

## Research Article

## Risk Factors and Spectrum of Fungal Keratitis in a Teaching Tertiary Care Hospital of Haryana

Goel Nidhi\*, Gagneja Deep and Chaudhary Uma

Microbiology, PT. B.D. Sharma PGIMS, Rohtak.

### ABSTRACT

Fungal keratitis is a leading cause of ocular morbidity. The incidence of keratomycoses and systemic mycoses is rising. Due to a large agrarian population and environmental factors in our country, fungi contribute largely to the environmental list of infectious intruders of the cornea. The present study was undertaken to find out various fungi causing keratomycosis. A total of 110 corneal scrapings from patients with corneal ulcers were included in the study. Samples were processed for direct examination using KOH mount as well as for culture on Sabouraud's dextrose agar (SDA). The isolates were then identified using standard microbiological procedures. Incidence of fungal corneal ulcers was maximum in the age group of 20-50 years (76.31%). Agriculturists constituted the largest group (71.05%). History of trauma was present in 73.7% of the patients. *Fusarium sp* were the commonest isolate (33.3%) followed by *Alternaria spp.* (23.3%), *Aspergillus sp*, *Candida albicans* (16.66% each), *Curvularia spp.* (6.7%) and *Penicillium spp.* (3.3%). Fungal keratitis is an important cause of microbial keratitis with injury to the cornea being a leading predisposing factor. Early diagnosis and accurate identification of the pathogenic organism should be mandatory to initiate appropriate therapy and thereby reduce morbidity.

**Keywords:** Fungal keratitis, Haryana.

### INTRODUCTION

Fungal keratitis is a refractory and potentially blinding fungal infection, with corneal ulceration and suppurative infection. It is an insidious, rapidly progressive disease that causes severe ocular morbidity and blindness worldwide, especially in tropical and developing countries. In these regions 4-60% of infectious ulcers are caused by fungus.<sup>1</sup> This distribution is believed to result from socioeconomic conditions, environmental characteristics, and geographical variations, such as latitude and climatic differences, especially humidity. Other factors associated with fungal keratitis are host hypimmunity,<sup>2</sup> inadequate use of topical antibiotics and steroids<sup>3,4</sup>, previous corneal injury<sup>5</sup>, wearing contact lenses<sup>6</sup>, ocular surgery or transplantation.<sup>7</sup> Fungal keratitis is an insidious, rapidly progressive disease that is difficult to diagnose, and can be resistant to treatment. The incidence of fungal keratitis has increased over the last few years. To institute appropriate measures for prevention, accurate diagnosis, and effective treatment of fungal keratitis, the etiologic and epidemiologic characteristics should be determined. Though few studies have been carried out from various

parts of India but there is little data from Haryana. Keeping this in mind the present study was conducted to study the spectrum of fungal keratitis and associated risk factors for its development.

### MATERIAL AND METHODS

This prospective study was conducted in a tertiary care teaching hospital from July 2010 to June 2011. All consecutive patients who presented with clinically presumed keratitis with corneal ulceration were included in the study. Each patient was examined with a slit lamp. Age, sex, medical history, associated predisposing factors, onset of symptoms and clinical signs and ocular conditions were recorded. Corneal specimens were obtained by an ophthalmologist using a sterile 21 gauge needle after instillation of local anesthetic eye drop such as 0.5% proparacaine, under aseptic conditions. The specimen was taken from the active margin and base of the ulcer following debridement. The specimens were smeared on slide and examined by 10% potassium hydroxide wet mount and light microscopy. Then they were directly inoculated in duplicate onto the Sabouraud dextrose agar (SDA; Hi-media Mumbai) and

incubated aerobically at 25°C and 37°C. The cultures were examined daily, and discarded after 28 days if there was no growth present. Any growth obtained was further identified on the basis of colony morphology, microscopic characteristics and biochemical properties, using standard mycological techniques.<sup>8</sup> Yeast isolates were identified by direct microscopy with Gram's stain, germ tube formation in serum, cultural characteristics (Hi-chrom candida, Mumbai), carbohydrate fermentation and carbohydrate assimilation reactions. Identification of filamentous fungi was based on microscopic appearance on slide cultures stained with lactophenol cotton blue and included septate and branching hyphae, color, size, shape, texture, formation of conidia, as well as physiological characteristics of colony morphology.

## RESULTS

A total of 38 patients were diagnosed with fungal keratitis either by culture or KOH wet mount. Out of 38 confirmed fungal keratitis patients 26(68.4%) were males and 12(31.6%) were females. The cases of fungal keratitis were maximum in 20-50 year of age group (76.31%) and mean age of patients was 37.94 years. There were 30 rural residents and eight were urban residents. Agricultural workers (71.05%) were significantly higher than non agricultural worker (29%). History of trauma was present in 28 (73.7%) patients of which 22 were agriculturist and all the 22 gave history of trauma with vegetative matter. Previous use of steroids was observed in four (10.5%) patients and use of contact lens use was seen in three (7.9%) patients. Out of 38 specimens 25 were culture and KOH wet mount positive, five specimens were KOH negative and culture positive and eight specimens were KOH positive and culture negative ( Table-1). A total of 30 pathogenic fungi were obtained. Out of 30 positive cultures, filamentous fungi were isolated in 25(83.33%) cases and yeast were isolated in six (16.6%) cases. *Fusarium spp.* were the most common isolate (33.3%) followed by *Alternaria sp* (23.3%), *Aspergillus* (16.66%), *Candida albicans*.(16.66%), *Curvularia sp* (6.7%) and *Penicillium* (3.3%) (Figure-1). Out of five cases of keratitis caused by *Candida albicans*, three gave history of contact lens use and one had undergone eye surgery recently.

## DISCUSSION

Fungal keratitis mainly occurs in developing countries in tropical and subtropical regions, such as India, China, Iran, Ghana, and Brazil, where the incidence is about 50% of infective

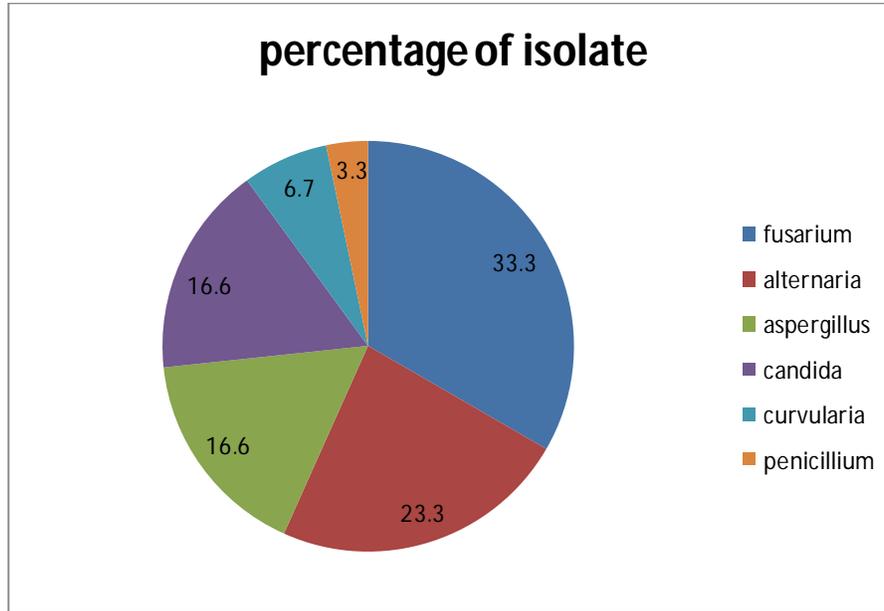
keratitis.<sup>9</sup> The prevalence and pathogenic spectrum of fungal keratitis differs between countries and regions as a result of different climate, environmental, social and other conditions. In our study, prevalence of fungal keratitis was 34.54% which was in comparison with Saha et al<sup>10</sup>(38.06%) and Arora et al<sup>11</sup> (30%). We observed that majority of fungal keratitis patients fall in age group of 20-50 years (76.31%) and mean age being 37.94 years. Arora et al<sup>11</sup> reported the incidence of fungal ulcers as 56.67% in the age group of 20-49 years whereas, Rehman et al<sup>12</sup> reported an incidence of 67.40% in the age group of 30-49 years. In our study male to female ratio was 2.2:1 however, Norina et al<sup>13</sup> found that male patients in their mid-40s contributed to the majority of their patients, with a male-to-female ratio of 1.5:1. Previous history of trauma in our study was observed in 73.7% patients. Trauma has been reported as most commonly associated factor in fungal keratitis by other authors also.<sup>5</sup> History of contact lens use was seen in 7.9% cases in our study. Rosa et al<sup>14</sup> has also reported five (4%) cases of fungal keratitis following extended wear contact lens use. Norina et al<sup>13</sup> found that 21% patients of microbial keratitis had contact lens use but the author included data of both bacterial and fungal keratitis patients. In our study, filamentous fungi were more commonly (83.33%) isolated than yeast (16.66 %). Strains of the genus *Fusarium* were isolated most frequently (33.3%) followed by *Alternaria sp* (23.3%), *Aspergillus sp* and *Candida albicans*.(16.66% each), *Curvularia sp* (6.7%) and *Penicillium* (3.3%). Our study is in agreement with Bharathi et al<sup>15</sup>. Studies elsewhere reported *Aspergillus* species (40-59%) to be commoner than others.<sup>16</sup> In our study yeast was isolated in only 12% of patients. *C. albicans* was the most common spp isolated. Similar findings were reported by studies from North India and Philadelphia.<sup>17</sup> Keratitis due to yeast or yeast like organism is associated more frequently with contact lens wearer and patients with pre-existing systemic disease. Since our population consisted more of farmers without pre-existing disease, so this may be the reason for the less number of yeast. As the numbers of patients were less in our study so a further analysis on these factors should be made.

## CONCLUSION

Because of the serious consequences of fungal keratitis it is important to know the exact etiology of corneal ulcer to institute appropriate therapy in time. Our results indicated that trauma with vegetative matter was the most

common risk factor associated with fungal keratitis. Strains of genus *Fusarium* and *Alternaria* were the most common pathogenic fungi. The results of our study will certainly add to the clinical data, management of fungal

keratitis and institution of appropriate therapy. This baseline information will also be helpful in the planning of a corneal ulcer management strategy and for future studies on fungal keratitis.



**Fig. 1: Distribution of isolates from cases of fungal keratitis**

**Table 1: Comparative results on direct microscopy and culture**

KOH	Culture	Number of patients
Positive	Positive	25
Positive	Negative	8
Negative	Positive	5
Negative	Negative	72
Total		110

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