

A CLINICO-MYCOLOGICAL STUDY OF OTOMYCOSIS IN TERTIARY CARE HOSPITAL.

Otorhinolaryngology

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ABSTRACT

Background: Fungal infection of the external ear (otomycosis) is a common condition encountered by the otorhinolaryngologist in routine ENT clinic. Otomycosis is a condition defined as a fungal infection of the external ear auditory canal, rarely it can involve the middle ear, if the drum is perforated or the mastoid cavity following an open mastoidectomy, associated with symptoms of itching, pain, aural fullness, aural discharge, hearing impairment and tinnitus. we have undertaken this study with the aim to describe the spectrum of fungi, clinic-pathology of patients with otomycosis. **Methods:** Present study was prospective in nature conducted among 100 otomycosis patients. All patients fulfilling inclusion criteria and exclusion criteria were taken up for the study. Study was carried out over a period of 1.5 years. **Results:** Majority of the patients was in the age group of 10-30 years and most of them were female. Most common presenting complaint was itching reported (92%) followed by pain (78%), ear discharge (44%) and hearing loss (26%). Most common fungal spp. Isolate was *Aspergillus Niger*. **Conclusion:** Cases presenting with itching in EAC, earache, hearing loss & ear discharge should be suspected & evaluated for otomycosis, especially children, adolescent & young age group people as they found to be most at risk in our study.

KEYWORDS

Otomycosis, EAC, ear, clinic-pathology, *Aspergillus Niger*

INTRODUCTION:

Fungal infection of the external ear (otomycosis) is a common condition encountered by the otorhinolaryngologist in routine ENT clinic. Nearly about 250,000 different fungal spores enter the human respiratory tract every minute.¹⁻³ Otomycosis is a condition defined as a fungal infection of the external ear auditory canal, rarely it can involve the middle ear, if the drum is perforated or the mastoid cavity following an open mastoidectomy, associated with symptoms of itching, pain, aural fullness, aural discharge, hearing impairment and tinnitus.⁴⁻⁶ It is seen in 9–27% of all the cases with EAC infection.^{7,8} Various types of fungal species could be the cause of otomycosis. However, the genus *Aspergillus* found to be the most common causative agent, particularly *Aspergillus niger*.⁹ Other fungal agents include species from the genera *Penicillium*, *Fusarium*, *Mucoraceae*, *Scopulariopsis*, *Alternaria*, *Malassezia*, and *Candida*, as well as various dermatophytes.¹⁰⁻¹² Common risk factors for otomycosis are poor hygienic conditions; minor trauma, inflammation or physical injury, use of swimming pools, Improper self-cleaning, self-medication, and insert of unnecessary tools into the ear canal, being exposed to hot humid climate, as in tropical and subtropical areas; prolonged use of antibiotics, and prolonged use of steroid ear drops especially in those with impaired immune system.^{10,13-15}

There is paucity of studies on otomycosis in our setting and we feel that still there are some gaps in our understanding of etiopathogenesis of this condition & ultimately an obstacle for effective management; hence we have undertaken this study with the aim to describe the spectrum of fungi, clinic-pathology of patients with otomycosis.

OBJECTIVES

- To determine the commonest modes of clinical presentation, various predisposing factors for otomycosis, otoscopy findings and various types of fungi causing otomycosis.

MATERIALS AND METHODS

This was a facility based prospective observational study, protocol of which was approved by the Institutional Ethical committee of the medical college. Written informed consent was taken from all study subjects.

Patient of otomycosis presented in ENT OPD of our tertiary Care Hospital constituted our study subjects. All consecutive patients fulfilling inclusion and exclusion criteria were taken up for the study until the required sample size was fulfilled. Sampling method used was universal sampling. Study was carried out over a period of 1.5 years from January 2021 to June 2022. Clinically diagnosed cases of otomycosis were included in the study. Exclusion criteria were patients with spinal diseases, hypertension/hypotension, heart disease, neurological disease, central lesions confirmed on history physical examinations in the form of neurological test reflexes, cranial nerve examinations, X-ray, CT, MRI etc. and pregnancy

All cases of otomycosis of ear presented ENT OPD of our tertiary Care institute were analyzed as regard to the history, clinical presentation, predisposing factors, effect of various antifungal agents on otomycosis cases, pH of external auditory canal in these cases. Clinical and laboratory finding were obtained from each case. Data was collected in pre-structured proforma (Annexure I- case record sheet) which was pilot tested and after ensuring its validity. The data collected was then analyzed by appropriate test of significance.

Sample size was calculated with $n = [DEFF * Np(1-p)] / [(d^2/Z^2_{1-\alpha/2}) * (N-1) + p * (1-p)]$ using OPENEPI software version 3.

In a study by **Habib Merza et al¹⁶ (2021)** on Evaluation of the Prevalence of Otomycosis in Patients Referred to the ENT Clinic, found that prevalence of otomycosis was 67.5%, considering this prevalence & 10% absolute error, at 95% confidence interval, sample size came out to be 85 but for convenience of calculation we have rounded up the figure to 100.

Method of assessment

100 patients attending ENT OPD and diagnosed to have otomycosis were included in the study as per the sample size calculations. Two aural swabs or whenever possible otomycosis debris were taken up on sterile ear swab sticks. From one swab, wet mount preparation in 10% KOH (potassium hydroxide) solution and smear for Grams stain was prepared to determine the presence or absence of fungal element (hyphae, spores and blastospores). The second swab / otomycosis

debris was directly inoculated into SDA (Sabourad 's dextrose agar) medium. Secretion and pus were collected from all patients by two sterile cotton wool swabs taken out from External Auditory Canal or mastoid areas like cholesteatoma. 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 shown discrete clumps of hyphae with conidiophores. In otomycosis caused by *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: 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 favoring 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 at least weekly and should be observed till minimum 4 weeks before reporting negative result. Treatment was done as per standard protocol.

RESULTS:

In the present prospective study, there was no lost to follow up and we could analyze all 100 otomycosis patients. Majority 58 (58%) of the patients were from the age group of 10-30 years followed by 26 (26%) from the age group of 30-50 years & least were > 50 years. Majority (54%) of the patients were female. 48 (48%) of the cases had right ear otomycosis followed by left ear otomycosis in 43% and bilateral among 9%. Most common comorbidity among our study participants was congested tympanic membrane with oedema of canal wall (44%) followed by congested tympanic membrane (25%), CSOM (23%), diabetes mellitus (12%) and HIV (4%) while 15% cases did not have any comorbidity. On examination of external auditory canal (EAC) we have found that, pH was raised and alkaline in all the cases & ear wax was absent in 96% cases with otomycosis, suggesting lack of probable role of cerumen in preventing otomycosis & lack of protective acidic pH against the infection. (Table 1)

Table 1. Distribution of otomycosis patients according to baseline characteristics.

Sr. No.	Baseline characteristic		Frequency (no.)	Percentage (%)
1	Age groups	10-30	56	56
		30-50	28	28
		>50	16	16
2	Gender	Male	46	46
		Female	54	54
3	Laterality	Right	48	48
		Left	43	43
		Bilateral	09	09
4	Comorbidity	DM	12	12
		CSOM	23	23
		HIV	04	04
		Congested tympanic membrane	25	25
		Congested tympanic membrane with oedema of canal	44	44
		None	15	15
5	Ear Wax	Absent	96	96
6	pH of EAC	Acidic	00	00
		Alkaline	100	100

In this study, most common presenting complaint was itching reported by 92 (92%) patients followed by pain in 78 (78%) patients, ear discharge among 44 (44%) and least common symptom was hearing loss in 26 (26%). (Chart 1)

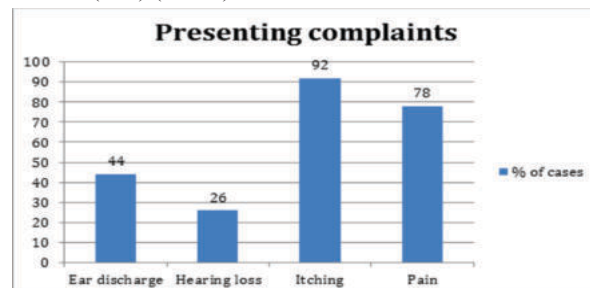


Chart 1. Presenting complaints among study participants.

We could find that most common predisposing factors for otomycosis was injury to ear canal due to habit of putting sticks, hair pin, earbuds, match sticks etc. among 70% patients, followed by use of ear drops in 48%, swimming/entry of water into ear canal in 42%, use of coconut oil in ear canal in 12% and use of wax solvents in 8%. 18% cases did not have any of these risk factors. (Chart 2)

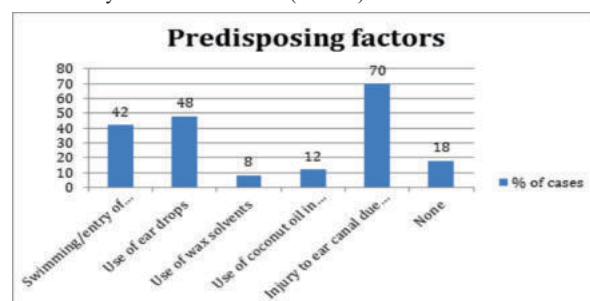


Chart 2. Predisposing factor wise distribution of cases.

On Otoscopic examination most common finding was black mycological plug in 54% cases which is consistent with *Aspergillus Niger* fungal infection followed by wet mycelial mat/debri in 20%, dry mycelial mat in 13%, soft debri in 7% and cotton wooly mass in 6%. (Chart 3)

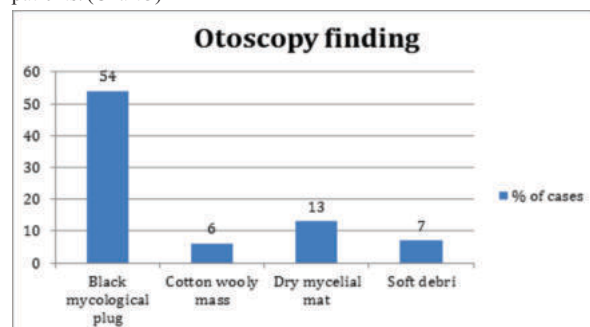


Chart 3. Otoscopic examination findings of cases.

On culture analysis, most common fungal species isolated was *Aspergillus Niger* in 60% cases followed by *Aspergillus flavus* in 19%, *Aspergillus fumigatus* 10%, *Candida albicans* 6% and *Penicillium notatum* among 5%. (Chart 4)

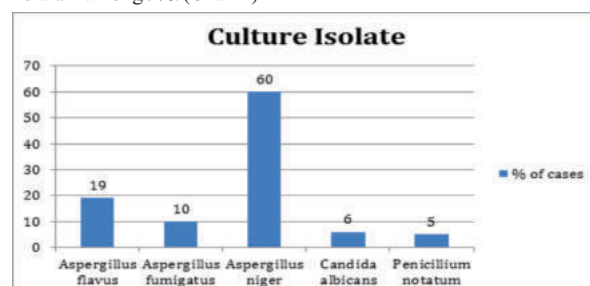


Chart 4. Distribution of cases according to culture isolate.

DISCUSSION:

Otomycosis is one of the commonest clinical presentations in ENT OPD. Its clinical presentation, etiopathogenesis & predisposing factors could differ from patient to patient & setting wise. In our study, otomycosis was more common among young age group (10-30 years) patients. Mean age of the patients was 32.08 ± 13.91 years. Majority of the study participants were female with female to male ratio of 1.17:1. Consistently James Fasunla et al¹⁷ noted younger age group & female majority in their study; ArvindKumar B. Sangavi et al¹⁸ reported mean age of the study population was 28.31 years and Priti Agarwal et al¹⁹ reported most of the cases (66.35%) from 15-35 years age group. Similar to our study, James Fasunla et al¹⁷ also noted that most common presenting complaint was aural pruritus in 90.21% patients followed by otalgia 83.86%, tinnitus in 78.31%, feeling of aural blockage in 24%, hearing impairment in 14.81% and ear discharge in 7.67%, ArvindKumar B. Sangavi et al¹⁸ in their study noted that pain & itching was the most common complaint and Priti Agarwal et al¹⁹ who noted common presenting complaints were sensations of blocked ear (76.6%), itching (70.7%), pain in ear (66.3%) and ear discharge (33.1%). Otomycosis could be asymptomatic but if left untreated, may lead to morbidity like hearing loss.⁵⁰ In our study, 26% patients had various degrees of conductive hearing loss. Often presentation of Otomycosis may be indistinguishable from bacterial otitis externa²¹ resulting in misdiagnosis and inappropriate treatment with topical antibiotics. Most of the comorbidities found in this study increases the vulnerability to fungal infection of EAC. Consistent predisposing factors like our study were noted by James Fasunla et al¹⁷ who observed in their study that significant number of patients, 52 (13.76%), had prior topical aural antibiotic treatment following misdiagnosis; Mila Bojanović et al²² who observed common risk factors for otomycosis were using antibiotic ear drops (63.3%), EAC hygiene with soap/shampoos/antiseptics, headphone use (27.6%), frequent ORL examinations & rinsing of EAC, using corticosteroid ear drops & predisposing diseases (13.3% each); Priti Agarwal et al¹⁹ reported that Self-cleaning, instillation of mustard oil and use of ear drops appeared to be common predisposing factors in otomycosis & ArvindKumar B. Sangavi et al¹⁸ reported that most important risk factor was a habit of using pins or sticks in 81.2% patients. We further observed that pH was alkaline in all the cases & absence of protective cerumen in EAC both of which predisposing to fungal infections of EAC. Otoscopy findings are also consistent with fungal infection of EAC, especially *A. Niger*. On culture report we found that *A. Niger* was the commonest fungal spp. In our patients. So these findings are in line with Khaled Ali et al²³, James Fasunla et al¹⁷, Kurnatowski P et al²⁴, Ologe FE et al²⁵, Bassiouny A et al²⁶, Gughani HC et al²⁷, Mgbor N et al.²⁸

CONCLUSION:

- Cases presenting with complaints of itching in EAC, earache, hearing loss & ear discharge should be suspected of & evaluated for otomycosis, especially children, adolescent & young age group people as they found to be most at risk in our study.
- Being risk factors for otomycosis, we recommend to avoid habit of putting sticks, hair pin, ear buds, match sticks, ear drops, swimming/entry of water into ear canal, putting coconut oil in ear canal and wax solvents and use of ear drops for maintaining acidic pH in auditory canal so as to protect against the fungal infection. Also while evaluating & treating the cases specific attention should be given to *Aspergillus Niger* which was the commonest fungal species responsible for otomycosis.

Declaration:

There was no source of funding in our study and there were no any conflict of interest.

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