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A STUDY ON THE MICROBIAL ETIOLOGY OF OTOMYCOSIS IN A TERTIARY CARE CENTRE

Microbiology

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ABSTRACT

Introduction- Otomycosis implies fungal infection of the external ear. **Objective-** To identify the various fungal agents causing otomycosis in patients presenting with symptoms of the same and the associated bacterial infections. **Materials And Methods-** A prospective study was conducted in the department of Microbiology, Government Medical College Thrissur for a period of 1year. **Results-** A total of 150 ear swabs were collected from patients with symptoms of otomycosis. 55 samples yielded fungal growth, predominant causative agent being *Aspergillus niger* followed by *Aspergillus flavus, Aspergillus fumigatus, Candida* species, *Aspergillus tereus* and *Penicillium* species. 22 samples showed bacterial co infection with predominant bacterial species being *Pseudomonas aeruginosa* followed by *Staphylococcus aureus* and *Klebsiella pneumoniae.* **Conclusion:** Early clinical diagnosis, identifying the causative agents and treatment with appropriate drugs is essential in reducing the morbidity due to otomycosis.

KEYWORDS

Otomycosis, EAC- external ear canal, *Aspergillus, Candida.*

INTRODUCTION

Otomycosis or external fungal otitis is acute, subacute or chronic fungal infection of the external auditory canal.[1] It is one of the common conditions encountered in a general otolaryngology clinic setting and accounts for 5-25% of the otitis externa cases.[2] Fungi can either be the primary pathogen or be superimposed on bacterial infections. Fungal infection coexisting with bacterial infection may be the cause for recurrent otitis externa. Pre-existing fungal infection, unrecognized prior to operation can lead to otological surgical failures.[3] This study was conducted to determine the common etiological agents of otomycosis in Thrissur, Kerala where the climate is tropical humid favoring fungal infections.

Aim

1. To identify the various fungal agents causing otomycosis in patients presenting with symptoms of the same to ENT OPD
2. To identify the associated bacterial infections
3. To analyze the antimicrobial sensitivity pattern of bacterial and yeast isolates.

MATERIALS AND METHODS

Study Design- Prospective study

Study Setting- Department of Microbiology and Department of ENT, Government Medical College Thrissur, Kerala

Study Population-
Patients of all age groups attending outpatient Department of Ear, Nose and Throat, with symptoms of otomycosis.

Study Period- 1 year

Inclusion Criteria- Patients attending ENT OPD with symptoms of otomycosis as severe itching in the ear, pain, tinnitus, sense of blocked ear, hearing loss or ear discharge.

Exclusion Criteria- Surgically operated ENT cases, patients with fungal infections in other parts of the body.

Study Procedure- 3 ear swabs were taken from the affected ear of each patient before aural toileting. One swab was used for direct microscopic examination of the specimens by Gram stain and 10% KOH mount to look for fungal filaments. The second swab was inoculated on to two slopes of SDA with Chloramphenicol and incubated at 37^0C and 25^0 C for a minimum of 4 weeks. The third swab was inoculated to Blood agar and MacConkey agar to isolate the bacterial agents. Antibiotic sensitivity testing was done by disc diffusion method. Fungal isolates were further identified based on colony morphology, microscopy-LPCB mount and slide culture examination for moulds. Identification of *Candida* species was performed using Germ tube Test, detection of chlamydospore formation on Cornmeal Agar and differential morphology on HiChrom differential agar.[4] Antifungal sensitivity for azoles were done for Candida isolates based on CLSI M44-A2.[5]

Statistical Analysis

Data was analyzed with a statistical software program (epi_info). Categorical data was presented as frequencies and percentages.

Ethical Considerations

Ethical clearance was obtained from Institutional ethical committee. A predesigned proforma was used to evaluate and analyze demographic profile, predisposing factors, presenting complaints and clinical findings of clinically diagnosed patients.

RESULTS

Out of 150 cases with clinical suspicion of otomycosis, 55 samples yielded fungal growth. Maximum number of cases were found in the age group of 21-30 years. There was male preponderance among cases of otomycosis, accounting for 51 % of culture positive cases. Otomycosis was predominantly unilateral with right ear affected mostly (n=34) and there were 2 cases affected bilaterally. Most common presenting complaint in otomycosis cases was itching. Hearing loss was observed in 3 patients.

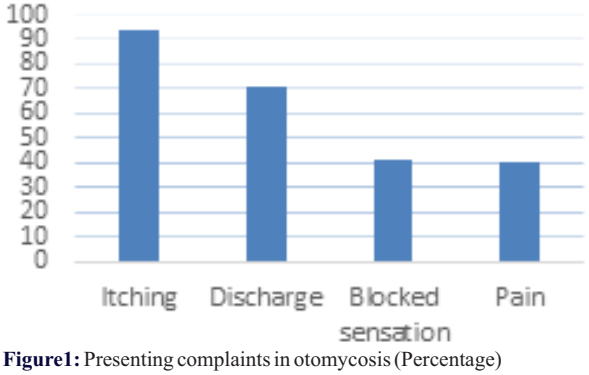

Figure1: Presenting complaints in otomycosis (Percentage)

Use of prior antibiotic or antibiotic-steroid drops was found in 67% of confirmed cases, 65% cases had history of EAC manipulation. 27% of the cases were diabetic patients on treatment. 22% of culture proven otomycosis cases had associated CSOM.

The most common fungal species isolated were *Aspergillus niger* (40 %) followed by *Aspergillus flavus* (29%), Aspergillus fumigatus (12.7%), Candida albicans(11%). 2 Candida tropicalis, 1 Penicillium species and 1 Aspergillus terreus .

Table1: Fungal Isolates

Fungal isolates	Number	% among total isolates
Aspergillus niger	22	40

Asprgillus flavus	16	29
Aspergillus fumigatus	7	12.7
Candida albicans	6	10.9
Candida tropicalis	2	3.6
Aspergillus terreus	1	1.8
Penicillium species	1	1.8

Disk diffusion method was performed for *Candida* isolates according to CLSI M-44 A2 to assess sensitivity of the isolates to azoles.[5] All the isolates of *Candida albicans* and *Candida tropicalis* were found to be sensitive to azoles.

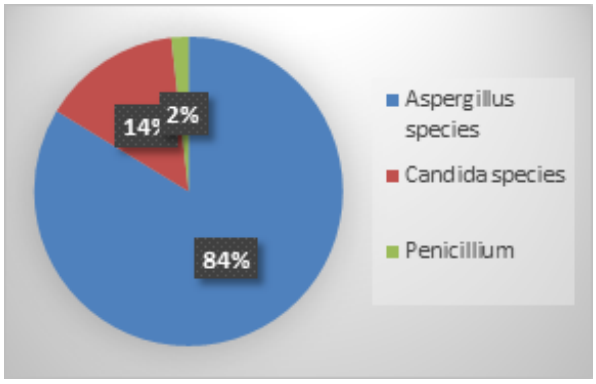

Figure 2: Fungal species isolated from otomycosis cases

Bacterial co infection was present in 22 samples out of the 55 fungal culture positive samples. So the incidence of associated bacterial infections in otomycosis cases was 34.4 %.17 fungal culture negative samples also yielded bacterial growth.

Table 2: Bacterial Co-infection In Otomycosis

Bacterial isolates	Number in fungal culture positive cases	Number in fungal culture negative cases	Total isolates (%)
Pseudomonas aeruginosa	13	11	24(61.5%)
Staphylococcus aureus	7	6	13(33.3%)
Klebsiella pneumonia	2	0	2(5%)

Pseudomonas aeruginosa was the predominant bacterial isolate in co infection cases (59%) followed by *Staphylococcus aureus* (32%).

Table 3: Sensitivity pattern of Pseudomonas aeruginosa (Total-24 isolates)

Antibiotis discs	% Sensitive
Ciprofloxacin	38
Gentamicin	67
Amikacin	88
Ceftazidime	88
Cefepime	92
Piperacillin	83
Piperacillin- Tazobactum	96
Imipenem	100

Table 4: Sensitivity pattern of Staphylococcus aureus(Total-13 isolates)

Antibiotis discs	% Sensitive
Penicillin	7
Cefoxitin	100
Erythromycin	23
Clindamycin	77
Cotrimoxazole	85
Gentamicin	46

DISCUSSION

The incidence of otomycosis in the clinically suspected patients according to the present study was 37%. This was comparatively lower compared to studies from nearby states. Study done by Pankti et al. in Ahmadabad had 46% confirmed otomycosis cases out of the 50 suspected samples they processed.[6] Most of the patients here were previously treated from local hospitals. 23% of the total cases were on Clotrimazole drops when they presented to the OPD. This could be one reason for the lower rate of fungal isolation.

Otomycosis was observed in different age groups, more common in young and middle aged individuals. Most of the people in this age group were manual laborers or employees working in the hot humid climate outdoors, getting more exposed to fungal spores. This was in accordance with study by Prasad et al.[7] Otomycosis is commonly a one sided disease, 96% of the confirmed cases had unilateral involvement. Itching was the predominant symptom present in 94% of cases. The most common predisposing factors were use of antibiotic and steroid drops (67%) and trauma to external canal (65%), in the form of inadvertent use of match sticks, or unsterile swabs to clean the external canals.

Many authors attribute the recent increase in incidence of otomycosis to increasing use of antibiotic and steroid ear drops.[8] This was the observation in the current study also. Antibiotic ear drops can cause fungal proliferation due to depletion of the competing bacteria.

Prevalence of diabetes among the confirmed otomycosis cases was 27% which was more or less equal to the prevalence in the total study population (29%). 40 % cases had past history of CSOM. Fungal infection can be the result of prolonged treatment for bacterial otitis externa that alters the flora of the ear canal.

Aspergillus niger which accounts for 40 % of the isolates 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.[9] *Aspergillus flavus, Aspergillus fumigatus* and *Aspergillus tereus* were the other *Aspergillus* species isolated. *Candida* was the next common fungi isolated with predominant being *Candida albicans*. The results were closer to that obtained by Pinto et al in Mangalore.[10] A very rare case of otomycosis with Scedosporium apiospermum was reported by Baumgartner et al.[11] ,such unusual organism were not isolated in the present study.

Mixed fungal infections are reported in literature, but present study did not come across such cases.

The differences in the fungal distribution in different studies may be due to geographic pattern of fungi in different places, but not much epidemiological data is available for comparison from Kerala.

Antifungal susceptibility results were in concordance with the results of Ashish Kumar et al. where all Candida isolates were susceptible to azoles.[2]

Incidence of bacterial coinfection in otomycosis as obtained in the present study was 40% .The most common isolate was *Pseudomonas aeruginosa* (59%) followed by *Staphylococcus aureus* (32%) .

Studies have shown that mixed infections are quite rare as the fungi generally tend to inhibit bacterial flora, [12,13] but coinfections of bacteria and fungi has been recorded by many authors.

Among the isolates of *Pseudomonas aeruginosa* 63% were resistant to Ciprofloxacin. All isolates of *Stapylococcus aureus* were sensitive to Cefoxitin,

The basic principles of management of fungal otitis externa include effective aural toileting, identifying the causative organism, and eliminating it using the appropriate antifungal agent. For those who turned up for follow up, treatment was continued in case of microbiological confirmation of otomycosis for 3 weeks. Oral antibiotics were given in case of mixed infections according to antibiotic sensitivity pattern. It was noted in the present study that in the follow up series patients with 1% Clotrimazole antifungal agent had very good response in terms of signs and symptoms. Among those patients who were on follow up, no recurrences have been noted till the end of study period.

CONCLUSIONS

Otomycosis is a common disease in India where the weather is conducive for the growth of fungi. The *Aspergillus* genera of fungus were the most common etiological agents causing otomycosis among which *Aspergills niger* was the commonest. The disease can be prevented by avoiding unhygienic practices as manipulating the ear canal and inadvertent use of antibiotic topical preparations especially

over the counter medications. Keeping in view the high prevalence of otomycosis, identifying the causative agent and susceptibility testing for proper treatment of otomycosis is the need of the hour.

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