mycotic keratitis following trauma. Diabetes mellitus (4%), use of topical steroids (7%) and herbal medicines (4%) were other significant risk factors associated with mycotic keratitis in our study. This finding correlates with studies by Aarti tewari et al<sup>5</sup>where ocular trauma was seen as the most common risk factor for development of fungal keratitis and use of topical steroids and diabetes mellitus were found as other significant associations.

Our study indicates that Occupation and social economic background have an important impact in the development of fungal keratitis. Majority of the affected individuals in our study are from rural background (76% rural as compared to 24% urban). This can be explained by the fact that most of the people in rural area have agricultural or similar occupation background which make them more prone to ocular trauma and subsequent fungal keratitis. Poor health care facility in the rural area further increases the proportion of the affected individuals. In our study farmers (43%), housewives (13%), labourers (8%) and carpenter (7%) were the most affected people with fungal keratitis. Anusuya Devi et al<sup>5</sup> also found that farmers were most commonly affected in their study.

In present study, *Fusarium* species accounted for the maximum number of cases (43.58%). It was followed by *Aspergillus fumigatus* (15.38%), *Aspergillus flavus* (7.69%) *Curvularia* species (7.69%), *Alternaria* species (7.69%), *Non-albicans Candida* (7.69%), *Fonsaceae* species (2.56%), *Penicillium* species (2.56%), *Dreschlera* species (2.56%) and *Aspergillus niger* (2.56%). *Fusarium* as the most common isolate was also reported by many authors in their studies. A study from Tamil Nadu 2003, by Bharathi MJ et al<sup>10</sup> found Fusarium species as commonest isolate in fungal keratitis, followed by Aspergillus species.

## Conclusion

Rural population, especially males in the active working age group and those involved in agriculture were found to be predisposed to the development of fungal corneal ulcers. Rapid and reliable detection of presence of fungal elements in suspected cases of keratomycosis can be done using direct microscopy with KOH preparations of corneal scrapings. *Fusarium* species were found to be the commonest isolates in patients presenting with keratomycosis in Jaipur.

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