

Clinical and microbiological profile of otomycosis among patients attending a tertiary care center

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Abstract

Background: Otomycosis is a superficial fungal infection involving the external ear. Proper identification of predisposing factors and pathogenic agent is important for the success of the therapy and to prevent recurrence. This study was undertaken to describe the clinical features, predisposing factors and microbiological profile of patients with Otomycosis. **Material and methods:** A descriptive study was undertaken for a period of 11 months in 188 patients. All relevant data were included in the proforma. Fungal debris collected from the external auditory canal was examined with direct microscopy with 10% KOH mount. Fungal culture was done in Sabouraud's Dextrose Agar medium. **Results:** The predominant age group affected with Otomycosis was 30 – 50 years; more common in female population especially in housewives. The disease was mainly unilateral. Main predisposing factors were self-cleaning of ear, water entry into the ear, use of antibiotic/steroid ear drops, use of hearing insert, diabetes mellitus, seborrhoeic dermatitis and history of foreign body ear. Chief presenting complaints were pruritus ear, blocked sensation of ear, ear pain, ear discharge, tinnitus and hard of hearing. Diagnosis was made clinically and confirmed by direct microscopy with KOH mount and fungal culture with Sabouraud's Dextrose Agar. In this study, *Aspergillus* genus was found to be the most common organism (79%) followed by *Candida* (17%). **Conclusion:** Prevention of predisposing factors and maintenance of personal hygiene plays important role in prevention of Otomycosis. From this study it is inferred that otomycosis was common in female population especially in housewives, in the age group of 30 – 50 years and majority had unilateral disease. Maintenance of personal hygiene and prevention of identified major predisposing factors such as self cleaning of ear, water entry into the ear, prolonged use of antibiotic/steroid ear drops and use of hearing insert play important role in avoiding the occurrence of Otomycosis.

Keywords: Otomycosis, Otitis Externa, Fungus, *Aspergillus*, *Candida*, Fungal Culture.

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Introduction

The term Otomycosis is used to describe a superficial diffuse fungal infection of the ear canal. It is more common in hot, humid climates and is often secondary to prolonged treatment with topical antibiotics. Diabetes and immuno-compromised states also predispose to the condition[1]. It is commonly caused by *Aspergillus* species particularly *A.niger*, *A.flavus*, *A.fumigatus* and *Candida* species mainly *C.albicans*, *C.parapsilosis* and *C.tropicalis*. Studies conducted in tropical and subtropical regions found *A.niger* to be the commonest organism causing infection while those conducted in temperate regions showed a slight preponderance of *Candida* species. The prevalence varies with climatic conditions, but warm and humid environment favours the growth and causes fungal proliferation in the human ear canal. In tropical countries, otomycosis has been reported to account for 6% of patients with ear symptoms [2,3]. Predisposing factors are failure in defence mechanisms of the ear (changes in the coating epithelium, changes in pH, qualitative and quantitative changes in the ear wax), bacterial infection, use of hearing insert, self-cleaning of ear, swimming, immunocompromised host and increased use of topical antibiotics/steroid drops. In immunosuppressed individuals, infection may progress to malignant otitis externa, the commonest fungal etiology being *Aspergillus fumigatus*[2,4]. Most patients suffering from otomycosis complain of

severe itching which often progress to pain, ear block, ear discharge, hearing loss and tinnitus. Otoscopic examination reveals fungal debris with erythematous and oedematous canal[5]. The most common finding is a black, grey, green, yellow or white discharge with debris that is often said to resemble wet newspaper. Sometimes debris is seen with visible fungal hyphae[1]. Treatment recommendations include meticulous removal of fungal debris, the use of topical antifungal agents and controlling the predisposing factors to prevent the recurrence of Otomycosis[6]. Eventhough Otomycosis is one of the common conditions encountered in Otolaryngology clinics in India, there are only a few studies have been done. The present study aims to describe the clinical features, predisposing factors and mycological profile of clinically diagnosed cases of Otomycosis.

Material and methods

Study Design: Descriptive study

Study Setting: ENT Department, Government Medical College, Thiruvananthapuram and Central Microbiology Lab, Government Medical College, Thiruvananthapuram, India.

Study Period: November 2017 – September 2018.

Study Population: Patients attending ENT Department clinically diagnosed as Otomycosis during study period.

Clinical diagnosis of Otomycosis was made by the presence of symptoms like pruritus ear, blocked sensation ear, ear discharge, ear pain, tinnitus, hard of hearing (either one of the symptom or combination of these symptoms) and otoscopy revealing masses of hyphae, spore or a curd-like grey/ white discharge[7].

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Inclusion Criteria: Patients with clinical and otoscopic finding suggestive of Otomycosis

Exclusion Criteria: 1. Otitis externa with severely oedematous canal. 2. Patients not willing to give consent.

Sample Size: 188 subjects

Sample size is calculated using the formula $n = 4pq/d^2$

p is taken as 35 (% of *Aspergillus* species in Pontes et al study)[4]

q is 100-p, d is relative precision (20% of p)

Sampling Method: consecutive sampling

Data Collection Method

All the data including personal details were entered into the proforma. Specimen from the external auditory canal were collected from all patients using sterile techniques and sent to Central Microbiology Lab for culture. Microscopic examinations of the debris were done using 10% KOH and Culture done by inoculating microscope in Sabouraud's Dextrose Agar medium. The culture was cultivated at 22°C and 37°C with weekly observation during 30 days. Fungi were identified by traditional methods including macroscopic and microscopic findings. Lactophenol blue preparation were made from the culture and examined microscopically. The slide culture technique was also used when a study of the morphological details of various fungi was necessary for exact identification of the fungus. A descriptive study of 188 patients with Otomycosis over a period of 10 months was undertaken in the ENT department, Government

Medical College, Thiruvananthapuram. Clinical diagnosis of Otomycosis was made by the presence of symptoms like pruritus ear, blocked sensation ear, ear discharge, ear pain, tinnitus, hard of hearing (either one of the symptom or combination of these symptoms) and otoscopy revealing masses of hyphae, spore or a curd-like grey/ white discharge. Patients with clinical and otoscopic findings suggestive of Otomycosis were included and patients with otitis externa with severely edematous canal and patients not willing to give consent were excluded. The sample was calculated to be 185 subjects with a prevalence of 35% and 20% precision. Consecutive sampling method was adopted in this study. All the data including personal details were entered into the proforma. Fungal debris from the external auditory canal was collected from all patients using sterile techniques. Microscopic examinations of the debris were done using 10% KOH mount and fungal culture was done in Sabouraud's Dextrose Agar medium. The culture was cultivated at 22°C and 37°C with weekly observation during 30 days. Fungi were identified by traditional methods including macro-morphological and micro-morphological studies. All microbiological investigations were carried out in the Microbiology Lab, Government Medical College, Thiruvananthapuram.

Results and analysis

188 patients were included in this study.

Table 1: Distribution of the study group according to demographic factors

Gender	Gender	Frequency	Percent
	Male	75	39.9
Female	113	60.1	
Laterality	Right only	83	44.1
	Left only	64	34.0
	Bilateral	41	21.8
Age group	Less than 10 years	16	8.5
	11 – 20 years	20	10.6
	21 – 30 years	23	12.2
	31 – 40 years	40	21.3
	41 – 50 years	36	19.1
	51 – 60 years	31	16.5
	61 – 70 years	14	7.4
	Above 70 years	8	4.3
Total		188	100

The above table shows that the incidence of Otomycosis is higher in females compared to males. Out of 188 patients, 133 (60.1%) were female and 75 (39.9%) were males. Male to female ratio was 0.56:1. Majority of the patients had unilateral disease (78.2%). Right ear was more affected (44.1%) than left (34%). The age of the patients ranges from 8 months to 84 years. Maximum number of patients (76/188) belonged to the age group of 31-50 years - 31-40 years (21.3%) and 41-50 years (19.1%).

Table 2: Predisposing factors of Otomycosis

Predisposing factors	Frequency	Percent
Self-cleaning of ear	121	64.4
Water entry to ear	76	40.4
Antibiotic ear drops	58	30.9
Seborrhoeic dermatitis - scalp	57	30.3
Chronic Otitis Media	49	26.1
Hearing insert	39	20.7
Diabetes Mellitus	35	18.6
Foreign body ear	30	16
Mastoid surgery	7	3.7
Systemic steroid	5	2.7
Onychomycosis	4	2.1
Pulmonary TB	4	2.1
Post Radiotherapy	3	1.6
Post Chemotherapy	2	1.1

Most common predisposing factor was self-cleaning of ear (64.4%) followed by water entry to the ear (40.4%).

Table 3: Symptoms of Otomycosis

Symptoms	Frequency	Percent
Pruritis ear	125	66.5
Ear block	116	61.7
Ear pain	111	59
Ear discharge	77	41
Tinnitus	41	21.8
Hard of hearing	29	15.4

Majority of patients had presented with pruritus ear (66.5%) followed by ear block (61.7%) and ear pain (59%).

Table 4: Aural findings of Otomycosis

Aural findings	Frequency	Percent
Congested TM	5	2.7
Canal Oedema	25	13.3
Perforated TM	49	26.1
Fungal debris	188	100

On examination of the infected ear, fungal debris were found in all the cases. Perforated Tympanic membrane was found in 26.1% (Chronic Otitis Media), and canal oedema was found in 13.3% of the cases.

Table 5: Validity and reliability of KOH and Culture

KOH	Fungal Culture		Total
	Positive	Negative	
Positive	53	2	55
Negative	46	87	133
Total	99	89	188

Sensitivity: 53.54%, Specificity: 97.75%, PPV: 65.41%, Accuracy: 74.47%

KOH mount has got 53.54% sensitivity compared to the culture which is considered as the gold standard investigation for diagnosis of fungal infection. Specificity of KOH mount was 97.75%.

Table 6: Fungal distribution

FUNGUS	No. of cases	Percent
A.niger	48	48.5
A. flavus	31	31.3
Candida	17	17.2
Others	3	3.0
Total	99	100

Aspergillus was the most common species (79.8%) isolated from fungal culture followed by Candida (17.2%). Other species include Pseudoallescheria boydii, Acromonium and Exophiala jeikei.

Discussion

The present study was to find out the clinical and microbiological profile of Otomycosis. The results are compared and correlated with the studies conducted by other. About 188 patients clinically diagnosed to have Otomycosis were included in this study. Among them, 75 were males and 113 were females. The male female ratio was 0.56:1. Similar female preponderance was noticed in the study conducted by Pontes ZBVS et al (103 patients) in which the male female ratio was 0.62:1 [4]. In the studies by Barati B et al⁷ and Venugopal M et al [8] there was female preponderance. But the studies by LS Agarwal et al [9], Ismail MT et al [10], Kazemi A et al [11] showed male preponderance. In this study, age of the patients ranged from 8 months to 84 years. The common age group affected was 30-40 years (21.3%), a finding similar to that of studies by Barati B et al [7] (30.4%) and Kazemi A et al [11] (30.4%). The next predominant age group affected was 41-50 years (19.1%). In the study by Venugopal et al [8], commonest age group involved was 20-40 years (49%) and in the study by Agarwal et al [9], (66.3%) it was 15-35 years. Majority of the patients were house wives (40.9%)

followed by students (18.6%). These data were in agreement with finding by Venugopal M where house wives were 47% and students 22%. Self-cleaning of the ear canal and water entry into the ear were the prominent predisposing factors of Otomycosis in females, whereas in students it was hearing inserts and water entry into the ear due to shower-bath. In the male adult population, majority were manual labourers. In the present study, majority of the patients had unilateral disease (78.2%) and 21.8% of patients had bilateral disease. This result is slightly higher compared to Prasad SC et al [2] & Muglistonet al [12], where bilateral disease was seen in 5% and 11% cases. But it is 40% in Pontes et al⁴ study. In this study, right ear (44.1%) was more commonly affected than left. Similar results were seen in the studies by Coronel JA et al [13] and Pontes et al [4] where right ear involvement was 47.5% and 57% respectively. Predisposing factors for Otomycosis were determined from history and subsequent clinical examination. Majority of the patients gave the history of frequent self-cleaning of the ear (64.4%) with ear bud or pointed objects like match sticks or hair pin. History of frequent water entry into the ear was seen in 41.1% of patients and history of prolonged use of antibiotic ear drops in 26.1% patients. Almost similar results were seen in the study by Jia X et al [14]. In their study, 76.63% patients gave history of frequent scratching of the external ear canal and 24.07% patients had history of using long term antibiotic ear

drops. Other factors associated were use of hearing insert (20.2%) and past history of foreign body ear (16%). Predisposing factors observed by Agarwal et al[9] were self-cleaning of ear, instillation of mustard oil in the ear and the use of ear drops. In a study by Kiakojori et al[15], out of 205 patients, 86% had history of ear manipulation and self cleaning. Pruritus (66.5%) was the most common symptom in this study followed by ear block (61.7%), ear ache (59%), ear discharge (41%), tinnitus (21.8%) and hard of hearing (15.4%). Almost similar results were seen in the study by Kazemi A et al[11], where the most common complaint was pruritus (100%) followed by aural fullness (53%), ear discharge (13%) and ear ache (11%). A definite diagnosis of most fungal diseases requires identification and recovery of the fungus from the culture. Fungal isolation by culture is considered as the gold standard investigation for diagnosing Otomycosis. In this study, 52.7% of samples were found to be positive for fungal culture, which is comparable with the study by Barati B et al[7] where fungal isolation rate from culture was 69%. But it is lower compared to studies by Agarwal et al[9] (88.6%) and Kazemi et al[11] (92%). But it is higher compared to the study by Ismail T et al[10] (23.4%). Culture requires several days to weeks for the organism to produce enough growth and sporulation for identification. Tentative or preliminary diagnosis can often be made by detecting the fungal elements present in the clinical specimen. Treatment with KOH can clear cells or debris from the specimen (KOH mount). A well trained person with knowledge of fungal morphology can often provide definite diagnosis by this method or at least provide a tentative diagnosis days or weeks before culture confirmation, so that treatment can be started earlier. In this study, KOH mount was positive in 55 out of 188 cases. KOH mount was positive in 53 out of 99 culture positive cases (53.5%). The sensitivity of direct microscopic examination with KOH mount is 53.54% in this study. It is comparable with Coronel JA et al[13] (60%). But in the study by Gokale S et al[16], sensitivity was 92.05%. The specificity of KOH mount in this study is 97.75%, where in Gokale S et al found 73.33% specificity.

Conclusion

From this study it is inferred that Otomycosis is mainly unilateral, more common in female population in the age group of 30 – 50 years. Self cleaning of ear, water entry in to the ear, long term use of antibiotic/ steroid eardrops and hearing inserts were the predisposing factors of the disease which can curbed to prevent Otomycosis.

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