Mycotic Keratitis from Mumbai

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Abstract

Purpose: To find out fungal isolation rate in clinically suspected cases of mycotic keratitis and to identify aetiological agents and risk factors.

Methods: 260 suspected cases of mycotic keratitis seen over two and half years from January 2005 to June 2006 were included in the study. Corneal scrapings were subjected to microscopy and fungal culture. Data of patients and various predisposing factors were studied.

Results: Fungi were isolated in 13.07% cases. Correlation between microscopy and culture was present in 58% cases. Male: Female ratio observed was 3:1. Filamentous fungi were isolated in 79.41% cases and yeasts were isolated in 20.58% cases. Predominant fungal isolates were Aspergillus species 17.64% (16/34), Fusarium species 14.7% (5/34). Curvularia species, Penicillium species and Candida albicans were isolated in 3 cases each (8.82% each); Cladosporium species, Dreschleria species, Acremonium species, Aureobasidium species were isolated in 2 cases each (5.88% each), while Alternaria species and Bipolaris species in 1 each.

Conclusion: Wide range of fungi were isolated from cases of mycotic keratitis. High index of suspicion by ophthalmologists and laboratory confirmation could save the eye from blindness caused by mycotic keratitis.

Introduction

Mycotic keratitis is an important ophthalmic problem. Scarring of cornea as a result of keratitis is one of the preventable causes of blindness and carries usually unfavourable prognosis due to its protracted course and requirement of specific therapy. Various reports consistently list corneal ulceration second only to cataract as major aetiology of blindness and visual disability. Normally eye is kept free from microbial infection by cleansing effect of lacrimal secretion. Untreated keratitis may lead to opacification and ultimately to perforation of cornea.

Keratomycosis occurs mainly in warm climates and coincides with seasonal increase in temperature and humidity. Trauma particularly with vegetative or soil matter seems to be the most important predisposing factor for keratomycosis. Apart from that, injudicious use of topical corticosteroids, antibacterial agents for external ocular disease and use of contact lenses further enhances risk. Also previous surgery as cataract operation and systemic illness predispose individual to keratitis.

The diversity of clinical presentation observed in each case and also new emerging cases each year pose a diagnostic and therapeutic challenge to ophthalmologists. The associated morbidity as a result of several factors directly affects the management, because of lack of diagnostic facilities and appropriate treatment. Specific treatment requires correct identification of causative pathogen.
A large number of fungi have been incriminated to be the cause of mycotic keratitis.\textsuperscript{1-15} Although frequency and spectrum of fungal members differ from place to place largely based upon climatic, geographic and socioeconomic conditions.\textsuperscript{1-10} Although presumptive diagnosis can be made by KOH mount or smears of corneal scrapings, culture is necessary in terms of therapy. The ophthalmologist should be aware of common fungal isolates within his/her geographical area. There are various reports available from North and South India and worldwide. No such study is conducted in recent years in Mumbai. This study is an attempt to evaluate frequency of positive cultures in suspected cases of mycotic keratitis, to identify aetiological agents and to identify risk factors in these patients attending tertiary level superspeciality hospital of Mumbai.

**Materials and Methods**

This prospective study comprises of a total 260 patients suspected of mycotic keratitis investigated in the Department of Microbiology, Lokmanya Tilak Municipal Medical College and Hospital, Mumbai from January 2005 to June 2007.

Patients suffering from bacterial and viral keratitis were excluded in this study. Data collected including age, sex, occupation, information of previous infectious process as well as use of corticosteroids, herbal medicine, previous eye surgeries, diabetes or any other major systemic illness, any condition of immunosuppression and use of therapeutic contact lens. In all cases, collection of corneal scraping for analysis was carried out by an ophthalmologist directly from base and margins of ulcers aseptically using fresh Bard-Parker blade after 2-3 drops of local eye drops (4% xylocaine).

Direct microscopy was performed in 10% KOH and smears were prepared for Gram’s staining for demonstration of fungal elements. Corneal scraping were inoculated in two sets of Sabouraud’s Dextrose Agar (SDA) slants. One was incubated at 25° C and other at 37° C. Both tubes were observed daily for presence of growth. Some portion of material was inoculated in Brain Heart Infusion Broth (BHIB) and then subcultured on SDA after appearance of turbidity.

The characteristics considered for fungal identification were growth rate, texture and morphology of colony on obverse and reverse side.\textsuperscript{2} Lactophenol Cotton blue (LPCB) preparation was done from the growth. Confirmation of aetiological agent was done by putting slide culture on Potato Dextrose Agar (PDA). The yeast isolates were further identified by Germ tube test, growth pattern on Corn Meal Agar (CMA) and sugar assimilation tests.\textsuperscript{2}

All the patients were given 1% Nystatin ointment to which they responded.

**Results**

Out of 260 patients of suspected mycotic keratitis investigated, in 13.07% cases (34 / 246) fungal aetiology was identified. Correlation between microscopy and culture was present in 58% cases (14/24).

The most common age group affected was 20 to 50 years with average of 35 years. Male: Female ratio observed was 3:1. In all cases there was affection of single eye only. Filamentous fungi were isolated in 79.41% (27/34) cases and yeasts identified in 20.58% (7/34) cases.

History of trauma was present in 26.47% (9/34) patients from which fungi were isolated, while history of topical antibiotics and steroids was present in 11.76% (4/24) each. History of keratoplasty was seen in
23.52% (8/34) and history of diabetes was present in 2.94% (one patient). No patient with previous use of contact lenses was reported.

Out of 34 cases of mycotic keratitis, 12 were labourers (35.29%), 6 were housewives (17.64%), 6 were students (17.64%) and 10 were farmers (29.41%).

In 9 cases giving history of trauma, 8 were farmers due to vegetative matter and one was labour due to metal particles. No particular seasonal variation in isolation of fungi was noted.

Out of the 34 isolates, 27 (79.41%) were filamentous fungi, of which 16 (47.05%) were nondemacious fungi and 11 (32.35%) were demacious fungi. Yeasts were isolated from 7 (20.58%).

Among the nondemacious fungi isolated, Aspergillus species (Aspergillus flavus\textsuperscript{5} and Aspergillus fumigatus\textsuperscript{5}) were isolated in 6 cases, Fusarium species in 5 cases, Penicillium species in 3 cases and Acremonium species in 2 cases. Out of the demacious fungi isolated, Curvularia species were isolated in 3 cases, Cladosporium species, Dreschleria species and Acremonium species in 2 cases each and Alternaria species, Bipolaris species were isolated in one case each.

Out of the 7 yeasts isolated, Candida albicans was isolated from 3 cases, while Candida parapsilosis and Candida tropicalis were isolated in 2 cases each.

Thus Aspergillus species 17.64% (6/34) was the commonest isolate followed by Fusarium species 14.70% (5/34), while Curvularia species, Penicillium species and Candida albicans were isolated in 3 cases each (8.82%). Cladosporium species, Dreschleria species, Acremonium species, Aureobasidium species were isolated in 2 cases each (5.88% each).

Out of the 34 species isolated, there was only one isolate of Alternaria species and one that of Bipolaris species.

**Discussion**

Present study shows fungal involvement in 13.07% cases (34/260). This is in comparison to other studies where isolation rate varied between 16.8%\textsuperscript{12} to 39%\textsuperscript{6}(Table 1).

Microbial pathogens responsible for keratitis though varies geographically, the deciding factor causing keratitis in many cases is the local microbial flora. Sandhu\textsuperscript{10} in his study observed that out of 128 healthy eyes, 26.56% were positive for fungi. The most common fungi were Aspergillus sp.(7.8%), Alternaria sp. (4.69%), Fusarium sp. (3.13%), Cladosporium sp. (2.34%), Penicillium sp. (0.78%) and Helminthosporum sp. (3.5%).

He also observed Aspergillus, Alternaria, Curvularia, Fusarium, Cladosporium, Trichoderma, Paecilomyces, Yeasts, Mucorales were isolated from environment by exposing culture plates in air. Though

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\textsuperscript{5} Saha et al\textsuperscript{11} Delhi 22.25

\textsuperscript{6} Chowdhary et al\textsuperscript{10} New Delhi 39

\textsuperscript{7} Poria et al\textsuperscript{3} Jamnagar 35

\textsuperscript{8} Sandhu et al\textsuperscript{10} Amritsar 32.14

\textsuperscript{9} Bharati et al\textsuperscript{9} Tirunelveli 32.26

\textsuperscript{10} Kunimoto et al\textsuperscript{5} Hyderabad 25.7

\textsuperscript{11} Srinivasan et al\textsuperscript{11} Madurai 46.8

\textsuperscript{12} Gokhale et al\textsuperscript{2} Pune 23.1

\textsuperscript{13} Upadhyay et al\textsuperscript{8} Nepal 16.8

\textsuperscript{14} Pichare et al\textsuperscript{9} Aurangabad 20

\textsuperscript{15} Present Study Mumbai 9.75

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these factors determine the isolation rate of fungi from cases of mycotic keratitis, their contribution in the present study showing low isolation rate could not be found. 58% correlation was observed between direct microscopy and culture in the present study. This finding is comparable with other reports.

Saha et al\textsuperscript{1} reported 67% correlation, Upadhyay et al\textsuperscript{8} reported 55.4%, Chowdhary et al\textsuperscript{6} reported 62.3%, Poria et al\textsuperscript{11} reported 62% correlation between microscopy and culture positivity. Only one study from Pune by Gokhale\textsuperscript{12} et al reported very low percentage of correlation (15.4%). Our finding matches with all studies mentioned above, except study from Pune.

Present study shows varied fungal aetiology of mycotic keratitis 47.05% nondermatious filamentous fungi, 32.35% dermatious fungi and yeasts were isolated from 20.58% (7/34) cases.

Saha et al\textsuperscript{1} showed Aspergillus (55.81%) as commonest fungal pathogen. Similar findings were reported by Shrinivasan et al\textsuperscript{7} (47.1%), Poria et al\textsuperscript{11} (32.3%) and Hugnani et al\textsuperscript{13} (57.4%). Aspergillus sp. were isolated in this study from 6 cases (22.22%) and these were the commonest isolates. Fusarium sp. was reported as important cause of mycotic keratitis by many workers\textsuperscript{6,7,11} range varying from 23.78% to 47.66%.\textsuperscript{6,7,11} In present study Fusarium sp. were isolated in 5 cases (14.70%). Penicillium sp. were isolated in 8.82% cases in the present study. Other studies show its isolation varying from 1.29\textsuperscript{1} to 19%,\textsuperscript{13} Acremonium sp. were isolated in 5.88% of the isolates. Saha et al\textsuperscript{1} reported its isolation as 2.59% while Upadhyay et al showed higher percentage of isolation (44%).\textsuperscript{8} No other nondermatious filamentous fungi were isolated in the present study, while few studies reported isolation of Mucor and Rhizopus, though isolation was low.\textsuperscript{3,8}

Curvularia (8.82%), Cladosporium (5.58%), Dreschsleria (5.50%), Aureobasidium (5.58%) were dermatious isolates, while Alternaria sp. And Bipolaris sp. were isolated in single case each. All the above fungi were reported by other workers in different parts of India.\textsuperscript{16,10,14} Aureobasidium sp. is emerging as important pathogen as observed in the present study. It was reported earlier by Pichare et al from Aurangabad.\textsuperscript{9} Candida sp. were isolated in 7 (20.58%) cases in this study. Its isolation rate also varies, lowest isolation rate reported was 0.5%\textsuperscript{6} and highest isolation rate reported was 47.66%.\textsuperscript{4} This is also significant finding in the present study.

Thus fungi isolated cases of mycotic keratitis vary from place to place. The knowledge of common fungi isolated in particular geographic area is important for ophthalmologists for treatment purpose.

Male to female ratio observed in this study was 3:1. Similar findings were reported earlier.\textsuperscript{5,8,10,11} Higher incidence of mycotic keratitis in males may be due to work profile and outdoor activity.

Most common age group observed in this study was 20-50 years with an average of 35 years. This age group is commonly involved in outdoor activities.

Trauma reported to be the predominant predisposing factor earlier with vegetative matter.\textsuperscript{1,2,6,8,9,11} In this study also trauma was predominant predisposing factor (26.47%). Topical use of steroids and use of antibiotics were reported in various studies.\textsuperscript{11,15,16} The same factors have been reported in this study (11.76% each). Steroids have been proven to alter corneal metabolism there by changing defense mechanism while antibiotics alter normal local flora.\textsuperscript{6} Diabetes was reported in single case, it was also reported by Chowdhary et al\textsuperscript{6} in three cases; Keratoplasty was also reported by them as predisposing factor.
similar to the present study. All these patients responded to antifungal treatment.

The key element in diagnosis of mycotic keratitis is the clinical suspicion by the ophthalmologist and laboratory confirmation of fungus so that appropriate treatment could save the eye from this preventable cause of blindness. For this, knowledge of geographic pattern of pathogenic organisms and risk factors help a lot.

References

10. Sandhu DK. The correlation between environmental and ocular fungi. Ind J ophthalmol 1981; 29 : 177-82.