



## FUNGAL PROFILE AND ANTIFUNGAL SUSCEPTIBILITY PATTERN OF YEAST ISOLATED FROM CHRONIC SUPPURATIVE OTITIS MEDIA IN A TERTIARY CARE HOSPITAL IN UTTARAKHAND

### KEY WORDS

Antifungals, CSOM, Fungal Infection

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### ABSTRACT

**Introduction** Chronic suppurative otitis media (CSOM) is one of the most commonly encountered diseases in otorhinolaryngology practice. **Material and method** A total of 70 samples from 64 clinically diagnosed cases of CSOM were included in the study. The fungal identification was done and antifungal susceptibility of the yeast isolates was carried out by automated method. **Result** Out of 70 samples 50% (33/70) showed positive fungal culture. Among 64 patients, 53.12% (34/64) were males and 46.87% (30/64) were females. The most common isolated fungus was *Aspergillus fumigatus* (36.36%) followed by *Aspergillus niger* (30.30%) and *Candida albicans* (18.18%). All strains of *Candida* species were sensitive to fluconazole, amphotericin B, flucytosine and voriconazole. **Conclusion** Irregular and indiscriminate use of antibiotics precipitates the emergence of multi-resistant bacteria and also suppress normal bacterial flora of ear leading to fungal infection.

### INTRODUCTION

Chronic Suppurative Otitis Media (CSOM) is defined as persistent disease of middle ear, which is capable of causing severe destruction sequel with the manifestation of deafness, discharge and a permanent perforation (1). The duration of the symptoms to define the disease varies according to various otolaryngologists (2). But according to World Health Organization (WHO) only two weeks of duration is required to define CSOM (3).

CSOM usually develops in the first decade of life but can persist during adulthood. Prevalence of CSOM is more in the developing and underdeveloped countries. According to WHO, the prevalence of CSOM in India is more than 4% and it falls among those countries where urgent attention is needed (3). The incidence of CSOM is increasing in the developing countries because of low socio-economic status, poor nutrition, poor hygienic practices and lack of health education (5). Other risk factors involved in pathogenesis of CSOM are recurrent upper respiratory infections, breast-feeding while lying down, craniofacial malformation and Eustachian tube defect (6).

In CSOM, bacteria can reach the middle ear either from the nasopharynx through the Eustachian tube or from the external ear canal through a non-intact tympanic membrane. The aerobic microorganisms most frequently isolated in CSOM are *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Proteus* species, *Klebsiella* species, *Escherichia* species, *Haemophilus influenzae*, and *Moraxella catarrhalis* (3) (8). The most frequently isolated anaerobic organisms from CSOM are *Bacteroides* species, *Peptostreptococcus* species and *Fusobacterium* species (9).

Fungi are also thought to play a role in CSOM. In some populations, especially those residing in hot and humid regions, fungi are isolated from the cases with CSOM as fungus flourish in such environmental conditions. Among the fungus *Candida* species and *Aspergillus* species are the common fungus involved in CSOM (10)(11). Recently,

concern has risen about secondary fungal overgrowth as a complication of treatment with topical antibiotics as these drugs not only act against the pathogenic bacteria but these drugs also suppress the normal commensal flora of the ear (10).

In view of the above background the present study was conducted to access the incidence of fungal profile in cases of chronic suppurative otitis media in a tertiary care hospital setting with an objective to identify the fungal isolates and the antifungal sensitivity profile of yeasts responsible for CSOM.

### MATERIAL AND METHODS

The present study was conducted in the Department of Microbiology and Immunology, Shri Guru Ram Rai Institute of Medical and Health Sciences (SGRRIM&HS) and Microbiology division of Central Laboratory of Shri Mahant Indires Hospital (SMIH) in collaboration with E.N.T department of Shri Mahant Indires Hospital, Dehradun for a period of one year from October 2014 to October 2015. A total of 70 samples from 64 clinically diagnosed cases of CSOM of all age groups and both sexes attending outpatient department of ENT as well as those admitted in ENT ward of Shri Mahant Indires Hospital were included in this study.

**Inclusion criteria:** Patients who were diagnosed as suffering from CSOM after thorough clinical evaluation by an ENT surgeon, patients of all age groups and both sexes who were not on antibiotic both systemically and topically for minimum of 24 hours prior to sample collection were included in this study.

**Exclusion criteria:** Patients who were suffering from CSOM and were on systemic antibiotics or who were on topical medication to the ear were excluded from this study.

An informed consent was taken from the patient or from the guardian (in case of minor) in the prescribed format. At the time of sample collection all demographic details and relevant clinical data

was collected in the specially designed Case Recording Form for each patient.

**Method:** The external ear was wiped with sterile cotton and then with 70% alcohol and allowed to dry. With the aid of head mirror and lamp as a source of light, sterile ear speculum was introduced into the ear and taking aseptic precautions, the ear discharge was collected using sterile cotton swabs in duplicate prior to instillation of any topical medication. One swab was used for microscopy for Gram staining and KOH mount following standard protocol (12).

The second swab was used for fungal culture following standard protocol (12). The inoculated tubes of Sabouraud Dextrose Agar slants were incubated at 37°C and 22°C for 14 days and were checked on 3rd, 7th and 14th day for any evidence of growth. The fungi from the growth so observed was identified by colony characteristics, microscopically by Gram stain, germ tube test and final identification was performed by Vitek2 Compact system (bioMérieux) in case of growth of yeast-like colony. Identification of molds was done by colony characteristics, microscopically by lactophenol cotton blue mount and by performing slide culture (12)(13).

Antifungal susceptibility was performed by Vitek2 Compact system (bioMérieux) in case of growth of yeast-like colony.

**Statistical Analysis:** The results and data obtained were analyzed using Chisquare test for statistical significance.

**Results**

In this study males were found to be affected more than females i.e, out of the 64 patients studied, 53.12% (34/64) were males and 46.87% (30/64) were females. Statistical analysis revealed that the male preponderance was not significant (p=0.733). It was observed that out of 64 patients of CSOM included in this study, 50% (32/64) were from age group 0-10 years followed by 20.31% (13/64) in age group 11-20 years (Table 1). This observation when analyzed was found to be statistically significant (p=0.06).

A total of 70 samples from 64 cases were studied of which 47% (33/70) were culture positive and 53% (14/70) were culture negative (Figure 1). 78.78% (26/33) of culture positive cases belonged to low socioeconomic status. With p value of 0.00032 this observation was found to be statistically highly significant (Table 2)

With 36.36% (12/33) *Aspergillus fumigatus* was found to be the predominant isolate. While, 30.30% (10/33) *Aspergillus niger*, 18.18% (6/33) *Candida albicans*, 6.06% (2/33) *Aspergillus terreus*, 3.03% (1/33) *Candida tropicalis*, 3.03% (1/33) *Rhizopus* species and 3.03% (1/33) *Paecilomyces* species were also observed (Figure 2). All the seven strains of *Candida* species were sensitive to fluconazole, amphotericin B, flucytosine and voriconazole (Figure 3)

**Table 1: Age wise distribution of the cases (N=64)**

Age group	Number of cases
0-10 years	32(50)
11-20 years	13(20.31)
21- 30 years	5(7.81)
31-40 years	8(12.5)
41-50 years	3(4.68)
51-60 years	1(1.56)
61-70 years	1(1.56)
71-80 years	1(1.56)
<b>Total</b>	<b>64(100)</b>

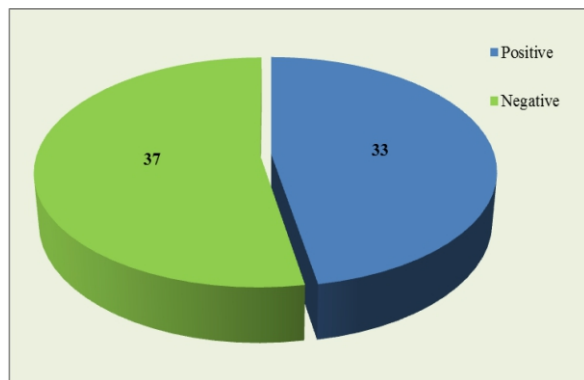
Figure in parentheses indicates percentage  
 $X^2 = 4.54$   $p = 0.06$  significant

**Table 2: Distribution of the cases according to their socio economic status (N=64)**

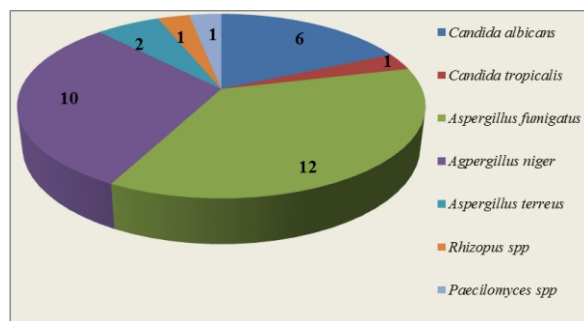
Socio economic status	Culture positive	Culture negative	Number of cases
Low	26(78.78)	18(58.06)	44(68.75)
Middle	6(18.18)	9(29.03)	18(28.12)
High	1(3.03)	1(3.22)	2(3.12)
<b>Total</b>	<b>33(100)</b>	<b>31(100)</b>	<b>64(100)</b>

Figure in parentheses indicates percentage  
 $X^2=12.90$   $p=0.00032$  highly significant

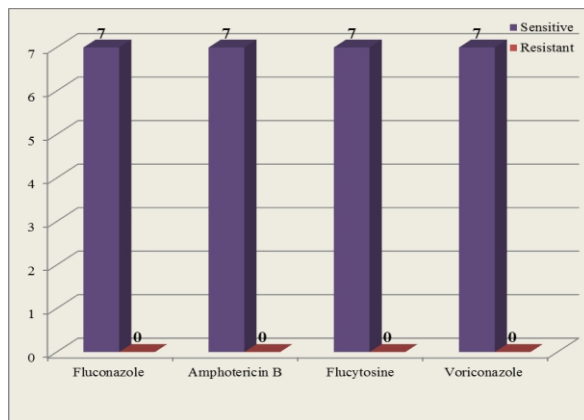
**Figure 1: Distribution of samples studied based on fungal culture results (N=70)**



**Figure 2: Distribution of fungal isolates studied in cases of CSOM (N=33)**



**Figure3: Antifungal susceptibility pattern of Candida species (N=7)**



**DISCUSSION**

Chronic Suppurative Otitis Media is a major health problem and occurs with a high incidence and prevalence in both developed and developing countries. In India, due to temperate climate with heavy monsoons, CSOM is a major complaint encountered in ENT clinics.

In the present study an attempt was made to know the fungal profile of CSOM, with antifungal susceptibility of yeast isolated from the cases of CSOM in the population attending our hospital.

In present study, males with 53.12% (34/64) were more affected than females 46.87% (30/64), this is in accordance with the other studies Kumar.S.A.Jagdish et al and Arun Ghosh et (14) (15).

Dominance in age group of 0-10 years which accounted for 50% (32/64) of the cases followed by 20.31% (13/64) cases falling in age group of 11-20 years is similar to the observation of other workers (16) (17) (18). These observations when analyzed were found to be statistically significant with p value < 0.001. The greater susceptibility of young children to CSOM may be due to short and horizontal course of Eustachian tube and increased frequency of respiratory infections causing AOM due to reduced physiological and immunological defense pathogens.

Based on the socioeconomic status of the subjects studied it was found that the incidence of CSOM was maximum in low socioeconomic status with 68.75% (44/64). These observations when analysed statistically were found to be highly significant with a p value 0.00032. This correlates with most national and international studies (18)(19)(20). Poverty, overcrowding, lack of education, poor hygiene, malnutrition and lack of medical facilities have been suggested as a basis for the widespread prevalence of CSOM in people with low socioeconomic status.

*Aspergillus fumigatus* as the commonest fungal isolate has also been observed in various studies (21)(22)(23). It has been suggested that the prolong use of topical broad spectrum antibiotics leads to suppression of bacterial flora and subsequent emergence of opportunistic fungal flora in the ear (24). However, in present study no such association of fungal growth with use of topical antibiotics could be established as there was no control group included in this study that used topical antibiotics before sample collection. Among individuals with bilateral CSOM in our study, it was observed that five cases had similar isolates from both the ear. It was probably due to the fact that they used the same cotton bud (ear bud) or equivalent in both the ears to clean them thus leading to cross contamination. In our study, antifungal susceptibility for *Aspergillus* species and other molds were not performed as it is still not standardized universally.

In developing country like India, self-treatment, instillation of oil for temporary relief and seeking treatment from the quacks further lead to chronicity of the disease. Patients should therefore be instructed by clinicians to avoid such practices and requires adequate sensitization/health education.

Emergence of antimicrobial resistance is becoming more common with indiscriminate and haphazard use of topical antibiotics. As the symptoms subside many patients stop taking antibiotics before the completion of therapy and allow the partly resistant microbes to flourish. It is well documented that indiscriminate use of topical antibiotic and steroid suppress the normal bacterial flora of ear subsequently leading to fungal pathology. Therefore it is important for treating clinician to know the microbiological profile of the disease whether bacterial or fungal and in vitro pattern of antimicrobial sensitivity to plan the treatment of a chronically discharging ear.

## CONCLUSION

Chronic Suppurative Otitis Media has become a matter of public health importance in the present days in developing countries like India. It is well known disease of multiple etiologies and its recurrence and persistence.

Recurrent upper respiratory infection, low socioeconomic status, lack of education, ignorance of parents about the disease, bathing in contaminated dirty water, introduction of foreign body into the ear,

instillation of oil in the ear canal and seeking treatment from quacks are some of the contributing factors for developing CSOM in the present era.

Irregular, haphazard and indiscriminate use of antibiotics not only precipitates the emergence of multi-resistant bacteria but also suppress normal bacterial flora of ear leading to fungal infection. Therefore it is strongly recommended to use carefully selected local or systemic antibiotics guided by culture and sensitivity, along with the use of frequent ear toilet as an effective treatment modality. This will prevent development of drug resistance and administration of unwanted antibiotics and in return would prevent complications related to CSOM.

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