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Original article

Otomycosis : A Clinico Mycological Study

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ABSTRACT

Introduction: Otomycosis is a common fungal infection of the ear that is seen in the tropical and sub tropical regions of the world. **Objective:** The aim of this study was to determine the prevalence of fungal agents and predisposing factors involved in otomycosis. **Methods:** Samples from the 103 clinically suspected patients of otomycosis were collected between July - 2011 to June - 2012 and subjected to mycological diagnosis [direct microscopic examination and culture]. **Results:** Otomycosis was diagnosed in 85% of the patients. Swimming, use of oils and eardrops were the most common predisponsing factors. Otalgia and pruritus were the symptoms commonly encountered. The fungi isolated were Aspergillus niger, A fumigatus, A flavus, C. albicans, non albicans candida, Mucor and penicillium. **Conclusion:** Otomycosis is very common in India, clinical examination and mycological studies are important for diagnosis and effective treatment of patients.

KEYWORDS: Aspergillus, Candida, Otomycosis.

INTRODUCTION

Otomycosis [Gr.oto = ear + mycosis = fungal infection] simply refers to a superficial fungal infection of the external auditory canal, however the disease may occur in the middle ear if the tympanic membrane is perforated[1,2,3]. The epidemiology of otomycosis is global; however, the hot, humid and dusty environment of the tropics and subtropics makes otomycosis more prevalent in these regions[4].It is mainly characterized by pruritus, otalgia, aural fullness, hearing impairment and tinnitus[1-4].

The disease is worldwide in distribution. It is estimated that approximately 5-25% of the total cases of otitis externa are due to otomycosis[5]. This is more prevalent in warm, humid climate between 2nd and 3rd decades of life among individuals belonging to lower socioeconomic status keeping poor hygiene. Various predisposing factors have been proposed for otomycosis, including immunocompromised host, steroid usage, trauma, swimming, use of oils, instrumentation of ear, fungal infection elsewhere

in the body like dermatomycosis and malnutrition in children[1-7]. Wide spectrum of fungal agents such as Aspergillus, Penicillium, Mucor, Rhizopus, Scopulariopsis, Absidia and Candida are involved, species of Aspergillus and Candida are the most common etiological agents.

Despite the fact that our climatic condition may encourage otomycosis, literature search reveals that not much work has been carried out on various aspects of otomycosis. Keeping in view the high prevalence of otomycosis in hot, humid and dusty areas, the study was carried out on clinical features,predisposing factors and fungal agents involved in otomycosis in Bagalkot district in north Karnataka, India.

MATERIALS AND METHODS

Study group: The samples were obtained from 105 patients attending the otorhinolaryngology clinic of HSK hospital Bagalkot between July 2011 to June 2012 with the clinical diagnosis of otomycosis. The clinical diagnosis was made based on the following Symptoms pruritus, hearing loss, otalgia, ear fullness, otorrhoea, and tinnitus.

Collection of Sample: The samples were collected from the patients with the help of a sterile cotton Swab from the external auditory canal or a sterile scalpel blade.

Mycological Investigation:

1.Direct Microscopy: For detection of fungal elements using KOH [10%] preparation Gram's Stain *2.Culture:* Samples were inoculated on Sabourand's Dextrose agar [SDA] with and without antibiotics and incubated at 25^0c and 37^0c for a minimum of 4 weeks. Identification is done by lactophenol cotton blue preparation and Gram's Stain. *3. Slide Culture:* Done for differentiation of morphology of different Species. *4.Biotyping :* Done by Carbohydrate fermentation tests and chlamydospore formation on corn meal agar.

RESULTS

A total of 103 patients with otomycosis were included in the study. The majority of the patients, 52 [50%] showing Symptoms of otomycosis visited the clinic between july to November [i.e. rainy season] followed by 32 [31%] in summer and minimum 19 [18%] in winter season. The common symptoms presenting solely or in combination of each other encountered in the study group have been summarized in Table:1. Otalgia [64%] was the most common complaint encountered followed by pruritis [53%], Ear discharge [20%], hearing impairment [15%], headache [10%] and fullness of ear [7%].

Table 1: Symptomatology of Otomycosis. N = 103

Symptoms	Incidence
Aural pruritus	55 [53%]
Otalgia	66 [64%]
Ear discharge	21 [20%]
Headache	11 [10%]
Hearing impairment	16 [15%]
Feeling of aural blockage	07 [6%]

There were 59 [57%] males and 44 females [42%] in our study. The age ranged from 2-70 years. The most prevalent age group was 21-30 age group [32%] followed by 31-40 [22.3%] and 41-56 age group [97%] [Table: 2] .In the study group, only 92 Samples were positive for the presence of fungal elements of which 81 [88%] Samples were both KOH preparation and culture positive, where as 7 samples were positive only by culture and 4 samples were positive only by KOH preparation. Out of 103 samples 11 were negative both by microscopy and culture [Table:3]. True positives were 81 and true negatives were 11 by KOH preparation when compared to culture (Gold standard). Sensitivity (95% CI) and Specificity(95% CI) of KOH preparation was 92.05 (84.3-96.7) and 73.33 (44.9-92.2) respectively.

Table 2: Age and sex distribution of the Otomycosis patients

Age in Years	Male	Female	Total
0-10	01	01	02
11-20	03	08	11
21-30	19	14	33
31-40	13	10	23
41-50	14	04	18
51-60	05	05	10
61-70	04	02	06
Total	**59**	**44**	**103 [100%]**

Table 3: Sensitivity and specificity of KOH preparation when compared to Culture (Gold standard)

Positivity	Culture positive	Culture negative	Total
KOH Positive	81	04	85
KOH Negative	07	11	18
Total	88	15	103

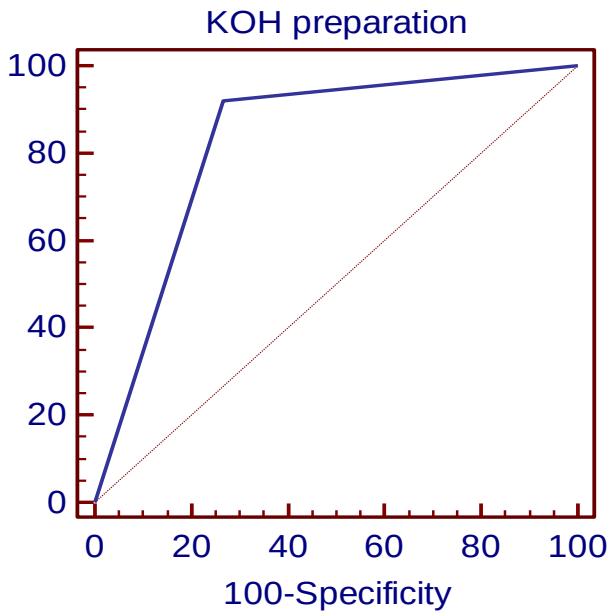
Sensitivity (95% confidence interval) : 92.05(84.3-96.7), Specificity (95% confidence interval) : 73.33(44.9-92.2)

Receiver operating characteristic (ROC) curve was constructed to know the diagnostic ability of KOH preparation. The area under the curve was found to be 0.824 with 95% CI of 0.74-0.894, which is statistically highly significant $p<0.0001$ [Fig: 1].

Predisposing factors for the development of otomycosis were determined by history elicitation and subsequent examination. 50% of the patients gave history of swimming in canals, ponds, 43% patients were having the habit of putting oil in the ear, 23% gave h/o using ear drops for pain and 17% of patients showed concomitant dermatomycosis [Table: 4].

A total of 88 out of 103 Samples were positive for fungal growth by culture. Out of 88 positive Samples, mixed infection was seen in 7 Samples. The most common fungal isolates belonged to the species of Aspergillus accounting for 78 [82%] of 95 fungal isolates. Aspergillus niger 36 [37%] was the most common isolate followed by Aspergillus flavus 12 [12%]. Next common group was candida species, accounting for 12 [13%] of total isolates, 9 isolates were candida albicans and 3 were non albicans candida. Other isolates found in our study were mucor 3 [3%] and pencillium 2 [2%][Table:5].

Fig 1: ROC curve showing the diagnostic ability of KOH preparation.



Area under the curve (95% confidence interval) : 0.827(0.74-0.894) , P value <0.0001 (highly significant)

Table 4: Predisposing factors for Otomycosis among culture positive cases [n=88]

Factors	No. of patients	Percentage %
Excessive exposure to water	44	50.00
Use of Oil	38	43.18
Use of Eardrops	21	23.86
Dermatomycosis	15	17.04
Trauma	05	05.68
Diabetes	03	03.40

Table 5: Spectrum of Fungal isolates from Otomycosis

Fungal Species	No. of patients	Percentage %
Aspergillus niger	36	37.89
Aspergillus fumigates	30	31.57
Aspergillus flavus	12	12.63
Candida albicans	09	09.47
Non albicaus candida	03	03.15
Mucor	03	03.15
Pencillium	02	02.10

DISCUSSION

Otomycosis is a recognized clinical entity in the tropical region. It is common in India. The high incidence can be attributed to the high degree of humidity and heat, the dusty environment and the fact that a large proportion of the population is made up of outdoor labourers and persons of low socioeconomic status[2,10].The habit of cleaning the ear with feathers, match stick and contaminated finger tips is known to encourage the inoculation and growth of the spores of fungus on the moist external auditory canal especially in patient applying oil to the area [2,7,9,10]. Otalgia and pruritus were the most common symptom followed by discharge, Hearing impairment, headache and fullness of ear, confirming the findings of earlier studies[1,2,5,7,10,11].

All age groups seem to be affected, although the occurrance appears to be more in the early adulthood with 71% of the cases occurring between the age 20 and 50 years which is similar to the findings from previous studies[1,2,7,10]. In our study, we observed that otomycosis was more common in young men, which is in accordance with the findings of other studies[7,10]. Males are more exposed to fungal spores because they generally spend more time outdoors than others do. It is well known that the outdoor air is an important vector for locally prevalent fungal flora. Our observation that otomycosis was unilateral and showed no preference for either side confirms the findings of other authors and supports the idea that the disease is not highly infectous [10,12].

In our study 88 patients were proven to be suffering with otomycosis by culture growth. It accounts for 85% of patients suspected to be having otomycosis were confirmed in our study. It is slightly higher than other studies [5,10,11,13]. It may be because our ENT surgeons were very competent in making clinical diagnosis and also because of quick processing of the samples in microbiology laboratory. In this study 81 samples were KOH preparation and culture positive, 07 samples were positive by culture and negative by KOH preparation. Four samples did not show growth on media, although was positive for fungal elements in KOH preparation, probably because of delay in processing of these Samples and stringent requirement for some essential nutrient. The p value <0.0001 was found to be statistically highly significant. KOH preparation has very good sensitivity in detecting the fungal elements in comparision to culture which is taken as the Gold standard.

Predisposing factors determined in this study include use of oils and eardrops, swimming, diabetes, trauma and fungal infection else where in the body. Swimming in ponds, river was the most common predisposing factor in our study, followed by use of oils and eardrops, 17% of patients had determatomycosis. The majority of the fungal pathogens isolated from the ear swabs belonged to the taxon Aspergillus followed by candida sp, Mucor and pencillium. Aspergillus spp are common in airborne dust and their heavy growth is added by earwax. Further more the P^H level in the normal ear canal is on the acidic side and the common pathogenic aspergilli experience optimal growth at a P^H range of 5 to 7. The pathogenic fungi involved in otomycosis in this agriculturally dominated part of India, are similar to Iran, Turkey and other Mediterranean countries where the majority of the pathogenic fungi involved belonged to Aspergilli. Aspergillus niger was the commonest fungi isolated in our study, in accordance with the other studies [1,2,5,10,11,12]. Several studies reported A fumigatus as the commonest pathogen isolated because it produces a exotoxin which has the ability to alter skin resistance. Variation found in our study might be attributable to differences in population groups, habits, climatic conditions and methods.

Prevalence of otomycosis during moist and humid conditions has been reported by other study [11]. Our study reveals higher incidence in rainy season

followed by summer and minimal in winter season. Moist and humid conditions coupled with suitable temperature facilitate fungal growth, are the factors responsible for the higher incidence of otomycosis in this part of the country.

Clinical suspicion of otomycosis can prevent unnecessary use of antibiotics and potent steroids for prolonged periods, which might lead to the alteration of the local flora of the ear and leads to the morbidity like hearing loss. Keeping in view the high prevalence of otomycosis in India, Critical diagnosis of the causative agent and susceptibility testing for proper treatment of otomycosis is the need of the hour.

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