

## FUNGAL ISOLATES IN OTOMYCOSIS

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### Summary

Mycological examination of 130 specimens of ear swabs and cerumen from suspected cases of otomycosis showed positive fungal isolation in 74.6%. Eight different genera of fungi were isolated. *Aspergillus* was the predominant genus isolated and *Candida*, the next. Of the isolates, only *Epidermophyton floccosum* is generally recognised as a human pathogen.

### INTRODUCTION

Otomycosis, or otitis externa of fungal etiology, is a chronic or subacute infection of the pinna, the external auditory meatus and the ear canal.<sup>1</sup> It has a world-wide distribution with a prevalence in tropical and subtropical regions. Etiological studies in many parts of the world have revealed that many fungi may be involved. As early as 1447, 53 different species had been implicated.<sup>2</sup>

Otomycosis is not an uncommon problem in Malaysia, but little has been done in the way of characterisation of the etiological agents. This report presents a review of the species of fungi isolated from suspected cases of otomycosis over a period of twelve years to allow some indication of the fungi that are encountered in otomycoses in this country.

### MATERIALS AND METHODS

130 specimens of swabs, ear scrapings or cerumen were examined from 1969 to 1981. These specimens were submitted for mycological investigation for reasons such as ear-ache and pain, chronic ear infection, ear discharge not responding to antibiotics and suspicion of fungal infection.

Direct examination of ear scrapings or cerumen was performed in 30% potassium hydroxide while ear swabs were examined after Gram-staining. All specimens were inoculated onto duplicate tubes or plates of Sabouraud's dextrose agar, Mycobiotic agar (Difco) and Sabouraud's dextrose agar with the addition of 0.036% potassium tellurite or 0.05 mg/ml. chloramphenicol. All cultures were kept at room temperature for three weeks. An isolation was considered significant only if the fungal growth coincided with the inoculation streaks and many colonies of the same fungus were obtained.

Ear swabs from 18 healthy people with no com-

plaints of ear infection were also processed in the same manner.

### RESULTS

Isolation of fungi was successful in 74.6% of the specimens examined (Table 1). There were eight specimens from which more than one fungus were isolated (Table 2), therefore resulting in a total of 107 fungi isolated from 97 positive specimens. All of the fungi isolated fell into eight different fungal genera (Table 3).

*Aspergillus* was the most frequently isolated. It was isolated in 78.4% of the positive specimens and accounted for 71% of all fungi isolated. Within the genus of *Aspergillus*, there were 24 isolates that were specifically identified as belonging to the *Aspergillus niger* group, while the rest were found to belong to *Aspergillus fumigatus* group (3); *Aspergillus flavus* group (4); *Aspergillus ustus* (2); *Aspergillus terreus* group (2) and *Aspergillus ochraceus* Wilhelm (1).

The genus *Candida* was isolated in 25.8% of the positive specimens and accounted for 23.4% of the fungal isolates. Most were not *Candida albicans*.

*Cunninghamella*, *Epidermophyton floccosum*, *Penicillium*, *Streptomyces*, *Trichosporon* and a true yeast (that was neither *Candida* nor *Cryptococcus*) were isolated once each.

In the 18 supposedly healthy people with no ear complaints, *Paecilomyces* was isolated in two. Both claimed later that they had unusual dampness in their ear canals. None of the 8 genera of fungi isolated from the cases of otomycosis were found in the healthy people.

### DISCUSSION

The acceptance of otomycosis as a clinical entity has not been without controversy. While Kingery<sup>3</sup>

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TABLE 1.  
RESULTS OF THE ISOLATION OF FUNGI FROM SPECIMENS

Total number of specimens examined	Number of specimens positive for fungi	Positive specimens (percentage)	Total number of fungi isolated
130	97	74.6	107

TABLE 2  
THE FUNGAL TYPES ISOLATED IN POSSIBLE MIXED INFECTIONS

Number of specimens	Fungi isolated
1	<i>Aspergillus, Candida, Cunninghamella.</i>
1	<i>Aspergillus, Penicillium, Epidermophyton floccosum.</i>
6	<i>Aspergillus, Candida.</i>

TABLE 3  
THE GENERA OF FUNGI ISOLATED AND THEIR FREQUENCY OF ISOLATION

Genera	Number Isolated	Isolation rate as percentage of positive specimens	Isolation rate as percentage of total fungal isolates
<i>Aspergillus</i>	76	78.4	71.0
<i>Candida</i>	25	25.8	23.4
<i>Cunninghamella</i>	1	1.0	0.9
<i>Epidermophyton floccosum</i>	1	1.0	0.9
<i>Penicillium</i>	1	1.0	0.9
<i>Streptomyces</i>	1	1.0	0.9
<i>Trichosporon</i>	1	1.0	0.9
True yeast (non <i>Candida</i> and non <i>Cryptococcus</i> )	1	1.0	0.9

dismissed the existence of otomycosis by stating that it has "something in common with the snakes of Ireland; there are none", McGonigle and Jillson<sup>4</sup> referred to it as a "distinctive clinical entity". Some<sup>3</sup> believe that abnormal conditions in infected ears favour the growth of fungi that are coincidentally present but are of no etiological association: others<sup>5</sup> doubt that fungi are capable of producing primary inflammatory process, but accept them as secondary invaders; yet others<sup>6-8</sup> believe that fungi can be primary agents of infec-

tion, causing inflammation by penetration into deeper portions of the ear canal. Despite the widely divergent opinions, the weight of the evidence in the literature points towards the existence of otomycosis as an entity."<sup>6-8</sup> However, it is estimated that not more than 15 to 20% of ear infections are otomycoses; the majority being bacterial in origin."

In this present study, a laboratory diagnosis of otomycosis was made in 74.6% of specimens received. This indicates that the clinical presenta-

tion of otomycosis often allows a diagnosis to be made with fairly good accuracy. This, coupled with the fact that doctors do not usually request for laboratory investigation unless the infection is chronic, probably explains the low number of specimens received in a span of 12 years.

Eight different genera of fungi were implicated as causes of otomycosis in this series. Among these genera, *Candida* and *Penicillium* have been reported as the more common isolates in many studies, while *Aspergillus* stands as the leading cause.<sup>2,5,7,10</sup> Similarly, *Aspergillus* proved to be the most important cause in this series. It was isolated in 78.4% of positive cases. While *A. fumigatus* is the more frequently implicated species in other forms of Aspergillosis, *A. niger* appears to play the more significant role in otomycosis. The genus *Candida* was the next frequently isolated in this series, being isolated in 25.8% of the positive cases. This high predominance of *Candida* was also noted in studies by Beaney and Broughton<sup>7</sup> and Youssef and Abdou.<sup>5</sup> However, most of the *Candida* isolates in this series were not *Candida albicans*, and the fact that species of *Candida* other than *C. albicans* may be found as commensal flora on skin surfaces confuses the interpretation of etiological significance. But it is of interest to note that out of 18 ear swabs from normal people, none grew *Candida*. *Penicillium*, reported to stand with *Aspergillus* as the most common agent by Haley<sup>11</sup> was not a significant cause in this series. It was only isolated once, as were the other five genera. *Epidermophyton floccosum* was the only generally recognized pathogen isolated, and is an unusual cause of otomycosis. It probably represents an extension of an infection elsewhere.

A high incidence of mixed infection by many fungal types was noted in a study by Youssef and Abdou.<sup>5</sup> They found that it occurred in 28% of their cases. In this present series, only 7.3% yielded multiple isolation of fungi. Details of these isolations are given in Table 2.

The predominant causative role played by saprophytic fungi in otomycosis is characteristic of the infection. Therefore, laboratories must be cautioned on the choice of media for investigating such cases. The unsuspecting may investigate a case of otomycosis using media with cycloheximide (a compound that inhibits saprophytic fungi), as is generally done for investigation of other mycoses, and therefore fail to isolate the causative agent. A positive microscopic examination and the isolation of many colonies of the same fungus help to make a decision on the etiological significance of the isolate. As laboratory diagnosis of this mycosis is

fast and simple to perform, cultural confirmation of all cases should be encouraged to prevent mismanagement and possibly relapses, and also to better the knowledge on the disease and the causative agents.

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