

# Prevalance and Demographical Profile of Patients Presenting with Otomycosis

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## Abstract

Otomycosis is a widely prevalent and often underdiagnosed fungal infection of the ear that is commonly seen in the tropical and subtropical regions. We performed mycological analysis on the scrapings and debris taken from the external auditory canal of 97 patients clinically suspected to have otomycosis. Male sex, young age group, rural background and rainy season emerged as the major risk factors. 37 patients were positive on KOH mount and 39 patients were positive when cultured on SDA medium. The prevalence of confirmed otomycosis was  $40.2 \pm 4.98$  (95.C.I = 30.44 - 49.96). Smear positivity was found to have a statistically significant relationship with the prevalence of positive cultures in patients presenting as otomycosis. *Aspergillus niger* and *fumigatus* were the major isolates.

## Key Words

Otomycosis, *Aspergillus*, *Candida*, Otitis externa

## Introduction

Otomycosis is a subacute or a chronic superficial fungal infection of the external auditory canal. It is one of the frequently encountered fungal infections of the ear. The fungal agents responsible for this clinical entity are found as saprotrophic in the environment and true fungal pathogens are very rarely recovered from these patients. The disease is worldwide in distribution. Its prevalence has been quoted to be as high as 9% among patients who present with signs and symptoms of otitis externa. (1) This is more prevalent in warm, humid climate, particularly monsoon season as compared to arid or cold climates. It is more common in individuals of low socio-economic status with poor hygienic conditions. Otomycosis is a commonly diagnosed condition amongst the patients attending the ENT clinic with complaints of otorrhoea and signs and symptoms of otitis externa. Nearly 61 fungal species are involved in otitis externa, but the most common fungal agents causing otomycosis are *Aspergillus niger* (80% of cases), *Candida albicans* (second most common), *Actinomyces*, *Trichophyton*, *Aspergillus fumigatus* and *Candida tropicalis*. The ear is constantly exposed to biotic elements of the biosphere and is thus access to various micro-organisms including fungi. Therefore, identification of fungal agents in the external auditory canal has been valuable for determining the potential risk for Otomycosis and has been extensively

worked upon by different groups of scientists. In this study we tried to identify the demographical profile and the spectrum of the causative agents in various patients presenting with features of Otomycosis. Such a study has not been performed previously in our state and may help to guide the management protocols for clinicians in the treatment of Otomycosis.

## Material & Methods

A prospective study was conducted in the Deptt. of Microbiology, Government Medical College, Jammu, a tertiary care hospital, over a period of 1 year, on patients attending the Out Patients Department of ENT. A total of 97 cases of otomycosis presenting to above mentioned deptt. were enrolled for the study after clinical diagnosis of otomycosis was made. All patients presenting with symptoms of Otomycosis like itching, pain, ear discharge, feeling of foreign body in the ear, hearing loss, headache and aged between 4 to 60 years were included. Patients above 60 year and below 4 years of age. Patient with uncontrolled systemic illness (Diabetes mellitus, Hypertension) and patient with suspected malignances and infiltrating tumours were excluded. The biological material collected, comprised of secretions, pus and debris from the external auditory canal, using two sterile cotton swabs. One swab was used for direct microscopy and the other was used for culture on Sabouraud's dextrose

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agar medium. No transport media was used for swabs. All swabs taken were subjected to microscopic examination by 10% KOH and inoculated on SDA medium. In case of unavoidable delay of more than 24 hrs the sample was refrigerated at 4°C. The presence of fungal elements in KOH mount were confirmed by growth on Sabourauds culture medium. If no growth was obtained on SDA after 4 weeks, then culture was considered sterile. If growth was seen on SDA medium, the morphology of fungal isolates were further studied by using the LACTO PHENOL COTTON BLUE (LPCB) (2). Presumptive identification of *Candida albicans* was done by using GERM TUBE TEST. The suspected strain of *Candida* was further grown on CORNMEAL AGAR (2).

### Statistical Analysis

Statistical testing were conducted with the statistical package for the social science system version SPSS 17.0. Nominal categorical data between the groups were compared using Chi-square test. 'P<0.05' was considered statistically significant.

### Results

Table-1 shows that out of 97 patients 54 were females and 43 were males with a female: male ratio of 1.2:1. Maximum number of patients 59(60.8%) were in the age group 20-40 years, followed by 25( 25.7%) in the age group >40 years and least number 13(13.4%) in the age group of <20 years. The youngest patient in the study was 4 year old child and oldest was 60 years old .50 patients were from rural background and almost equal number of patients i.e 47 were from urban area, with rural /urban ratio of almost 1:1. Maximum number 54 of patients were seen in the rainy season followed by 35 in the summer. There were least number of cases , 4 each in spring and winter months. Most common presenting symptom was itching in 65 patients, followed by fullness of ear and pain in 60 patients each, followed by hearing loss in 45 patients, and lastly headache and discharge were reported in 30 patients each. Out of 97 patients, 55.6% patients had involvement of left ear where as 44.4% had involvement of right ear.

Out of 97 patients 12 patients had various systemic illnesses which included Diabetes Mellitus , COPD, Hypertention, Bronchial Asthma, Chronic Renal Disease, 5,3,2 1,1 respectively. None of the patient had Acquired immunodeficiency syndrome. Out of 97 patients of Otomycosis, 37 were KOH POSITIVE on wet mount preparation where as rest were negative. . The prevalence of otomycosis in our patients was 40.2 ± 4.98. 39 of these were culture positive where as 58 were culture negative on Sabourauds Dextrose Agar. 22 out of the 39

**Table.1 Showing Demographical Profile of Patients (n=97)**

|                              |                           |
|------------------------------|---------------------------|
| Male Vs Female               | 43 Vs 54                  |
| M:F Ratio =                  | 1.2 :1                    |
| < 20years =                  | 13(13.4%)                 |
| 20-40 years =                | 59(60.8%)                 |
| >40 years=                   | 25(25.7%)                 |
| Rural Vs Urban=              | 50 Vs 47                  |
| Season : Rainy Vs Summer=    | 54 Vs 35                  |
| KOH Postive=                 | 34                        |
| Sabourauds Dextrose Postive= | 39                        |
| Point Prevalance=            | 40.2%(95% CI=30.44-49.96) |

culture positive patients also had positive wet mounts (positive KOH smears) whereas 17 were smear negative. On the other hand only 15 culture negative patients had positive KOH smears. 'P' value was calculated to be 0.0024 which was statistically significant. Thus it was concluded that smear positivity has a statistically significant relationship with the prevalence of positive cultures in patients presenting as otomycosis.

25 out of 54 females had positive cultures whereas only 14 out of 43 males had cultures positive on SDA medium. 'P' value was 0.0165 which was statistically significant (<0.05). Thus we concluded that sex and culture positivity bear a statistically significant relationship. In to our study, age and culture positivity did not have a statistically significant relationship. 50% rural patients were culture positive whereas only 29.8% of the urban patients had positive cultures. Thus the urban patients were more likely to have negative cultures. The 'p' value was 0.0425 which is statistically significant and we concluded that urban patients had a statistically significant likelihood to have negative cultures which could be due to the early initiation of treatment in these patients. The season of presentation, the symptoms at the time of presentation and the occupation of the patients did not bear a statistically significant relationship with the culture positivity. 3 out of the 5 diabetic patients had positive culture whereas one patient who had bronchial asthma was also culture positive but the presence of coexisting systemic illnesses in the patients did not have a statistically significant relationship to the culture positivity. Out of 97 patients of Otomycosis, 39 had positive cultures on SDA medium. The commonest fungus isolated was *A. niger* 51.28%, followed by *A. flavus* 17.94% and *A. fumigatus* and *Candida* in 15.38% each.

### Discussion

Otomycosis is common in India (3). The high incidence can be attributed to high degree of humidity and heat, the dusty environment, and the fact that a large proportion of

the population is made up of outdoor labour and persons of low socioeconomic status. Other contributing factors might be such habits as cleaning the ear with a match stick, contaminated fingertips and instillation of oils, oil and garlic mixture, antibiotics/steroids drops, wax solvents or fatty acid in the ears which are known to encourage inoculation and growth of spores of fungus on the moist external auditory canal especially with patients with poor personal hygiene (3,4).

The prevalence of otomycosis in our study was 40.2 + 4.98 (95.C.I=30.44-49.96). Similar observations on prevalence have been made by Than Khin Mya (5), Ologe FE (6) and Mahmoudabadi AZ (7) in their studies amounting to 54.62%, 53.9% and 45.6% respectively. However a higher prevalence rate 72.72%, 74.7%, 81.3% and 88.6% have been reported by Chander J (8), Kour Ravinder (9), Pardhan Bibhu (10) and Paulose KO (11) respectively in their studies on otomycosis.

Females in the present study were more often affected by otomycosis, constituting 55.6 %, with a M:F ratio of 1:1.2. Out of 54 females, 25 had positive cultures whereas only 14 out of 43 males had cultures positive thus concluding that sex of the patients had a statistically significant relationship to the culture positivity. Similar observations were made by Mahmoudabadi (2006) and Zeba (12) in which 73% and 74% were females respectively. However these data, are in disagreement from the findings by Yehia MM (13), Kour R (9), who found in their studies 52.5% , 60% , 56% of total subject were males suffering from otomycosis.

Otomycosis is a disease of young adults and in our study 60.8% of the patients were young adults in the age group of 20-40 years, and least number (13.4%) in the age group less than 20 years. Similarly patients in the age group 20-40 years were most likely to have positive cultures (56.4 %) which was not statistically significant. However no age is immune. The youngest patient was 4 years old and oldest was of 60 years of age. Similar observation was made on otomycosis by Zeba Ahmed (12) in which the youngest patient was 5 years old and oldest was 60 years old and majority of the patients (57%) were between age group of 50 years. In the study carried out by Fasnula J (4) the most prevalent (39.56%) age group was in the 3rd and 4th decade of life out of 378 proven cases of otomycosis. The age incidence is in accordance with studies of Mugliston T (1) 21%, Yehia MM (13) 48%, Paulose KO (11) 41%. Ozcan KM (15) and Colleagues in their study had 31-60 years age groups as suffering the most and they attributed it probably to religious practice of head covering as a predisposing factors which is mandatory in Turkey.

All of the patients had unilateral ear involvement. Right ear was involved in 44.4% and left ear in 55.6% of patients. Similar observations that otomycosis is unilateral and shows no preference for either side is supported by other studies by Kour R (3) and Yehia MM (13). The above study are in accordance with studies by Paulose KO (11) and Mugliston T (1) who have reported that otomycosis is predominantly a unilateral disease in 87% and 89% of their patients respectively.

All patients were seen between May to October and none in the month of November to April. Maximum number of patients (55.6%) were seen in the month of July to September as otomycosis is more prevalent in these months because of high humidity favouring the growth of the fungus. Patients presenting in the rainy season also had a higher number of culture positive samples though it wasn't statistically significant. The above observations are in accordance with the study by Mugliston T (1) in 1985, Sood VP (16) and Beg MH (17). Similar observation has been made by Zeba Ahmed (12) in which most of the patients were seen between April to September.

It is likely that the dormant spores of fungi lying in the canal start multiplying under these favourable conditions of optimum temperatures and humidity (16). All patients had two or more of the aural symptoms (itching, otology, hearing loss, fullness of ear, discharge, pain). Three common symptoms in our study were itching, fullness of ear, pain, in 67% and 61.86% each respectively. A similar observation has been made by Zeba Ahmed (12) in their 70 patients of otomycosis in which itching, fullness of ear and pain in the ear, were the most common presenting feature seen in 89%, 80% and 91% respectively. As regards hearing loss seen in 46.39% of our patients, it was 51% in the study carried out by Zeba Ahmed (12). However hearing loss ranging from 78.3% to as high as 96% has been reported by Fasnula J (4) and Pradhan B (10). However, ear blockage and otalgia were the two common presenting symptom in a clinicomycology study of otomycosis by Kaur R (3) from the department of microbiology Maulana Azad Medical College, and the department of otorhinolaryngology L N Hospital, New Delhi. Similar observations have been made by various others as shown in the below *table:2*

In this study 37.1% of cases were housewives hailing from town and villages. They constituted a major group because of the cold damp working atmosphere of village kaccha houses acting as a contributory factor. This group frequently cleans and sweeps the floor of the houses. The resulting raised dust containing fungal spores acts as predisposing agent for the initiation of the disease, Yehia

MM (13). Five patients in this study had Diabetes Mellitus, two each had Chronic obstructive pulmonary disease as well as hypertension and one each was suffering from bronchial asthma, Seborrhea and chronic kidney disease. There was no patient of AIDS in our study. Diabetes mellitus is a known predisposing factor for infections. Similar observation has been made in a study carried out by Chander J (8) on 80 culture positive patients in which two patients had diabetes mellitus. Similar observation has also been made by Zeba Ahmed (12). Fasunla J (4) showed in his study 6.08% of the patient had diabetes mellitus. Presence of an underlying systemic illness did not have a statistically significant influence on the culture positivity in our study. A great proportion of the cases reside in rural environment and in our study 64.10 % of the patients of otomycosis were from rural background and they also had a statistically significant likelihood to have positive cultures.

The diagnosis of otomycosis is usually confirmed from fungal culture of the ear swabs. In our study, out of 97

patients of Otomycosis, 39 were culture positive whereas 58 were culture negative on Sabourauds Dextrose Agar. The negative cultures might have been the result of previous treatment before these patients entered our study. Another study in 2005, reported that out of 451 suspected cases of otomycosis, only 24.3 % could be confirmed on cultures (18). Ashish Kumar in his study on fungal spectrum in otomycosis patients in the year 2005 reported that 82 out 108 (75.92%) suspected otomycosis patients had culture positive specimens (19).

22 out of the 39 culture positive patients also had positive wet mounts (positive KOH smears) whereas 17 were smear negative. On the other hand only 15 culture negative patients had positive KOH smears. Our study concluded that smear positivity has a statistically significant relationship with the prevalence of positive cultures in patients presenting as otomycosis. This was comparable to a similar study by Ashish Kumar on fungal spectrum in otomycosis patients in the year 2005 (19). He reported that only 82 (75.92%) samples were positive for the presence of fungal elements of which 48 (44.44%)

**Table 2. Showing Comparison of Most common Clinical Presentation in Various Study**

| S.NO | SYMPTOMS (%)     | PAULOSE <i>et al</i> (10) (1989) | M.M YEHIA <i>et al</i> (13) (1990) | PRADHAN <i>et al</i> (10) (2003) | MURAT OZCAN <i>et al</i> (15) (2003) | J.FASUNLA <i>et al</i> (4) (2008) | PRESENT STUDY (2011) |
|------|------------------|----------------------------------|------------------------------------|----------------------------------|--------------------------------------|-----------------------------------|----------------------|
| 1    | Itching          | 88                               | 78                                 | 93                               | 95.4                                 | 90.21                             | 67.01                |
| 2    | Earache          | 70                               | 50.4                               | 86                               | 54                                   | 83.86                             | 30.93                |
| 3    | Full Ness Of Ear | -                                | -                                  | -                                | -                                    | 92.00                             | 61.86                |
| 4    | Ear Discharge    | 58                               | 62.6                               | 9.2                              | 33.3                                 | 14.81                             | 30.93                |
| 5    | Hearing Loss     | 33                               | 38                                 | 96                               | 47.1                                 | 78.31                             | 46.39                |
| 6    | Tinnitus         | 11.4                             | 48                                 | -                                | 37.9                                 | -                                 | -                    |
| 7    | Headache         | -                                | -                                  | -                                | -                                    | -                                 | 61.86                |

**Table 3. Showing Comparison of fungal Isolates in Various Study**

| S. No | Fungus isolates          | Joy <i>et al</i> (20) | Paulose <i>et al</i> (10) | Yehia <i>et al</i> (13) | R.Kour <i>et al</i> (5) | Ashish kumar (19) | J.Fasunila <i>et al</i> (17) | Present Study |
|-------|--------------------------|-----------------------|---------------------------|-------------------------|-------------------------|-------------------|------------------------------|---------------|
| 1     | <i>A.niger</i>           | 45.9                  | 54.4                      | 70.9                    | 36.9                    | 52.43             | 48.35                        | 51.28         |
| 2     | <i>A. fumigatus</i>      | 15.7                  | 25.1                      | 5.6                     | 41.4                    | 34.14             | 33.96                        | 15.38         |
| 3     | <i>A. flavus</i>         | 24.3                  | -                         | 15.6                    | -                       | -                 | 5.43                         | 17.94         |
| 4     | Other <i>Aspergillus</i> | -                     | -                         | -                       | -                       | -                 | -                            | -             |
| 5     | <i>Candida spp</i>       | 8.7                   | 17.0                      | 7.3                     | 8.2                     | 12.21             | 12.26                        | 15.38         |
| 6     | <i>Mucor</i>             | 6.5                   | -                         | -                       | -                       | 1.21              | -                            | -             |
| 7     | <i>Pencillum spp</i>     | 1.1                   | 3.5                       | -                       | -                       | -                 | -                            | -             |
| 8     | <i>Rhizopus</i>          | -                     | -                         | 0.6                     | -                       | -                 | -                            | -             |
| 9     | Other Fungi              | -                     | -                         | -                       | -                       | -                 | -                            | -             |

specimens were smear (microscopically) and culture positive, whereas only 34 (31.48%) samples were culture positive for the presence of fungal elements. 25 (28.14%) samples out of 108 were smear and culture negative.

The aetiological agents of otomycosis found in our study were *Aspergillus* (84.60%) and *Candida* (15.38%). *Aspergillus* spp. are common in airborne dust, and their heavy growth is aided by ear wax. Furthermore, the pH level in the normal ear canal is on the acidic side, and the common pathogenic *Aspergillus* experience optimal growth at a pH range of 5 to 7. *Aspergillus Niger* was the commonest fungus isolated in various previous similar studies (4, 10, 20). (Table-3) *Aspergillus niger* grows on cerumen, epithelial scales and debris deep in the external canal, the resulting plug of mycelium and debris causes irritation, itching, pain, and deafness. However in a study by Kour R (3) *Aspergillus fumigatus* (41.4%) was the most common isolate followed by *Aspergillus niger* (36.9%). In one of the recent study also the predominant etiological agents reported were *Aspergillus flavus* (28.4%), *Candida guilliermondii* (19.3%) and *Candida parapsilosis* (18.2%) (21). Another recent study suggested that the most prevalent fungal pathogen was *Aspergillus niger* which was sensitive to Clotrimazole, Fluconazole, Ketoconazole. *Candida albicans* was sensitive to all drugs, in which, the most sensitivity was due to fluconazole. The most frequent fungal pathogen in their otomycosis cases was *A. niger*, and most of fungi that caused otomycosis were found sensitive to clotrimazole (22).

### Conclusion

Chronic infective disorders of the ear remain a common source of misery for the patients and frustration for the clinicians. In this study we found that otomycosis was more common in young adults, females, particularly housewives. Out of 97 patients, in 39 the diagnosis of otomycosis was confirmed and commonest fungus isolated was *A. Niger* as the major etiological agent where as *Candida*, was the sole etiological agent in all the 3 diabetic patients in this study. Cultures were statistically more likely to be positive in rural females presenting with KOH smear positive otomycosis whereas age, season, symptoms, occupation or underlying systemic illnesses did not significantly predict culture positivity.

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