

ASSESSMENT OF RISK FACTORS AND IDENTIFICATION OF FUNGAL AND BACTERIAL AGENTS IN OTOMYCOSIS AT RURAL COMMUNITY ATTENDING A TERTIARY CARE HOSPITAL

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ABSTRACT

Introduction: Otomycosis is a sub-acute or a chronic superficial fungal infection of the external auditory canal. It is one of the frequently encountered fungal infections of the ear. The prevalence of otomycosis is higher in tropical and subtropical climates zones. This study was planned to identify the most common organisms involved in otomycosis, clinical features and various predisposing factors of the disease in south India.

Materials and Methods: Prospective study on 187 confirmed cases of Otomycosis who attended the ENT OPD. A predesigned proforma was administered to the participants to know the clinical symptoms, predisposing factors, sociodemographic details, and comorbid conditions. Clinical findings in both ears were recorded.

Results: The majority of the study population (31%) were in the age group of 31-40. Around 47% of the study population had a history of manipulation of the external auditory canal. Around 32 % gave the history of the installation of either antibiotic drops or steroid drops into the ear. Around 97% of the study population had blocked, 83% had pain and 77 % had itching. The discharge was present in 47% of the study population. Female prevalence was high and more than 88% was unilateral. Aspergillus species and Candida species were more commonly present in the fungal culture. Around 88% had a bacterial infection along with fungal growth.

Conclusion: the diagnosis of Otomycosis must be considered for all cases of ear discharge for prompt and accurate treatment and to save time and suffering.

KEY WORDS: Aspergillus species, bacterial infection, Candida species, and Otomycosis.

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INTRODUCTION

Otomycosis is a sub-acute or a chronic superficial fungal infection of the external auditory canal. It is one of the frequently encountered fungal infections of the ear [1]. Disease is world-wide in distribution. Its prevalence has been quoted to be as high as 9% among patients who present with signs and symptoms of otitis externa [1-4]. The prevalence of otomycosis is higher in tropical and subtropical climates zones [4]. The flora found in the EAC is made up of a

series of microorganisms viz. genus Aspergillus or yeast-like fungi, Candida spp., Staphylococcus aureus, Staphylococcus epidermidis, Streptococcus species, Micrococcus, Corynebacterium species, Bacillus species, Pseudomonas aeruginosa, Escherichia coli, Haemophilus influenzae, Moraxella catarrhalis, etc. Commensal flora is not pathogenic as long as the balance between bacteria and fungi is maintained in the external auditory canal [5].

It is still not clear if fungi are the true primary infective agents or mere colonization species as a result of compromised local host immunity secondary to bacterial infection. Various predisposing factors include a humid climate, presence of cerumen, instrumentation of the ear, increased use of topical antibiotics/steroid preparations, immune-compromised host [6,7]. *Aspergillus niger* and *Candida albicans* are more common organisms with nearly sixty-one fungal species being involved in external fungal otitis [8-11]. Otomycosis presents with nonspecific symptoms like pruritis, discomfort, and pain in the ear, aural fullness, tinnitus, hearing impairment, and sometimes discharge, and also recurrence is common [12].

This study was planned to be conducted in a hot and humid coastal city of South India, to identify the most common organisms involved in otomycosis, clinical features and various predisposing factors of the disease.

MATERIALS AND METHODS

187 confirmed cases of Otomycosis who attended the ENT OPD Viswabharathi medical college, Kurnool, A.P. between October 2016 and October 2019 were included in the study after obtaining written informed consent. We excluded patients who did not give consent and those who had an uncontrolled systemic illness (Diabetes mellitus, Hypertension, etc) and patients with suspected malignancies and infiltrating tumors. A predesigned proforma was administered to the participants to know the clinical symptoms, predisposing factors, sociodemographic details, and comorbid conditions. Clinical findings in both ears were recorded. 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 agar medium. No transport media was used for swabs. All swabs taken were sent to the microbiology department immediately. Microscopic examination with 10% KOH was done and the other swab was inoculated into the SDA medium. The presence of fungal elements in KOH mount was noted and it was confirmed by growth on Sabouraud's culture medium. The culture was

considered sterile if there is no growth in the culture medium even after 4 weeks. If growth was seen on the SDA medium, the morphology of fungal isolates was further studied by using the LACTO PHENOL COTTON BLUE (LPCB). Presumptive identification of *Candida albicans* was done by using GERM TUBE TEST. The suspected strain of *Candida* was further grown on CORN-MEAL AGAR.

RESULTS

Table 1: Epidemiological Characteristics of patients with positive fungi-culture.

Epidemiological characteristics	Frequency (n=187)	Percentage
Sex		
Male	76	40.64
Female	111	59.36
Age group		
0-10	2	1.06
10-20	15	8.02
21-30	43	23
31-40	58	31.02
41-50	32	17.11
51-60	18	9.63
>60	19	10.16
Pre disposing factors		
Swimming	15	8.02
Ear cleaning/oil installation	88	47.06
Antibiotic drops	39	20.86
Steroid drops	21	11.22
Trauma	2	1.06
Nothing suggestive	22	11.76

Table 1 shows that around sixty percent of the study population were females and around 40 % of the study population were males. The majority of the study population (31%) were in the age group of 31-40, while around 23 % of the study population was in the age group of 21-30. The lowest incidence of Otomycosis was seen in the age group of fewer than ten years.

Around 47% of the study population revealed the history of manipulation of the external auditory canal with a stick, feather, hairpin, etc. Around 32 % gave the history of the installation of either antibiotic drops or steroid drops into the ear.

Table 2: Distribution of patients by otoscopic appearance, clinical symptomatology and localization of fungal otitis.

Clinical symptomatology	Present		Absent	
	Frequency	Percentage	Frequency	Percentage
Itching(pruritis)	145	77.54	42	22.46
Blocked ears	181	96.79	6	3.21
Otalgia	156	83.42	31	16.58
Otorrhoea	88	47.05	101	52.95
Tinnitus	7	3.74	180	96.26
Headache	15	8.02	172	91.98

Around 97% of the study population had blocked ear while they attended the OPD. Around 83% had pain and 77 % had itching. The discharge was present in 47% of the study population. The headache was present in 8% of the study population while tinnitus was present in only 4% of the study population (Table 2).

Table 3: Distribution of study population according to the laterality of otomycosis.

Laterality of otomycosis	Frequency	Percentage
Left	96	51.33
Right	70	37.43
Bilateral	21	11.24

Table 3 shows that around 89% had unilateral Otomycosis while around 11 % had bilateral Otomycosis. Of those who had a unilateral infection, 58 % had on the left side while the rest 42 % had on the right ear.

Table 4: Distribution of study population according to the isolated fungal species.

	Frequency	Percentage
Aspergillus niger	34	18.18
Aspergillus fumigatus	29	15.52
Aspergillus flavus	25	13.37
Aspergillus terreus	6	3.21
Rhizopus	9	4.81
Aspergillus nidulans	2	1.06
Candida albicans	38	20.31
Candida non-albicans (other yeasts)	12	6.42
Penicillium	8	4.25
Mucor species	9	4.82
Mixed infection	15	8.02

Around 20 % of the infections were due to candida species while around 18 % were due to Aspergillus niger. Another 15 % was due to Aspergillus fumigatus and around 13% were due to Aspergillus flavus. 8 % of the study population had more than one fungal organism (Table 4).

Table 5: Distribution of bacterial species in patients with otomycosis.

	Frequency	Percentage
Staphylococcus Aureus	45	24.06
Pseudomonas aeruginosa	32	17.11
E.coli	43	23
Klebsiella aerogenes	6	3.2
Proteus Vulgaris	3	1.61
Proteus mirabilis	5	2.67
Coagulase-negative staphylococcus	22	11.77
Mixed	7	3.74
None	24	12.83

Around 24 % of the study population had staphylococcal aureus infection while around 23 % had E Coli infection. Around 17% had pseudomonas Aeruginosa, around 12 % had coagulase-negative staphylococcus. Less than 4 % had a mixed infection while 13 % had no bacterial infection (Table 5).

DISCUSSION

Otomycosis is a superficial mycotic infection of EAC, highly prevalent in tropical and subtropical regions of the world. A high degree of humidity and heat, dusty environment, high density of population and suspended dust particles in the air are the reasons for high incidence. Other contributing factors might be such habits as cleaning the ear with a match stick, contaminated fingertips, use of hairpins, birds feather 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. Fungi found abundantly on decaying plant matter, can be blown in the wind with soil particles and carried away by water vapors in the rainy season. This correlates well with a higher rate of fungal infections during the rainy season [1,5]. Fructueux et al in their study demonstrated the importance

of hot as a growth factor of fungi by confirming that the growth of fungi is high at 37°C [6].

In our study also we found that many cases occurred during the rainy season as reported by Surinder Singh et al [4], Priti et al [5], Fructex et al [6], Prakash et al [13], Rathnesh et al [15], Vaidyanathan et al [18] Tabindah et al [21] Kaur et al [22] in India. The presence of a more humid climate during the rainy season promotes the growth of the fungi. There will be a dilution of ear wax which reduces its protective sleeve property are the reasons attributed to more incidence during rainy seasons. Hence dormant spores of fungi lying in the canal start multiplying under these favorable conditions of optimum temperatures and humidity [1]. Barati et al [19] in their study in Iran has found that more cases occurred during Autumn. The presence of more dry dusty winds has been attributed to the author.

Also, around 47% of the study population revealed the history of manipulation of the external auditory canal with a stick, feather, hairpin, etc. Around 32 % gave the history of the installation of either antibiotic drops or steroid drops into the ear. Similar results were obtained from the study done by Prakash et al [13], Rathnesh et al [15] and Vaidyanathan et al [18] in India. Vaidyanathan et al [18] in his study has mentioned that the use of oil into ears was the main cause of otomycosis.

Around sixty percent of the study population were females and around 40 % of the study population were males. The female to male ratio was 1.46:1. Similar results were found in studies done by many authors [1,3,4,6,14,17,19]. There is a disagreement from these findings by studies done by Priti et al [5], Mariraj et al [7], Prakash et al [13], Satish et al [20] and Kaur et al [22].

The majority of the study population (31%) were in the age group of 31-40, while around 23 % of the study population was in the age group of 21-30. overall 54 % of the study population was in the age group of 20-40. Otomycosis is the disease of young age and will occur in a productive age group. More sweating during productive work is the main reason attributed to the cause. Similar results were found in many studies [1,4-6,12,19] Mariraj et al [7] and

Visweswara Rao et al [14] found that the prevalence was higher between 11 and 30 years.

Around 97% of the study population had blocked ear while they attended the OPD. Around 83% had pain and 77 % had itching. The discharge was present in 47% of the study population. Headache was present in 8% of the study population while tinnitus was present in only 4% of the study population (table 2). Similar results were obtained by a study done by other authors [5,6,13,16,17,20] Tinnitus was only 4 % in our study compared to a study done by Vaidyanathan et al [18] in south India where he found that tinnitus was around 40%.

Itching in the ear was the commonest symptom in 89% of the patients. The fungus growth mixed with the epithelial debris and cerumen forms a characteristic of the mycotic plug. This gives rise to the symptom of blocked ear [16]. The presence of excessive wax in the inner external auditory canal may cause a sensation of blocked ear and will also cause itching and itching tends to create scratches in the EAC on which the fungal spores which are present on the ear cavity may germinate and cause otomycosis [5].

Table 3 shows that around 89% had unilateral Otomycosis while around 11 % had bilateral Otomycosis. Of those who had a unilateral infection, 58 % had on the left side while the rest 42 % had on the right ear. Unilateral otomycosis was high in most of the studies [1,3,5,13,20,21].

Suharshi et al and Prakash et al showed that left-sided otomycosis was common while Priti et al [5] in her study has mentioned that right ear otomycosis was more common.

Around 20 % of the infections were due to candida species while around 18 % were due to *Aspergillus niger*. Another 15 % was due to *Aspergillus fumigatus* and around 13% were due to *Aspergillus flavus*. 8 % of the study population had more than one fungal organism (Table 4). Similar results were obtained by many other studies [3-5,12,14-20].

Around 24 % of the study population had staphylococcal aureus infection while around 23 % had E Coli infection. Around 17% had *Pseudomonas Aeruginosa*, around 12 % had coagulase-negative staphylococcus. Less than 4 % had a mixed infection while 13 % had no bacterial

infection (Table 5). Similar results were obtained by studies done by Prakash et al [13] and Dinesh Singh et al [16]. Around 88% of the study population have superadded bacterial infection along with positive fungal growth in culture. This leaves us in a dilemma if fungal infection is a superadded bacterial infection or it occurs alone [6,7].

CONCLUSION

Chronic infective disorders of the ear remain a common source of misery for patients. Otomycosis is a common condition for ear discharge in humid and hot climate zones. Prompt diagnosis and appropriate initiation of treatment will arrest the progress of disease and prevent unnecessary use of antibiotics. Moreover, the alleviation of suffering by the infected persons also reduces at the earliest.

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