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# CAUSATIVE AGENTS OF KERATOMYCOSIS IN IBADAN: REVIEW OF LABORATORY REPORTS

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## ABSTRACT

**Introduction:** Fungi are responsible for less than 2.0 % of corneal infection around the globe. Trauma to the cornea is the leading cause of fungal keratitis especially with history of corneal trauma with vegetable or organic matter. Because of the dearth of data on the aetiological agents of Keratomycosis in this hospital, this study was aimed at finding the prevalence and fungal etiological agents responsible for this condition Ibadan, Nigeria. **Methods:** A retrospective review of the laboratory reports of corneal scrapings of patients that presented with signs and symptoms suggestive of Keratomycosis was carried out. The scrapings were subjected to wet preparation with 10.0 % KOH, Gram staining and Giemsa staining to rule out inclusion bodies. The diagnosis of Keratomycosis was made on the basis of the recognizable and characteristic appearance of fungal hyphae and fruiting bodies under microscopy. The media with no obvious growth after 3-4 weeks of incubation were regarded as negative. **Results:** A total of 48 specimens from patients with suspected diagnosis of Keratomycosis were included in the analysis. The patients consisted of 42 (87.3%) males and 6 (12.5%) females. The ages at diagnosis ranged from 3 to 73 years with a mean of 36.46 years and a median of 35.5 years. The prevalence of Keratomycosis among this group of patients in this hospital was 8.4 %. *Candida albicans* and *Fusarium spp* were the fungal isolates in these patients as it occurred in 4.2 % (2/48) of them respectively. **Conclusions:** Corneal scarring due to trauma or infections is a major cause of monocular blindness, especially in developing countries like Nigeria. Despite the low level of Keratomycosis in this study, high index of suspicion of possible diagnosis should be giving to patients with history of trauma, tissue devitalization with topical steroids and immunocompromised immunity.

**Keywords:** Keratomycosis, Corneal, *Fusarium* and *Candida*.

## INTRODUCTION

According to the World Health Organization, corneal diseases are a major cause of vision loss and blindness, second only to cataract in overall importance (1). It is estimated that ocular trauma and corneal ulceration result in 1.5 to 2 million new cases of corneal blindness annually.<sup>1</sup> Trauma is the most common precipitating factor in most of the cases (2). Trauma leads to destruction of the epithelium and Bowman's membrane, impairing barrier to infection. The underlying stroma becomes, excessively hydrated and possibly altered in such a way to constitute a more favorable site for fungus to grow (2). Keratomycosis caused by filamentous fungi is an occupational hazard of farmers and agricultural workers (3).

Keratomycosis is a major cause of visual disability in developing countries (1, 4). Fungi have replaced bacteria as the predominant cause of infectious keratitis in some developing countries like Nigeria (1). Fungal keratitis is a major blinding eye disease in Asia and other developing countries (2, 5). One report from South India found that 44% of all central corneal ulcers are caused by fungi (2). This high prevalence of fungal pathogens in South India is significantly greater than that found in similar studies in Nepal (17%), Bangladesh (36%), Ghana (37.6%), and south Florida (35%) (6-10).

It has also been postulated that the lower temperature of the cornea relative to the rest of the body may favor the growth of fungi (9). Many ophthalmologists also identified topical steroids as the principal risk factor in enhancing ocular fungal growth (11). Steroid use

as initial therapy was reported in 1 to 30% of patients having microbial keratitis (11).

Keratomycosis can be caused by as many as 60 species of fungi. The predominant etiological agents vary in different geographical areas. However, *Aspergillus* spp. is the commonest isolate in India (12-13). Most cases of mycotic keratitis are amenable to treatments if effective topical antifungal therapy is started early. The major hurdle to this lies in definitive laboratory diagnosis in clinically suspected case of oculomycosis. False negative diagnostic results may result in delay in institution of anti fungal therapy (2).

Because of the dearth of data on the prevalence of Keratomycosis in this hospital, this study was aimed at finding the prevalence and fungal etiological agents responsible for this condition.

## METHODS

This study was carried out in the Department of Medical Microbiology, University College Hospital, Ibadan, Nigeria. It was a retrospective review of the laboratory reports of corneal scrapings of patients that presented with signs and symptoms suggestive of Keratomycosis. The materials for culture and microscopic examination were obtained from the lesion.

The scrapings were subjected to wet preparation with 10.0 % KOH, Gram staining and Giemsa staining to rule out inclusion bodies. The diagnosis of Keratomycosis was made on the basis of the recognizable colonial morphology, characteristic appearance of fungal hyphae and fruiting bodies under microscopy.

The corneal scrapings were also cultured on the Sabouraud Dextrose agar at room temperature (27-30°C). Fungal growth occurred within 48 hours to three weeks. Once fungal growth appeared on primary isolation medium, colonies were subcultured promptly to fresh medium for isolation and identification in pure cultures. These fungi were identified with the aid of recognizable colonial morphology, microscopical appearance and biochemical reactions. All fungal cultures plates were kept for at least 3 week after inoculation before being declared negative. The data collected were analyzed with the aid of SPSS version 12.0 computer software.

## RESULTS

A total of 48 patients with suspected diagnosis of Keratomycosis were included in the analysis. The patients consisted of 42 (87.3%) males and 6 (12.5%) females. The ages at diagnosis ranged from 3 to 73 years (Mean - 36.5 years, median of 35.5 years and SD = 8.6).

The prevalence of positive culture results for Keratomycosis among this group of patients in this hospital was 8.4 %.

*Candida albicans* and *Fusarium spp* were the fungal isolates in these patients as it occurred in 4.2 % (2/48) of each of them respectively.

There was no statistical significance associated between age of presentation and types of fungi isolated ( $P > 0.05$ ). Though, there was no statistical significance between sex and fungi isolated ( $P > 0.05$ ), it was noted that all the fungi were commonly isolated from male gender in their thirties.

TABLE 1: DISTRIBUTION OF THE FUNGAL PATHOGENS.

Fungal isolates	Frequency ( n = 48 )	Percentage ( % )
<i>Fusarium spp</i>	2	4.2
<i>Candida albicans</i>	2	4.2

## DISCUSSION AND CONCLUSION

Mycotic keratitis is an infection of the cornea by the fungus that causes ulceration and inflammation, usually following trauma or treatment for a bacterial

infection with steroid and antibiotics. Fungal keratitis is responsible for a significant burden of blinding disease in the developing world (14). Despite the known potential for visual impairment and blindness

associated with fungal keratitis, few research studies have evaluated the risk factors and etiological agents in Nigeria. Corneal scarring due to trauma or infections is a major cause of monocular blindness, especially in developing countries like Nigeria.

More than 70 genera of moulds and yeasts have been associated with Keratomycosis (15). Hyaline moulds like *Aspergillus*, *Fusarium*, *Cephalosporium*, *Acremonium* and *Penicillium* are more frequently isolated as causative agents than phaeoids (dematiaceous fungi) moulds like *Alternaria*, *Curvularia*, *Bipolaris* and *Exserohilum* species (16, 17).

In this study, *Fusarium* and *Candida spp.* are the most common causes of fungal keratitis. This was found to be consistent with other studies in developing countries (10, 18). In India, *Aspergillus* and *Fusarium* are the commonest cause of Mycotic keratitis (16).

Chang *et al.* (19) from Taiwan have reported that *Fusarium* species are common plant pathogens, particularly in corn crops or onion fields. Gopinathan *et al.* (20) from India also reported *Candida* as a rare fungal corneal pathogen (0.7%). In a series of 24 patients also from Wills Eye Hospital, Philadelphia, *Candida* was identified in 45.8% of cases of fungal keratitis; this probably represents the only study reporting *Candida* as the commonest etiologic agent of fungal keratitis (21).

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Despite the low level of Keratomycosis in this study, high index of suspicion of possible diagnosis should be given to patients with history of trauma, tissue devitalization with topical steroids and immunocompromised immunity. Corneal scrapings of the patients should be sent to the laboratory as early as possible for prompt diagnosis.

## Recommendations

Nigeria is the most populous black African nation. The increased incidence of fungal keratitis warrants further study of the risk factors, antifungal susceptibility testing, and possible pharmacologic combinations to prevent blindness. Research toward rapid diagnosis and specific drug therapy that could minimize the morbidity caused by this preventable disease will be appreciated in University College Hospital, Nigeria.

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