

Prevalence of Fungal Infections in Patients Presenting With OtorrhoeaSaileswar Goswami^{1*}, Shivaam Kesarwaani²¹Associate Professor, Department of E.N.T., Calcutta National Medical College, Kolkata, West Bengal, India.²M.S.(E.N.T.) P.G.T., Department of E.N.T., Calcutta National Medical College, Kolkata, West Bengal, India.**Original Research Article*****Corresponding author**

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Abstract: Otorrhoea is a common symptom with which patients come to an otolaryngologist. Use of self-medicated antibiotic with steroid ear drops for long duration increases the possibility of otomycosis. The present study was conducted for a duration of three years in two Medical Colleges of West Bengal, India, to find the prevalence of fungal infections in otorrhoea. Out of the 226 patients in the study, 144 cases (63.7%) of purely bacterial, 59 cases (26.1%) of mixed (bacterial and fungal) and 23 cases (10.2%) of purely fungal infections were isolated. Total number of fungal infection were 72 (36.3%) out of 226. The most common age group was 20-30 years (33.3%) whereas the least common age group was 1-10 years (9.7%). A male predominance (63.9%) with a male, female ratio of 1.76:1 was found. Aspergillus species were the most common fungus and were found in 44 cases (61.1%) followed by Candida species in 10 cases (13.9%). Out of the 44 Aspergillus positive samples, Aspergillus niger was the most common and was found in 28 patients (38.9%) while other Aspergillus species found were Aspergillus flavus in 8 patients (11.1%), Aspergillus fumigatus in 4 patients (5.6%), and Aspergillus terreus in 4 patients (5.6%). Other fungi found in our study were Mucor species in 4 patients (5.6%), Penicillium species in 6 patients (8.3%), Fusarium species in 6 patients (8.3%) and Nigrospora species in 2 patients (3%). Patients with persisting otorrhoea using antibiotic with or without steroid ear drops as self-medication for long duration are more likely to have fungal infection. In such cases, ear swab for fungal culture should be done routinely.

Keywords: Aspergillus, Candida, otorrhoea, otomycosis, fungal infection, chronic otitis media

INTRODUCTION

Otorrhoea is a common symptom with which a patient present to an otolaryngologist. Even after the rapid advancement of antimicrobial therapy, otorrhoea remains a significant clinical condition in developing countries like India. In spite of adequate empirical local and systemic broad spectrum antimicrobial treatment chronic discharging ear often fails to respond. In this scenario relevant microbiological study has its own importance according to the changing microbiological behaviour throughout the world to postulate a recent epidemiomicrobiological trends in general otorrhoea population. Not only in immunocompromised patients, but also in healthy patients, fungus remains an important cause of otorrhoea in both otitis externa and media. This study was done to establish the prevalence of common fungi cultured from ear discharge of patients attending the ENT OPD in two Medical Colleges of West Bengal, India for over three years.

An ear with perforated tympanic membrane often present with chronic discharging ear.

Development of chronic otitis media may be related to the frequent infection of the upper respiratory tract and poor socioeconomic conditions like overcrowded housing, poor hygiene and nutrition[1]. Unlike otitis media with effusion which is common in the West, chronic discharging ears are highly prevalent in the tropical regions including India.

Of all these complications, hearing loss associated with ear discharge is reported in almost 53% of cases [2]. It may often be accompanied by complications including septicaemia, meningitis, brain abscess, facial paralysis and mental retardation.

Recently, bacterial biofilm [3] are thought to have a major role in many otolaryngological infections. Over the past 20 years a new appreciation has developed regarding how bacteria behave differently once bound to a surface. The formation of biofilm facilitates chronic bacterial infections and reduces efficacy of anti-microbial therapy [4]. In addition to bacterial biofilm, role of fungal infections in CSOM needs more attention. Fungal infections of middle ear

are common as fungi thrive well in moist pus [5]. Our knowledge about mycological aspect of ear infections is limited. The prevalence of fungal infections has been increasing in the recent years because of the excessive use of broad spectrum antibiotics, corticosteroids, cytotoxic chemotherapy and increase in the number of immune deficiency conditions.

MATERIALS AND METHODS

This prospective study was conducted over a period of three years on 226 patients in two Medical Colleges of West Bengal, India. Proper history was taken and the patients were examined completely. Special emphasis was given on the type and duration of treatment with antibiotics drops with or without steroids. Children below one year were excluded from the study because of relative inconvenience in obtaining swabs for culture. Sterile swabs were taken from the ears as deep as possible to avoid contaminants and were sent to the Microbiology department immediately. Routine smears with Gram stain and 20% KOH were examined. Separate bacterial culture was also done from the sample to study the bacterial spectrum.

The swabs were inoculated into Sabouraud’s Dextrose Chloramphenicol Agar Media and kept for 2 to 4 weeks for fungal culture. For bacterial cultures, all specimens were inoculated on blood and MacConkey’s agar plates. Bacterial growth was identified using colonial morphology, Gram stain results and key biochemical reactions. All bacterial isolates were

subjected to antimicrobial susceptibility testing using Kirby-Bauer method using selected antibiotic panel according to Clinical and Laboratory Standard Institute (CLSI) [6].

The relative distribution of fungi among all cases of ear discharge has been documented and studied. Age and sex distribution were additionally done.

RESULTS AND DISCUSSION

Fungal infection is found all over the world but it has a higher prevalence in the tropical areas where the climate is hot and humid [7]. Another important predisposing factor of fungal infection in otorrhoea is use of antibiotic ear drops for long duration. The chance of secondary fungal infection is further increased where steroid containing ear drops are used [8]. Immunocompromised condition also acts as a predisposing factor [9].

Prevalence of fungal infection in otorrhoea were reported to be up to 30% [10, 11]. Fungal infections of the middle and or external ear may be primary or secondary to bacterial infections. In our study we took swab from patients with active aural discharge. Out of the 226 patients in our study, we isolated 144 cases (63.7%) of purely bacterial, 59 cases (26.1%) of mixed (bacterial and fungal) and 23 cases (10.2%) of purely fungal infections. If we consider total percentage of fungal infection, it was 36.3%.

Table-1: Types of infection

Type of infection	Number of cases	Percentage (%)
Purely bacterial	144	63.7%
Mixed (bacterial and fungal)	59	26.1%
Purely fungal	23	10.2%
Total	226	100%

In their study of 84 young adult men with clinical otitic infections, Chow *et al.* [12] found 56.6 % bacterial, 6.7 % fungal, and 36.7 % both bacterial and fungal isolates. Shashikala *et al.* [13] in their study of 150 cases, found 48 cases (32%) to be positive in fungal culture. Balan *et al.* [14] in their study of 100 ear swab cultures found positive fungal culture in 28(28%) while combined bacteria and fungi in 24 (24%) cases and only bacteria in 62 (62%) cases. 10

swabs did not show the growth of any pathogen. Our finding was close to the above findings.

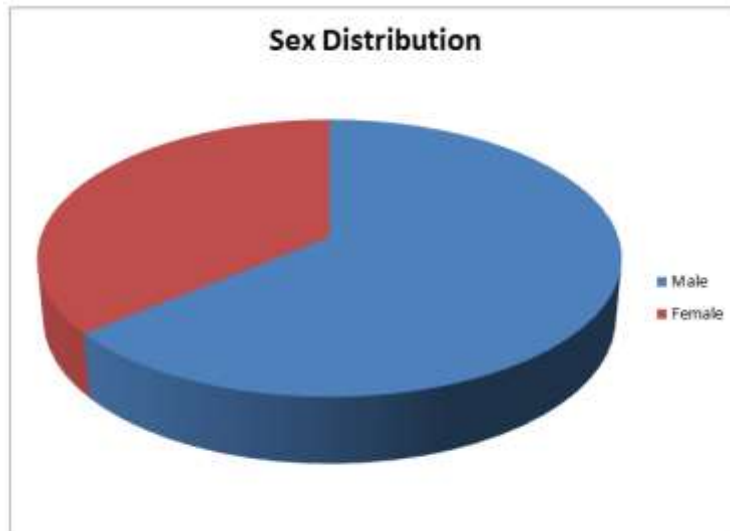
Considering the age distribution, 7 patients (9.7%) were of 1-10 years. of age, 16 patients (22.2%) were of 11-20 years. of age, 24 patients (33.3%) were of 21-30 years. of age, 14 patients (19.4%) were of 31-40 years of age and 11 patients (15.3%) were of 41 years and above of age.

Table-2: Age distribution

Age groups	Number of cases	Percentage (%)
1-10 years	7	9.7%
11-20 years	16	22.2%
21-30 years	24	33.3%
31-40 years	14	19.4%
41 years and above	11	15.3%
Total	72	100%

In our study the highest prevalence of otomycosis was found in the age group of 21–30 years (33.3%) and the lowest was noted in the age group of less than 10 years (9.7%). The observations were similar to the study done by Prasad *et al.* [15]

Sex wise among the 72 fungal culture positive patients, 46 patients (63.9%) were found to be male and 26 patients (36.1%) were found to be female.



Anwar *et al.* [16] in their study of 180 patients with documented diagnosis of otomycosis, found 107 (59%) male and 73 (41%) female cases. Sangavi *et al.* [17] found the ratio between male and female patients

as 1.13:1. Agarwal *et al.* [18] found the ratio between male and female patients as 1.3:1. In our study the male and female ratio was 1.76:1.

Table-3: Distribution Table of Fungal species

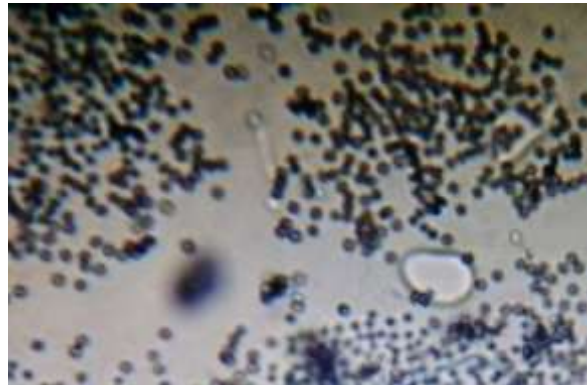
Fungal species	No. of cases(Total=36)	Percentage
Aspergillus niger	28	38.9%
Aspergillus flavas	8	11.1%
Aspergillus fumigatus	4	5.6%
Aspergillus terreas	4	5.6%
Candida albicans	10	13.9%
Penicillium species.	6	8.3%
Fusarium species.	6	8.3%
Mucor species.	4	5.6%
Nigrospora species.	2	2.8%

Aspergillus species were found to be the predominant fungi in most of the studies [11-15, 17-19]. In our study, out of the 72 cases of fungal infections, Aspergillus species were found in 44 (61.1%) cases. Out of the 44 Aspergillus positive samples, Aspergillus niger was the most common and was found in 28 patients (38.9%). Other Aspergillus species found in our study were Aspergillus flavus in 8 patients (11%), Aspergillus fumigatus in 4 patients

(5.6%), and Aspergillus terreas in 4 patients (5.6%). Our findings were at per with the findings of other authours [12, 13, 15, 17-19]. Among the Aspergillus species, Barati *et al.* [11] found A. flavus as the most common in (49%), followed by A. niger in (41.6%), A. fumigatus in (5.5%) and A. nidulans in (3.7%). Balan *et al.* [14] found A. fumigatus as the most common among the Aspergillus species.



Aspergillus niger on culture media



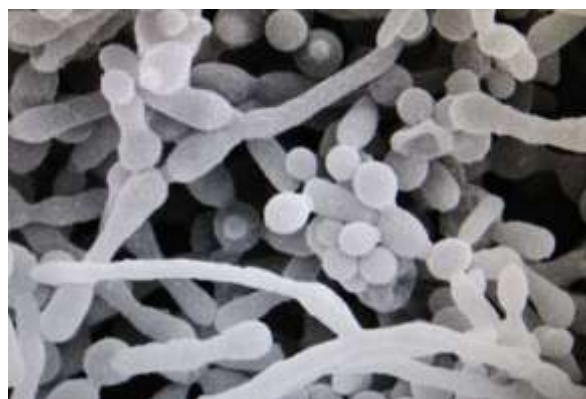
Aspergillus niger on photo microscopy

Second most common fungus found in otomycosis in most of the studies [11-14, 17-19] was *Candida* species. Prasad *et al.* [15] found *Penicillium*

species as the second most common. In our study, *Candida* species were found in 10 patients (13.9%) all of which were *Candida albicans*.



Candida albicans on culture media



Candida albicans on photo microscopy

Other fungi found in our study were *Mucor* species. in 4 patients (5.6%), *Penicillium* species. in 6 patients(8.3%), *Fusarium* species. in 6 patients(8.3 %) and *Nigrospora* species in 2 patient(2.8%).

CONCLUSION

In patients of otorrhoea, prevalence of fungal infection has been increasing gradually. Fungal infection should be kept in mind in cases with persisting otorrhoea even when there is no suggestive clinical finding. Patients with persisting otorrhoea using antibiotic ear drops as self-medication for long duration are more likely to have fungal infection. Possibility of otomycosis further increases in patients getting antibiotic combined with steroid ear drops. In such cases, ear swab for fungal as well as bacterial culture should be done routinely. Our study also recommends future studies on finding the causes of increasing incidence of fungal infections in ear discharge.

REFERENCES

1. Verhoeff M, van der Veen EL, Rovers MM, Sanders EAM, Schilder AGM. Chronic suppurative otitis media: A review. *International Journal of Pediatric Otorhinolaryngology* 2006;70:1-12.
2. Amedofu GK, Opoku-Buabeng J, Ose-Bagyina A, Antwi B. Hearing loss among school children in Ghana. *Ghana Med J.* 2003;37(4):148-52.
3. Costerton JW, Stewart PS, Greenberg EP. Bacterial biofilms: a common cause of persistent infections. *Science* 1999;284(5418):1318-1322.
4. García-Castillo M, del Campo R, Baquero F, Morosini MI, Turrientes MC, Zamora J, Cantón R. Stationary biofilm growth normalizes mutation frequencies and mutant prevention concentrations in *Pseudomonas aeruginosa* from cystic fibrosis patients. *Clin Microbiol Infect* 2011;17(5):704-11.
5. Ibekwe AO, al Shareef Z, Benayam A. Anaerobes and fungi in chronic suppurative otitis media. *Ann Otol Rhinol Laryngol* 1997; 106(8):649-52.
6. Clinical and Laboratory Standards Institute. Performance standards for antimicrobial susceptibility testing. Nineteenth informational supplement. 2009; M100-S19 Wayne, PA
7. Ologe FE, Nwawolo CC. Prevalence of chronic suppurative otitis media (CSOM) among school children in a rural community in Nigeria. *Niger Postgrad Med J.* 2002;9(2): 63-6.
8. Dhingra R, Monga S, Kaur G, Kaur M, Manpreet, Aggarwal V, Singh G. A study to establish the relation of antibiotics and steroids in fungal growth occurring in CSOM patients. *Int J Adv Med* 2015;2:104-9.
9. Viswanatha B, Naseeruddin K. Fungal Infections of the Ear in Immunocompromised Host: a Review. *Mediterr J Hematol Infect Dis* 2011;3(1):e2011003.
10. Pradhan B, Tuladhar NR, Amatya RM. Prevalence of otomycosis in outpatient department of otolaryngology in Tribhuvan University Teaching Hospital, Kathmandu, Nepal. *Ann Otol Rhinol Laryngol.* 2003;112(4):384-7.
11. Barati B, Okhovvat SAR, Goljanian A, Omrani MR. Otomycosis in central Iran: a clinical and mycological study. *Iran Red Crescent Med J.* 2011;13(12):873-6.
12. Chow VTK, Ho B, Hong GS, Liu TC. Bacterial and mycotic otological infections in Singapore. *J. Hyg, Camb.*1986; 97:385-92.
13. Shashikala BS, Deepthi P, Viswanatha B. Fungal Flora in Chronic Otitis Media: A Prospective Study in a Tertiary Care Hospital. *Research in Otolaryngology* 2018;7(1):5-8.
14. Balan S, Viswanatha B. Microbiology of Chronic Suppurative Otitis Media: A Prospective Study in a Tertiary Care Hospital. *J Otolaryngol ENT Res* 2017;9(1):00277.
15. Prasad SC, Kotigadde S, Shekhar M, Thada ND, Prabhu P, DSouza T, Prasad KC. Primary Otomycosis in the Indian Subcontinent: Predisposing Factors, Microbiology, and Classification. *Int J Microbiol.* 2014; 2014:636493.
16. Anwar K, Gohar MS. Otomycosis; clinical features, predisposing factors and treatment implications. *Pak J Med Sci* 2014;30(3):564-7.
17. Sangavi AKB, Peerapur B, Gummadi N. Clinico-mycological study of otomycosis in Raichur, Karnataka: a hospital based study. *Int J Otorhinolaryngol Head Neck Surg.* 2018;4(1):233-36.
18. Agarwal P, Devi LS. Otomycosis in a Rural Community Attending a Tertiary Care Hospital: Assessment of Risk Factors and Identification of Fungal and Bacterial Agents. *J Clin Diagn Res.* 2017;11(6):DC14-DC18.
19. Kazemi A, Majidinia M, Jaafari A, Ayatollah Mousavi SA, Zarei Mahmoudabadi A, Alikhah H. Etiologic Agents of Otomycosis in the North-Western Area of Iran. *Jundishapur J Microbiol.* 2015;8(9):e21776.