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MICROBIOLOGICAL AND EPIDEMIOLOGICAL PROFILE OF KERATOMYCOSIS IN A TERTIARY CARE HOSPITAL – A PROSPECTIVE ANALYSIS

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ABSTRACT **Introduction:** Microbial keratitis is predominantly an opportunistic, serious ocular infectious disease that can lead to significant vision loss and ophthalmic morbidity.1 The fungi are significant pathogens causing ocular infections due to their frequent involvement and difficulty in establishing definitive diagnosis..

Material and Methods: We prospectively analyzed 106 cases of keratomycosis in our tertiary care hospital. Corneal scrapings were collected, processed and fungal pathogens were identified by standard laboratory techniques.

Results: Out of 106 suspected cases, culture was positive in 31 cases. Aspergillus species were the most frequent isolates (51.61%). Next to this were Candida spp. (19.35%) followed by Fusarium spp., Alternaria spp., Mucor spp , Penicillium spp, Drechslera spp and Exserohilum spp . Males were more affected than females and trauma was the most common predisposing factor.

Conclusions: This study highlights important risk factors and organisms responsible for mycotic keratitis.

KEYWORDS : Microbial keratitis ,Keratomycosis , *Aspergillus spp , Exserohilum spp*

INTRODUCTION –

Microbial keratitis is predominantly an opportunistic, serious ocular infectious disease that can lead to significant vision loss and ophthalmic morbidity.[1]. Fungi are one of the most common infective organism responsible for this morbidity.[2] Fungal infection of the cornea (keratomycosis, mycotic keratitis or fungal keratitis) was described for the first time by Leber in Germany in the year 1879.[3] Corneal infection of fungal etiology may represent 40-50% of all cases of culture proven infectious keratitis[4] .If not treated early, this condition may lead to corneal blindness.

Due to a large agrarian population and environmental factors, fungi contribute largely to the environmental list of infectious intruders of the cornea[5]. In most of the studies, corneal trauma is the commonest predisposing factor. Other predisposing factors could be occupation, rural background, prolonged use of topical corticosteroids or antimicrobial agents, systemic diseases such as diabetes mellitus, pre-existing ocular diseases, and use of contact lenses. The etiological and epidemiological pattern of corneal ulceration varies significantly with the patient population, health of the cornea, geographical region, and also tends to vary with period of time[6].

More than 100 fungal species belonging to 56 genera have been implicated in mycotic keratitis the most frequently isolated being *Aspergillus, Fusarium, Curvullaria, Helminthosporium, Alternaria, Penicillium, Candida* and *Bipolaris* species. [7-12]

Fusarium species and *Aspergillus* species are responsible for 70 % of cases in tropical countries whereas candida is responsible for most of the cases in temperate countries[6,13].

Filamentous organisms are associated with infections following trauma with vegetable contaminated matter[14,15,16] whereas yeast infections typically occurs in eyes with preexisting ocular surface disease.[17]

MATERIAL AND METHODS

This prospective study was conducted in the Department of Microbiology, Gajra Raja Medical College, Gwalior. Corneal scraping of the patients suspected of fungal keratitis attending ophthalmology OPD and those admitted in ophthalmology ward of J A Group of Hospitals, Gajra Raja Medical College were studied during the period of one year. Corneal scrapings were taken by an experienced ophthalmologist under all aseptic precautions.

A total of 106 samples were included in this study. All the samples were processed for direct microscopy by KOH mount and Gram's staining.[6,18] and for culture on Sabouraud's dextrose agar and blood Agar.

Two tubes of Sabouraud's dextrose agar (one supplemented with antibiotics and one without antibiotics) were inoculated and incubated at 25^{0}C for 4 weeks. Any growth obtained was further identified by standard laboratory techniques. [19]

For blood agar, specimen was inoculated on to the plate in a row of C shaped streak and was incubated at 37 ºC and was examined daily for growth and was discarded in case no growth was seen even after 10 days of incubation period.[19]

RESULT

Out of 106 patients suspected of having fungal keratitis, 38 cases were found to have fungal etiology depending upon direct microscopy and clinical features, showing 35.84% incidence of keratomycosis in this study.

Out of the 38 cases, 35 cases were found positive for fungal elements in 10 % KOH mount and 3 cases were positive on culture but negative on KOH mount.

Among the 35 cases which were KOH positive, 28 were culture positive and 7 were negative showing 90.32 % sensitivity of 10 % KOH mount. (Table 1)

Among the fungal isolates 16 out of 31(51.61%) were *Aspergillus* spp., and next common agent isolated was *Candida* spp. (19.35%) followed by *Fusarium* spp. (9.6%), *Alternaria* spp. (6.4%), *Mucor* spp (3.2%), *Penicillium* spp (3.2%), *Drechslera* spp (3.2%) and Exserohilum spp (3.2%). (Table 2)

Males (22/31, 70.96%) were more affected than the females (9/31, 29.03%) .

Maximum number of culture positive cases belonged to age group of 41-60 yrs of age with 41.02 % incidence followed by age group having age >60 years.

Among the predisposing factors, trauma was present in 58.06% cases followed by long term steroid or antibiotic usage accounting for 29.03%, post ocular surgery in 12.90% and diabetes in 9.67 % cases. (Table 3) .Out of 18 cases due to ocular trauma, 10 cases (55.55) were due to trauma from vegetative matter.

Distribution according to occupation in this study showed that

maximum cases were farmer by occupation contributing about 51.61% followed by labourer 25.80%.

Seasonal variation in occurrence of cases showed higher incidence in months of Mar–Apr followed by Nov-Dec which corresponds to the harvesting season in this area.

Table 1 Correlation between direct microscopy and culture positivity

Name of investigation	Outcome	Number of cases (n)	Presence of fungal growth in culture	
			Positive	Negative
KOH mount	Positive	35	28	7
	Negative	3	3	0
	Total	38	31	7

Table 2 Distribution of isolates among culture positive cases

Sl no	Organism		Number of cases(n)	Percentage (%)
1.	*Aspergillus spp*		16	**51.61**
1.	*Aspergillus flavus*	9		
1.	*Aspergillus niger*	5		
1.	*Aspergillus fumigatus*	2		
2.	*Candida spp*		6	19.35
1.	*Candida albicans*	4		
1.	*Non albicans Candida spp (candida tropicalis)*	2		
3.	*Fusarium spp*		3	9.6
4.	*Alternaria spp*		2	6.4
5.	*Mucor spp*		1	3.2
6.	*Penicillium spp*		1	3.2
7.	*Drechslera spp*		1	3.2
8.	*Exserohilum spp*		1	3.2

Table 3 Predisposing factors among culture positive cases

Sl no	Predisposing factors	Number of cases (n)	Percentage(%)
1.	Trauma	18	**58.06**
2.	Long term steroid/antibiotic usage	9	29.03
3.	Post ocular surgery	4	12.90
4.	Diabetes	3	9.67
5.	Undefined	2	6.45

DISCUSSION-

Our study revealed that fungal keratitis accounted for 35.84% incidence which is in concordance with similar studies done by Bharti J *et al.* (34.4%)[6] , Kalshetti *et al.* (35%.)[20],Anuradha Chowdhury (39%) [11] and Jagdish Chander *et al.* (41.5%)[21].

In this study sensitivity of 10 % KOH mount was 90.32 %, which suggests that microscopy using 10% KOH can be used for rapid diagnosis of keratomycosis. In a similar study done by Srinivasan sensitivity was higher (99.23%).[8] in another similar study by Chander *et al* it was reported as 64.07%.[21]

Among the 31 fungal isolates in our study 16 (51.61 %) were *Aspergillus* spp followed by *Candida* species 6 (19.35%) and *Fusarium* species 3(9.6%) and the remaining 6 isolates were of *Alternaria* spp, *Mucor* spp, *Penicillium* spp, *Drechslera* spp and *Exserohilum* spp.

The dominant role of *Aspergillus* spp in corneal ulcer has also been documented in the studies of Basak Samar K *et al.,*[12] Khanal B *et al.,* [22] Suman Saha *et al.*[19] and Jagdish Chander *et al.* [21], where *Aspergillus* spp was found as the most common fungal isolates from the cases of fungal corneal ulcer.

However in contrast to our study where *Fusarium* was found only in 9.6% cases many studies have found *Fusarium* spp as the most common isolates. Bharathi M *et al.*[6] in their study found *Fusarium* as the most common fungus isolated followed by *Aspergillus* . Similar results were found in other studies of Lixen *et al.*[23]Prashant *et al.*,[24] and Reema nath *et al.*[25] .This difference may be explained by differences in climate and natural environment.

In our study, *Candida* spp were the second most common isolates after *Aspergillus* spp accounting for 19.35% of total isolates. This correlates with study done by Suman Saha *et al.*,[19] where *Candida albicans* was the second most common isolate ie 18.91%. In a similar study by Kumari *et al.*, *Candida* spp was found as second most common isolate after *Aspergillus* spp.[26]

In our study, among the 31 isolates, 22 (70.96 %) were isolated from males and 9 (29.03 %) from females showing male preponderance. Similar findings of male preponderance were observed in the study of Chowdhary *et al.* [11], Basak Samar K *et al.* [12], Suman Saha *et al.* [19], Reema Nath *et al.*[25] and Bharathi *et al.*[6]

Most common age group affected was 41-60 yrs representing 41.02% of cases. This is similar to the results found in study done by Bharathi *et al.*,[6] Kumari *et al.* [26], Gopinathan *et al.*[14] and Deshpande *et al.* [27] who documented higher incidence of fungal keratitis in age group of 21-50 yrs.

On assessing the predisposing factors in this study, ocular trauma was found as the most important predisposing factor. A definite history of antecedent corneal injury was recorded in 18 cases (58.06%), which is in concordance with the study done by Gopinathan *et al.*[14] where history of trauma was found in 54.5% of patients and Pande *et al.* [7] with history of trauma in 55.3% cases.

Among the different agents of ocular trauma such as vegetative matter, animal tail, dust etc, in our study 55.55% cases were associated with history of ocular trauma by vegetative matter. This correlates with the study done by Basak Samar K *et al*[12.] Suman saha *et al* [19] and Panda *et al* [7] in which 59.6%, 57.14% and 60.05% patients had corneal injury with vegetative matter respectively.

In present study, fungal keratitis was observed to be more common in farmers (51.61%) followed by labourers (25.80%) which is concordance with the study done by Uma Shree Malareddy *et al.*[28] , Bharathi *et al.* [6], Kumari *et al.*[26] and Deshpande *et al.* [27].

The present study shows seasonal variation in presentation of cases. Incidence was maximum in month of March-April followed by Nov-Dec. which correlated with the harvesting season of our region.

CONCLUSION

Keratomycosis is an important cause of ocular morbidity. Precise identification of the causative organisms is very important as early institution of antifungal therapy may limit ocular morbidity. Although culture helps in definitive diagnosis and identification, microscopy for detection of fungal elements in corneal scraping permits a rapid diagnosis and 10% KOH mount was found to be a sensitive and reliable method for prompt diagnosis of mycotic keratitis.

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