



Study of Etiological Factors, Mycological Profile and Treatment Outcome of Otomycosis

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 25 Nov 2023	<p><i>Otomycosis is a common condition encountered in ENT practice. Though it is not a serious condition it causes a lot of misery to the patient. Though there are many studies on various aspects about this disease, there are not many studies from this part of the country. Materials and Methods: 75 patients attending ENT OPD and diagnosed to have otomycosis were included in the study. Two aural swabs or whenever possible otomycotic debris scooped out using Jobson –Horne probe was obtained. From one swab, wet mount preparation in 10% KOH (potassium hydroxide) solution and smear for Grams stain were prepared. The second swab / otomycotic debris was directly inoculated into SDA (sabourad's dextrose agar) medium. Results: Mycological analysis of the swab from external auditory canal has shown that Aspergillus species was the most common fungus isolated followed by Candida species. All patients were treated with regular suction clearance and 1% clotrimazole ear drops. Conclusion: Simple measures like avoiding usage of ear buds/ unsterile material will help in prevention of otomycosis. 1% clotrimazole is effective in achieving complete mycological cure in otomycosis. Regular long term follow-up is required to effectively treat otomycosis.</i></p>
CC License CC-BY-NC-SA 4.0	<p>Keywords: External auditory canal, Otomycosis, Aspergillus, Candida, 1% Clotrimazole</p>

1. Introduction

Chronic infective disorders of the ear remain a common source of misery for the patients. Although not life threatening, otomycosis can be a frustrating condition for both the patient and the treating doctor due to the requirement for a long term treatment, regular follow up and its tendency for recurrence.

Otomycosis is a chronic superficial fungal infection that affects the deeper ear canal skin and the tympanic membrane. Unless manifested in the classical way, they tend to be misdiagnosed. Otomycosis is commonly associated with increased ear canal moisture, warmth and treatment of a bacterial infection with long term topical antibiotic therapy, which can lead to depletion of the protective cerumen layer, maceration of underlying skin, increase in ambient pH and a modification of the microbial flora of external auditory canal, thereby selecting for untreated organisms. A medical history of diabetes and / or an immunocompromised state may be present [1].

There are many studies to understand the common predisposing factors and causative fungi in otomycosis throughout the world. The most common organisms are Candida and Aspergillus species [2].

In a study conducted in Ludhiana, India, it was found that in patients with Chronic suppurative otitis media (CSOM), incidence of fungal infection was 16 % in untreated group, 24 % in patients treated with antibiotic drops and 32.5 in patients treated with antibiotics and steroids [3].

Study by Kaur R and others in New Delhi [4] showed 74.7 % of samples from clinically diagnosed otomycosis were positive. Aspergillus fumigatus (41.1 %) was commonest. Aspergillus niger in (36.9 %) and Candida was seen in 8.2 %.

Chennai, India being a very humid place otomycosis is a common condition here. This study has tried to find the main predisposing factors and causative fungi in this region. In addition the effectiveness of 1% clotrimazole ear drops has also been studied.

2. Materials and Methods

A total of 75 patients were included in the study. A detailed history and examination were done and recorded.

Inclusion Criteria

All patients diagnosed as otomycosis based on the following criteria were included in the study.

- (a) Symptoms – Itching, Pain, fullness in the ear
- (b) Signs – Evidence of otomycosis on otoscopy – wet mycelial mat, dry mycelial mat, wet blotting paper appearance (or) creamy white debris.
- (c) Cases of otitis externa which failed to respond to appropriate treatment in 2 weeks duration.
- (d) Positive fungal culture from the aural debris.

Exclusion Criteria

All patients with diabetes and any other immuno- compromised states and those on topical antifungal drops were excluded from the study.

Isolation of fungi

After a clinical diagnosis of otomycosis was made, two aural swabs or whenever possible otomycotic debris scooped out using Jobson –Horne probe were obtained. From one swab, wet mount preparation in 10% KOH (potassium hydroxide) solution and smear for Grams stain were prepared.

The second swab / otomycotic debris was directly inoculated into SDA (sabouraud's dextrose agar) medium. The fungal species were identified by standard procedure.

After taking the swabs, the external auditory canal was cleaned by microscopic suction toilet till it was cleared off all debris. Suction was done in all patients twice a week till clinical cure (no evidence of any otomycotic debris on otoendoscopy) and once a week or whenever indicated thereafter till mycological cure (culture negativity).

All patients were advised

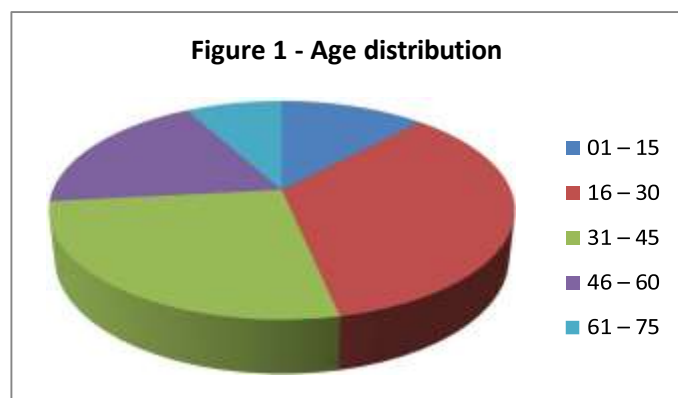
1. To keep the ear dry
2. Not to clean the ear themselves
3. To stop topical antibiotic / antibiotic+ steroid drops.
4. To instill 1% clotrimazole ear drops 3 times a day till further advise
5. Regular follow up at ENT OPD.

The culture was repeated at the end of 3 weeks. In those patients, where a positive culture was obtained, treatment was continued for another 1 week and culture was repeated. All patients were followed up till complete mycological clearance.

3. Results and Discussion

Age Distribution

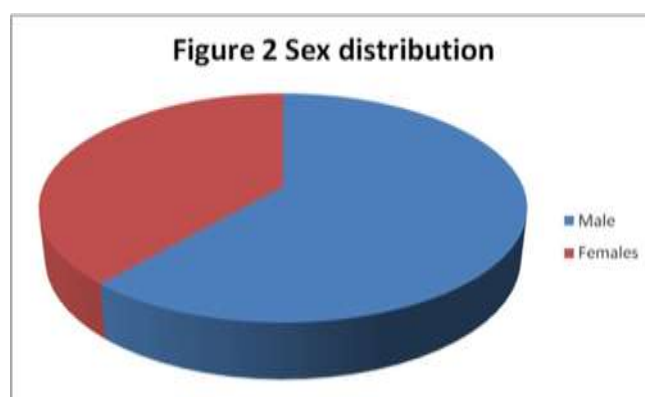
The age distribution is shown in Figure 1. It can be noted that maximum number of patients are in the age group 16-30. The youngest patient in this study was 2 ½ yrs old male child who had no previous history of otorrhoea, but the mother had tried cleaning the child's ear every day after bath with buds made indigenously. The oldest patient was 73 yrs old male with no previous history of CSOM or diabetes mellitus and he had been using canal insert (mould) type of hearing aid since 6 yrs. The study reveals that otomycosis was more common among adolescent and middle aged individuals. The age incidence is in accordance with studies of Mohanty and associates [5] - more prevalent in 2nd and 3rd decade of life, Khurana and associates [3] -3rd and 4th decade, Chander J and others- 21 – 30 yrs [6], Talwar and others-20- 27 yrs [7].



Sex Distribution

The sex distribution is shown in Figure 2. In this study, the incidence of otomycosis is more in males. This is in correlation with studies conducted by Khurana and others [3], Mohanty and associates [5], Talwar and others [7]. However studies done by Chander J and others [6] and Nwabuisi and Ologe [8] showed equal incidence in males and females.

The study done in Turkey by K Murat Ozcan and others [9] showed higher incidence in females (80.5 %). However this has been attributed to the wearing of traditional head covering by females in turkey.



Laterality Distribution

The distribution of sides is shown in Table 1. Otomycosis in general is a unilateral disease, which is evident from this study. Maximum number of patients has been noted to have otomycosis of left ear. The predominance of left ear otomycosis has been observed in studies done by Nwabuisi and Ologe [8] in Nigeria and also by K Murat Ozcan and others [9] in Turkey.

TABLE 1: Laterality distribution.

Side	Number of Patients
Right	31
Left	36
Bilateral (B/L)	08

Presenting Complaint

The most common presenting symptoms were pain and Itching. This is in correlation with studies conducted by Mohanty et al [5] which showed pain in 94.4 %, and Itching in 92.5 % patients. Also studies by Nwabuisi and associates [8] , Kombilla et al [10] show otalgia and pruritis as the most common symptoms. However studies by K Murat Ozcan et al in Turkey [9] showed different observations - Pain in 54 % and Itching in 95.4 %.

Table 2: Presenting Complaints.

Complaints	Number of ears
Pain	66
Itching	63
Fullness	47
Discharge	37
Tinnitus	28

Predisposing Factors

The results are shown in Table 3. Use of the unsterile materials, which varied from safety pins, hairpins, matchsticks, pens, and refills to unsterile buds, was most common predisposing factor. Chronic suppurative otitis media (CSOM) is the second common predisposing factor. Water entering the ear while taking bath, swimming or by syringing for wax removal was the third common factor.

These results are in accordance with study done by Mohanty et al [5], which showed ear cleaning with sticks in 75.9% as the predisposing factor and study by K Murat Ozcan et al [9] which showed only 27.6 % to have had swimming in pool / sea and 23 % to have had a Spa- bath prior to infection.

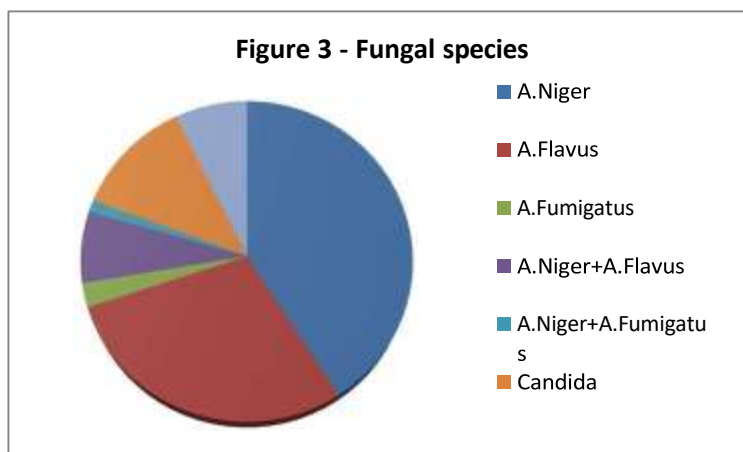
TABLE 3: Predisposing Factors

Factors	Number of ears
Buds/Unsterile Material	65
CSOM	30
Water Entering the ear canal/ swimming / syringing	23
Narrow EAC	21
Traumatic Perforation	18
Previous Surgery (MRM, Tympanoplasty)	05

Fungal Species

Fungi isolated in this study are shown in Figure 3. Aspergillus Niger has been observed as the most common isolate in various studies by Mohanty et al [5], Chander J and others [6], Nwabuisi and Ologe [8], Ozcan and others [9], Kombilla et al [10], Tisner J and associates [11] and Oliveri S et al [12].

However studies by Kurnatowzki and Filipiak [13] showed Candida as the commoner isolate. It has been observed that Candida is commoner in temperate climate. Aspergillus species has been isolated from the air and house dust. Beany and Broughton [14] found that Aspergillus species produce antibiotics, which eliminate bacterial competitors. This could be attributed to the fact that Aspergillus is commoner than candida in the isolates.



Treatment and Response

The treatment and response are shown in Table 4. In this study, 1 % clotrimazole was used as the topical therapy after thorough suction clearance of ear canal. 80 out of 83 ears were cured (culture negative) at the end of 4 weeks. The three patients who showed positive culture at the end of 4 weeks had poor compliance and were not regular in follow-up. Even in these three ears mycological cure could be achieved with continued treatment for two more weeks.

These results correlate well with the results of Chander J and associates [6] and Mohanty et al [5] who showed effectiveness of clotrimazole and miconazole topical applications respectively in the treatment of otomycosis. Stern JC and associates [15] showed 1 % clotrimazole to be very effective in otomycosis in vitro.

TABLE 4: Treatment and Response

Time period	Number of ears
03 Weeks	72
04 Weeks	08
06 Weeks	03

Otomycosis contributes about 10% of all otitis externa. Conley and others have noted that ear canal provides all growth requirements for fungi [2]. Trauma to the canal skin is one of the predisposing factors to otomycosis because it helps in fungal colonization as well as Sub-epidermal invasion. Presence of water in the deep meatus, macerates the canal skin and alters the pH of canal in favour of fungal colonization. Senturia and associates [16] have described several contributory factors in addition to effects of heat, humidity and trauma. They found that absence of protective coating of cerumen, neutralization or alkalization of the canal impairs the natural ability to ward off bacterial or fungal contamination.

Oliveri and associates [12] and Mugliston and O' Donoghue [17] had noted in their study that there has been no significant increase in the incidence of otomycosis since the wide spread use of topical preparations began, over 20 years ago. From this study it can be understood that self induced trauma is one of the common predisposing factors which can be easily avoided.

As many as 61 different species of fungi have been identified in the clinical disease process in related studies but the most common organisms are Candida and Aspergillus species. Various studies reveal that distribution of fungi differs from temperate to tropical climate. However Candida and Aspergillus species are the predominant ones. In the present study aspergillus followed by candida remain the common isolates.

The effectiveness of topical broad spectrum antifungal is well documented [5, 8, 15, 18]. Murat Ozcan and others [9] had shown that regular suction cleaning with 1% Tioconazole Cream local application in addition to 4% boric acid solution in stubborn cases was effective in the treatment even in mixed infections.

The role of systemic amphotericin B is only in those rare cases of invasive aspergillus otomycosis as was reported by Beackley LS et al [19]. In the present study regular suction cleaning with 1% clotrimazole has been effective in achieving complete mycological cure in all patients.

4. Conclusion

Otomycosis contributes about 10% of all otitis externa. Conley and others have noted that ear canal provides all growth requirements for fungi [2]. Trauma to the canal skin is one of the predisposing factors to otomycosis because it helps in fungal colonization as well as Sub-epidermal invasion. Presence of water in the deep meatus, macerates the canal skin and alters the pH of canal in favour of fungal colonization. Senturia and associates [16] have described several contributory factors in addition to effects of heat, humidity and trauma. They found that absence of protective coating of cerumen, neutralization or alkalization of the canal impairs the natural ability to ward off bacterial or fungal contamination.

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References:

1. Dennis J Bojrab, MD, Thomas Bruderly, DO, Yazzar Abdul Razzak. Otitis externa. OCN, 1996; 5 : 774
2. Conley JC. Evaluation of fungus disease of the external auditory canal. Arch otolaryngol 1948; 47:721-745.
3. Kurana AS, Kanta Shashi & Kumar Suresh. Incidence of fungal infection in CSOM. Indian Journal of otology 1998; 4(3): 121-123.

4. Kaur R, Mittal N, Kakkar M, Agarwal AK, Mathur MD. Otomycosis-A clinico-mycological study. *Ear Nose Throat J* 2000; 79(8): 606-609.
5. Mohanty JC, Mohanty SK, Sahoo RC, Gosh SK, Chayani N, Mallick B, KarAK. Clinico-microbial profile of otomycosis in Berhampur. *Indian journal of otology* 1999; 5(2): 81-83.