Etiological analysis on ocular fungal infection in the period of 1989 – 2000

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Background This study was to review the distribution and shifting trend of fungal culture specimens isolated from eyes of patients at the Beijing Institute of Ophthalmology, Tongren Hospital, Beijing, China.

Methods The fungal culture-positive rate, the distribution and change of isolates of 2609 specimens collected in a 12-year period (1989 – 2000) were retrospectively analyzed.

Results In 775 positive cultures, 707 specimens (91.2%) were from the cornea, 22 (2.8%) from the conjunctiva, 15 (1.9%) from the anterior chamber, 9 (1.2%) from the vitreous body, 3 (0.4%) from the lacrimal sac, and 19 (2.5%) from other parts of the eye. The average culture-positive rate was 29.7%. The ratio of the positive cultures in the first half year (from January to June) to those in the second half (from July to December) was 1:2.1. The main genus cultured was Fusarium sp (58.7%), followed by Aspergirum sp (16.8%). The percentage of Fusarium sp was increased from 53.6% (1989 – 1994) to 60.2% (1995 – 2000), whereas the percentage of Aspergirum sp was decreased from 22.3% (1989 – 1994) to 15.1% (1995 – 2000).

Conclusions Fusarium sp is one of the most predominant pathogens of ocular fungal infection in northern China and its incidence tends to increase, but that of Aspergirum sp to decrease. It is very important to recognize the distribution and shifting trend of pathogenic fungi in the diagnosis, prevention and treatment of fungal keratitis.

METHODS

The cases of ocular fungal infection increased significantly in the last decade in China. The most important cause for this increase is the wide use of broad-spectrum antibiotics, corticosteroids and immuno-suppressive agents. Hence recognizing the distribution and shifting trend of ocular fungi is of clinical significance.

The specimens obtained from patients with suspected fungal infection were incubated on culture medium at 28°C, with a humidity of 40% for 8 – 10 days. The culture medium contained Sabouraud’s agar and Potato glucose agar and identified according to the characteristics of growing colonies, hyphae and spore.

RESULTS

Of the 2609 specimens, 775 (29.7%) were fungal positive. The number and the ratio of fungal positive cultures to total fungal cultures per year are listed in Table 1.

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693 specimens were obtained during 1989–1994 and the number of positive cultures was 179 (25.8%); 1916 specimens collected during 1995–2000 and the number of positive cultures was 596 (31.1%). Comparison of the data from the two 6-year periods showed an increased average positive rate of 5.3%. Statistical data showed a significant difference (P = 0.002).

Among the 775 positive cultures, 707 (91.2%) were from the cornea, 22 (2.8%) from the conjunctiva, 15 (1.9%) from the anterior chamber, 9 (1.2%) from the vitreous body, 3 (0.4%) from the lacrimal sac, and 19 (2.5%) from the other parts of the eye. The positive rates were 35.2% (707/2007) for the cornea, 11.1% (22/198) for the conjunctiva, 10.0% (15/150) for the anterior chamber, 5.1% (9/178) for the vitreous body, 27.3% (3/11) for the lacrimal sac and 29.2% (19/65) for the other parts.

The data of different seasons showed 133 strains (17.2%) occurred in January to March, 116 strains (15.0%) in April to June, 161 strains (20.8%) in July to September, and 365 strains (47.1%) in October to December. The ratio of the strains in the first half of the year to that in the second half was 1.2:1 (Fig).

![Distribution of positively cultured fungi in specimens from the eyes by season.](image)

**DISCUSSION**

The fungi that cause infectious eye diseases could grow at body temperature, survive at the low redox potential of tissue and neutralize the humoral and cellular defenses of the host. Statistical data of this study showed that the absolute number and the rate of fungal positive cultures increased from the period of 1989–1994 to the period of 1995–2000, indicating that the abuse of broad-spectrum antibiotics, corticosteroids and immunosuppressive agents is one of the most important factors increasing the incidence of ocular fungal infection. Recognition of the clinical features of fungal infection by advanced laboratory techniques has enabled ophthalmologists to weigh the seriousness of ocular fungal infections in this country.

More than 70 fungi have been identified in fungal keratitis to the present. The fungi isolated from infected eyes of patients vary because of geographic distribution, environment of factors, hygienic habits and life style. In their report of 893 strains of fungi isolated from infectious eyes in India (1991–1998), Garg et al noted that *Fusarium sp* was the most frequently isolated fungus (35.1%), followed by *Aspergillus sp* (33.0%). A report in 1994 from South Florida, USA presented 127
cases of culture-positive fungal infection of the eye. *Fusarium sp* and *Candida albicans* were the most commonly isolated fungi with a rate of 62.2% and 12.6% respectively. We found that *Fusarium sp* was the most commonly isolated fungus (58.7%), followed by *Aspergillus sp* (16.8%). Because most cases at our hospital came from the northern part of China, we deduced that *Fusarium sp* is the most frequent fungus isolated from infected eyes, followed by *Aspergillus sp*.

The distribution of positive cultures by season showed that more than 2/3 of total fungi were isolated in July to December. This period is late summer and autumn in Northen China or the harvest time for farming.

The distribution of fungi is not only affected geographically, but also changed by time. The data of this study showed that in the later 6-year period, the percentage of *Fusarium sp* increased and that of *Aspergillus sp* decreased. At the same time, the percentages of *Alternaria sp* and *Mycelia sterilia* were also increased. It is very important to recognize the distribution and shifting trend of prevention and treatment of ocular fungal infectious diseases.

REFERENCES


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