ORIGINAL RESEARCH PAPER
Volume - 11 | Issue - 04 | April - 2022 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

"A STUDY ON CLINICO-MYCOLOGICAL SPECTRUM OF OTOMYCOSIS"

ENT

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ABSTRACT

AIM OF STUDY : To study about various fungal infections in the external ear
OBJECTIVES: 1. To study the incidence of fungal infection in ear ,2.To study the aetiological agents of otomycosis 3.To study the association with various diseases like otitis media (csom, asom) otitis externa, post op patients, drug induced(local drops)
Materials and Methods: This is a Cross-sectional study where patients fitting into inclusion criteria were interviewed and assessed after informed written consent.Detailed history is taken and after clinical examination ear swab for culture and sensitivity and KOH was sent and culture positive patients are studied for a period of one and half year from September 2019 to March 2021
Results: out of 120 cases observed for a period of 18 months in the Department of ENT Bhaskar Medical college ,the peak number of cases was in June month [12.5%] ,Female : Male Ratio was 55:45 ,Right ear is more than left ear ,most important predisposing factor being usage of unsterile sticks ,Itching being the most common complaint [67.5%] ,Otitis externa being the most common associated disease [20%] ,Asperigillus flavus being the most common organism in our study [49%] .
Conclusion : The present study highlights the increased prevalence of otomycosis in females as compared to males with majority of the cases occurring in the rainy season. In our study Unilateral predominance is seen with right ear than left ear .The incidence is more in age group of 31 to 40 years Other Indian studies report high incidence of otomycosis among 21 – 30 year age group. Aspergillus species was the most common fungi isolated

KEYWORDS

Ear, Oto-mycosis, Asperigillus, Itching ear, otitis Externa.

INTRODUCTION

Fungi constitute a vast and diverse group of eukaryotic, heterotrophic, spore producing, single-celled or multi-celled organisms that live by decomposing and absorbing the organic material in which they grow. Although there are over 1.5 million species of fungi on Earth, only about 300 of those are known to cause infections in humans. Pathogenic fungi are those which are capable of causing disease in humans. They do so because of their specific metabolism and enzymes systems, which allows them to survive at elevated body temperature and helps to overcome the host defense mechanisms.

Definition:

Otomycosis is derived from greek word Oto which means ear and mycosis means fungal i.e, superficial fungal infection of the external auditory canal [1].It is challenging for both patients and otolaryngologist as it frequently requires long term treatment and follow up. Inspite of proper treatment and follow up, the recurrence rate remains high .

Causative Organisms:-

Aspergillus and Candida are the most common organisms causing otomycosis. Among Aspergillus species, Aspergillus niger is usually the predominant species, followed by Aspergillus flavus, Aspergillus fumigatus and Aspergillus terreus. Among Candida species,Candida albicans is the most common isolate followed by Candida parapsilosis,Candida glabrata,Candida guilliermondii and Candida krusei. Other fungi like Penicillium, Mucor, Rhizopus, Cladosporium, Chrysosporium and Absidia are also involved . Different species of fungi have varying susceptibilities to the commonly used Antifungal drugs. Aspergillus fumigatus, Aspergillus terreus and non-albicans Candida show high degree of resistance to Antifungals . Hence it is very important to identify and speciate the causative fungi, as it will help in choosing appropriate antifungal drugs for effective therapy.In recent years there has been an increased awareness about fungal infections and a high degree of clinical suspicion among doctors in diagnosing otomycosis. More in-depth studies on the various otomycosis causing fungi and their degree of sensitivity to currently available Antifungal drugs will help the clinician in diagnosing and refining treatment . This study shall give us insights into the various fungi causing otomycosis in this region, their virulence factors and comorbidities associated with it

Inflammation Of Ear Canal (Otitis Externa)

Acute inflammation of skin lining EAC

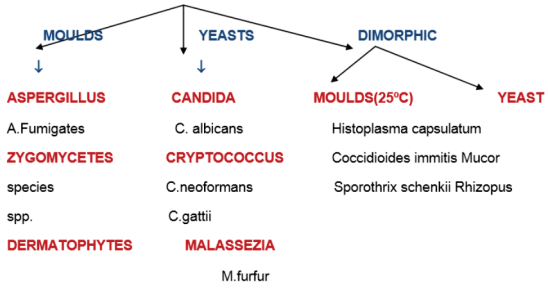
Aetiology

Bacterial -Localised otitis externa (furuncles)
-Diffuse otitis externa
-Malignant otitis externa

Fungal -Otomycosis
Viral -Herpes zoster oticus
-Otitis externa hemorrhagica

Classification Of Fungi

Depending on cell morphology they are divided into



Aim Of Study

To study about various fungal infections in the external ear

OBJECTIVES

1. To study the incidence of fungal infection in ear
2. To study the aetiological agents of otomycosis
3. To study the association with various diseases like otitis media

(csom, asom) otitis externa, post op patients, drug induced(local drops)
4. To correlate the resulting clinical and mycological diagnosis
5. To establish clinical significance of specific otomycosis

MATERIALS AND METHODS

This is a Cross-sectional study where patients fitting into inclusion criteria were interviewed and assessed after informed written consent Detailed history is taken and after clinical examination ear swab for culture and sensitivity and KOH was sent and culture positive patients are studied for a period of one and half year from September 2019 to March 2021.

Study population:

- All the patients attending ENT OPD at Bhaskar Medical College & Hospital, Moinabad for a period of one and a half year from January 2020to June 2021.

Sample size: 120

Inclusion Criteria:

All the patients who are diagnosed to have otomycosis on basis of Clinical examination and culture report.

Exclusion Criteria:

l The patients who are already undergoing treatment for otomycosis

Study period:

- September 2019 to March 2021

Data analysis :

Data was subjected to statistical methods. 120 patients attending ENT OPD and diagnosed to have clinical otomycosis were included in the study.

Two aural swabs or whenever possible oto-mycotic debris were taken up on sterile ear swab sticks From one swab, wet mount preparation in 10% KOH (potassium hydroxide) A portion of the scrapped material was suspended in 1-2 drops of 10% potassium hydroxide with methylene blue (2:1) on a clean slide and a cover glass was placed over it avoiding air bubbles.

It was examined under microscope for the presence of fungal hyphae, conidiophores or yeast cells. Another portion of the scrapped material was used for Gram staining, and examined for presence of inflammatory cells, bacteria, yeast cells or other fungal elements. The second swab / otomycotic debris was directly inoculated into SDA (Sabourad 's dextrose agar) medium. One swab was used for direct microscopy and next for culture examination. The presence of fungal structures is seen in potassium hydroxide (KOH) wet mounts.The microscopic examination shows discrete clumps of hyphae with conidiophores.

In A. niger, septate hyphae, sporulating vesicles and abundant black spores are seen.Collected swab was inoculated onto Sabouraud's dextrose agar.

The presence of fungal elements in stained smears was confirmed by growth of fungal colonies.

Yeast like organisms like Candida may grow partly as chains of budding elongated cells joint at end (pseudomycelium and pseudohyphae).

Koh Mount:

KOH dissolves keratin and cellular material while not affecting fungi.

Specimen is placed on a slide , a drop of 10 -20% KOH is added, covered with a coverslip , left for 20 min in incubator at 37 °C to digest keratin, then examined microscopically

SDA culture:

It is a Qualitative method of testing for most fungi.

It is a general purpose peptone medium with dextrose (supporting growth of the fungi)and antibiotic like Chloramphenicol and cycloheximide prepared at a pH of 5.6 favouring growth of many species mainly dermatophytes.

Agar should optimum moisture for inoculating specimen with sterile loop kept for observation in 25-30°C. Cultures are examined atleast weekly and should be observed till min. 4 weeks before reporting negative result.

RESULTS:

In this cross sectional study, analysis of 120 patients with clinical otomycosis was taken in ENT department of Bhaskar Medical college over a period of 18 months to determine incidence of otomycosis in patients. Clinical data was collected by means of a proforma and the observations made were analyzed with a Master Chart. The results have been evaluated primarily keeping in mind the aims of the study using Microsoft Excel and SPSS software.

In our study a total of 120 cases those fulfilled the inclusion criteria were included in the study. Peak numbers of cases were seen during June (n=15,12.5%), October (n=14,11.6%) and November (n=13, 10.8%).

The peak was in June (rainy season), followed by October and November (post monsoon months).

Table no.1 Month wise distribution of otitis externa

MONTHS	No. of cases	Percentage %
January	5	4.1%
February	6	5%
March	7	5.8%
April	9	7.5%
May	8	6.6%
June	15	12.5%
July	7	5.8%
August	8	6.6%
September	9	7.5%
October	14	11.6%
November	13	10.8%
December	9	7.5%

Otomycosis is found to be more common in age group between 31 to 40 years

Table 2: Age-wise distribution of otomycosis cases Gender

Age in years	**Number of cases**	**Percentage**
0 – 10	7	5.8
11 – 20	14	11.6
21 – 30	27	22.5
31 – 40	31	24.1
41 – 50	23	19.1
51 – 60	08	6.6
> 60	10	8.3

The disease was more prevalent in females (n=66; 55%) with a 1:1.2 male to female ratio

Table 3: Gender distribution of otomycosis

Sex	No.of cases	percentage
Male	54	45%
Female	66	55%

Unilateral disease was the usual presentation (n=114; 95%) with the right side being affected more (n=65; 54.1%).

Table 4 : laterality of ear involved

laterality	total	Right	Left
unilateral	114	65	49
bilateral	06	-	-

Majority of the patients (n=80; 66.7%) gave a history of habitual use of unsterile wooden sticks/metal wax pickers, whereas 48.3% (n=58) of patients used oil drops.

Prior antibiotic and/or steroid use was seen in 25% (n=30) of cases. Tympanic membrane perforation was seen in 15% (n=18) of the patients.

Table no.5: Predisposing factors

Predisposing factor	No.of cases	Percentage
Habitual use of unsterile sticks	80	66.7
Oil drops	58	48.3
Prior antibioticsor steroid drops	30	25

TM perforation	18	15

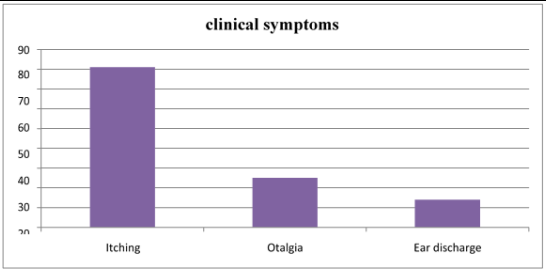
The most common otoscopic finding was the presence of moist brown green mouldy material with epithelial debris (n=60; 50%).

Itching was the most common symptom (n=81; 67.5%) followed by otalgia (n=79; 65.8%) andear discharge (n=37; 30.8%).

CSOM was seen in 12.5% (n=15) of the cases whereas 9.2% (n=11) patients had ASOM associated with otomycosis

Table 6: Clinical symptoms of otomycosis

symptom	N(no.of cases)	Percentage
Itching	81	67.5 %
Otalgia	25	20.8 %
Ear discharge	14	11.6 %



Bar diagram 1 : Clinical symptoms

Otomycosis associated with other diseases of ear such as otits externa, ASOM and CSOM are included in the study.

Otitis externa is the most commonly affected association with the otomycosis followed by ASOM and CSOM

Table 7. Associated ear diseases with otomycosis Fungal species isolated

Associated ear diseases	N (no. Of cases)	Percentage
Otitis externa	24	20%
ASOM	11	9.2%
CSOM	15	12.5%

The various fungi isolated from study group are listed in table 8

Table 8: Different fungal species in otomycosis

Fungal species	No.of patients	Percentage
Aspergillus flavus	59	49.1
Aspergillus niger	40	33.3
Aspergillus fumigates	17	14.1
Candida albicans	4	3.3

DISCUSSION:

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.

In the present study peak numbers of cases were seen during June (n=15,12.5%), October (n=14,11.6%) and November (n=13, 10.8%).

The peak was in June (rainy season), followed by October and November (post monsoon months).

In the present study the least number of cases are seen during January (n=5, 4.1%), February (n=6,5%) ,July (n=7,5.8%)

Mohanty JC et al[5] and Muglistan T et al [6] in their studies observed otomycosis to be more prevalent in warm and humid climate particularly in rainy season than in arid or cold climates and thus correlates with the present study.

The higher environmental humidity favors otomycosis because of the high humidity and temperature in the external auditory canal which approximates the body temperature, which in turn favors growth of dormant spores of fungi lying in the canal.

The presence of high humidity shifts the pH of external auditory canal to alkaline side. This further helps in the growth of fungi.

In the present study; majority of the patients were in the age group of 31 to 40 years and females were affected more than males and less number of cases are seen in the age group between 0 to 10 (n=7) ie,5.8% followed by age group of 51 to 60 years (n=8) ie, 6.6%. Our study is comparable to a study from Tamil Nadu where most of the cases occurred in 30-40 years of age whereas in studies from Karnataka most of the cases were reported in 21-30 years age group.(7,8,9)

Other Indian studies report high incidence of otomycosis among 21 – 30 year age group.(10,11,13-15).This is because, people of younger age group spend more time outside and are exposed to open air containing spores of locally prevalent fungi.(16)

The disease is more prevalent in females (n=66; 55%) with a 1:1.2 male to female ratio. This is in comparison to some Indian studies.(14,17,18,19)

More male patients with otomycosis is also reported in many Indian studies.(10,11,3,20).These differences are attributed to various factors like, covering head with cloth, working in dusty and smoky atmosphere(19).Unilateral disease was the usual presentation (n=114; 95%) with the right side being affected more (n=65; 54.1%).

Unilateral presentation and a higher incidence of otomycosis in rainy season as has been reported previously in many studies [6,8,9] was seen in our study as well. Habitual use of wooden sticks and metal wax pickers were found to be the predisposing factors causing damage to the ear canal.

Practices like addictive exploitation of the external ear with any hard object such as wooden stick, hair-pin, safety-pin, feather cause trauma (usually minor) to the skin. This leads to deposition of fungal conidia in the wound leading to fungal infection.

Itching was the most common symptom (n=81; 67.5%) followed by otalgia (n=79; 65.8%) and ear discharge (n=37; 30.8%).

Most Indian studies report, itching as the major symptom among otomycosis patients.(10,11,13,14,21)

Otomycosis is associated with other ear diseases otitis externa, CSOM and ASOM

Otitis externa seen in 24 patients which accounts for about 20%

CSOM was seen in 12.5% (n=15) of the cases whereas 9.2% (n=11) patients had ASOM associated with otomycosis.

The most common otoscopic finding was the presence of moist yellow green mouldy material with epithelial debris (n=60; 50%).

The commonest fungi isolated are Aspergillus species followed by Candida.

Aspergillus spp. are common in airbome dust, and their heavy growth is aided by earwax(6) . Furthermore, the pH level in the norma1ear canal is on the acidic side , and the common pathogenic aspergilli experience optimal growth at a pH range of 5 to 7.

Aspergillus spp. is the commonest fungus found in the atmosphere and a known contaminant everywhere. Conidia of these fungi spread through the air everywhere and wherever it finds suitable site for its growth it grows.When there is a predisposing condition for fungal growth in the external auditory canal, it is the commonest fungus to colonize and grow there.

Among the Aspergillus species, A. flavus was the most common isolate (n=59, 49%) followed by A. niger and A. fumigates, in contrast to otherstudies were Aspergillus niger was the commenst. And C. albicans(n= 4, 3.3%) was the most common species of Candida.

This variation from the findings of other investigators might be

attributable to differences in population group s, habits, climatic conditions, and methods of isolation.

Majority of Indian studies on otomycosis report Aspergillus spp. as the commonest isolate with percentages varying from 40 to 89.3%. (11,17,20)

Similar results have been reported previously by Agarwal P et al., where the authors found Aspergillus spp. (n=302; 87.3%) to be the predominant fungi isolated from the cases followed by Candida spp. (n=35; 10%) and Penicillium (n=2; 0.6%) [6].

Among the Aspergillus species, A. niger was the second most fungi (n=40, 33.3%) isolated in the current study.

A.niger grows on cerumen, epithelial scales and detritus deep in external canal . The lesion of aspergillosis is dry. Occurrence of exudate and foul smell is indicative of a bacterial etiology

Gupta S et al., in their study found A. niger (n=20; 51.3%), A.flavus (n=7; 17.9%), A. fumigatus and Candida spp (n=6; 15.4% respectively) to be the most common fungal isolates recovered from clinically suspect cases of otomycosis

Likewise Sangavi AKB et al., have reported A. niger (n=15; 46.9%) followed by A. flavus (n=6; 18.8%) and Candida spp. (n=10; 31.3%) to be the most common fungal isolates. In the studies done by Gokale SK et al[1], Paulose KO et al[4], Mohanty JC et al[5], XianhaoJiaet al[6], and Chander J et al8 had Aspergilli as the commonest fungus isolate followed by Candida, which correlates with the present study. Whereas Garica MP et al[10] had Candida as the commonest isolated fungi followed by Aspergillus species.The isolation of different fungal species varies from place to place depending upon the geographical pattern of fungus in that area.(22) .Candida albicans was the least fungi isolated in the current study (n=4,3.3%)

Candida albicans has been said to be a causative agent of otomycosis. It can colonize mouth, vagina and gut, but not on skin.

But other species of candida are normal flora of skin and are frequently blamed as causative agents of otomycosis, but their role is still debatable.Candida spp. is said to be mainly responsible for otomycosis in immunocompromised hosts.A medical history of diabetes and / or an immunocompromised state may be present.(12)

It is easy enough to make a diagnosis of fungal infection when inspection of the ear canal reveals a forest of waving conidiophores, as in cases of sporing aspergilli. However,yeasts, even in their mycelial form, do not make closely woven masses of hyphae like molds do, and they are therefore more likely to be missed. AIso, when fungus is present as a mycelium, the hyphae are embedded in the debris and might not be picked up by swabbing.

Thus, overlooking the fungal etiologic agent might lead to an unnecessary or excessive use of toxic broad –spectrum.

CONCLUSION:

The present study highlights the increased prevalence of otomycosis in females as compared to males with majority of the cases occurring in the rainy season.

In our study Unilateral predominance is seen with right ear than left ear

The incidence is more in age group of 31 to 40 years Other Indian studies report high incidence of otomycosis among 21 – 30 year age group.

This is because, people of younger age group spend more time outside and are exposed to open air containing spores of locally prevalent fungi. Associated ear diseases with otomycosis predominantely seen are otitis externa, CSOM and ASOM ,Fungal infection of the external canal should be suspected in all chronic cases of otitis externa which do not respond to conventional topical therapy. Aspergillus species was the most common fungi isolated.

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