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Prevalence of otomycosis in chronic suppurative otitis media – A descriptive study

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Abstract: *Background:* Chronic suppurative otitis media (CSOM) is defined by persistent ear discharge through a perforated tympanic membrane for more than twelve weeks. Secondary fungal infections (otomycosis) are a clinically significant complication, especially with prolonged antibiotic use and warm humid climates prevalent in India. *Aim:* To study the prevalence of otomycosis in CSOM, identify the types of fungal isolates, and determine associated predisposing factors. *Methods:* A hospital-based cross-sectional study enrolled 100 CSOM patients (aged 8–60 years) over 24 months at Al-Ameen Medical College, Vijayapura. Ear discharge was subjected to 10% KOH microscopy and Sabouraud's Dextrose Agar culture for fungal identification. Chi-square test was used for categorical analysis ($p<0.05$ significant). *Results:* Otomycosis was detected in 72% of cases. Aspergillus species were predominant (50%), with *A. niger* accounting for 56% of Aspergillus cases, followed by *A. fumigatus* (32%) and *A. flavus* (12%). *Candida* species comprised 22% of isolates, with *C. albicans* predominating (81.8%). Antibiotic ear drop usage (100%, $p<0.001$) and self-cleaning (80%, $p=0.002$) were the most significant risk factors. Males had significantly higher otomycosis prevalence ($p=0.002$). *Conclusion:* This study reveals a high prevalence of otomycosis (72%) in CSOM patients, with *A. niger* and *C. albicans* as predominant species. Antibiotic ear drop use and self-cleaning are the most significant risk factors. Routine mycological screening, judicious antibiotic use, and patient education are essential for optimizing CSOM management.

Keywords: Chronic Suppurative Otitis Media, Otomycosis, Aspergillus Niger, Candida Albicans, Koh Mount, Prevalence, Antifungal Therapy, Risk Factors, India.

Introduction

Chronic suppurative otitis media (CSOM) is defined by persistent middle ear discharge through a tympanic membrane perforation for more than twelve weeks. While bacterial pathogens -particularly *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Proteus* spp., and *Klebsiella pneumoniae* – are the primary pathogens, fungal superinfection (otomycosis) is an under-recognized complication, especially with prolonged antibiotic use and warm, humid climates prevalent in India [1].

Otomycosis complicating CSOM presents diagnostic challenges due to clinical overlap with bacterial infections, and is often refractory to antibacterial therapy when unrecognized [2]. Global prevalence of otomycosis in CSOM ranges from 5% to over 50%, with India's tropical climate and widespread antibiotic availability creating conditions particularly favourable for fungal superinfection [3]. Fungal biofilm formation on the damaged tympanic membrane and middle ear mucosa further complicates eradication and contributes to symptom chronicity. The global prevalence of otomycosis in CSOM varies widely, ranging from 5% to over 50%, reflecting differences in climate, diagnostic approaches, and healthcare practices [3]. India's tropical and semi-arid climatic zones, combined with widespread over-the-counter antibiotic availability, overcrowding, and local ear hygiene practices, create conditions particularly favourable for fungal super infection [4].

Aspergillus species (particularly A. niger and A. fumigatus) account for 60–90% of

otomycosis cases; Candida species (predominantly C. albicans) represent the second most common group [5]. Diagnosis requires 10% KOH microscopy and fungal culture; management involves aural toileting, topical antifungals, and correction of predisposing factors [6-7]. The present study was undertaken to determine the prevalence of otomycosis in CSOM patients, identify the fungal species, and evaluate associated predisposing factors [8].

Aim: To study the prevalence of otomycosis in chronic suppurative otitis media.

Objectives:

1. To determine the prevalence of otomycosis in CSOM patients.
2. To identify the types of fungal isolates in CSOM patients.
3. To study the associated predisposing factors.

Material and Methods

This hospital-based cross-sectional study was conducted at Al-Ameen Medical College, Vijayapura, over 24 months (October 2023–October 2025) following Ethics Committee approval. One hundred CSOM patients (aged 8–60 years, either sex, persistent ear discharge >12 weeks with tympanic membrane perforation) were enrolled by convenient sampling. Patients with primary otomycosis or external auditory canal stenosis were excluded.

All patients underwent ENT examination including otoscopy and tuning fork tests. Ear discharge was collected under aseptic precautions: one swab for 10% KOH direct microscopy and one for culture on Sabouraud's Dextrose Agar (SDA) with gentamicin, incubated at 25°C and 37°C for up to six weeks. Species were identified by lactophenol cotton blue (LPCB) mount. Predisposing factors and clinical data were recorded using a structured proforma. Data were analyzed using SPSS version 26; chi-square test was applied for categorical associations ($p<0.05$ significant). Written informed consent was obtained.

Results

Fungal species were identified by KOH microscopy and SDA culture. Chi-square test assessed risk factor associations. A total of 100 CSOM patients were studied. The demographic, clinical, mycological, and risk factor findings are summarized in Tables 1 through 3 below.

Table-1: Demographic Profile and Clinical Characteristics of Study Participants (n=100)

Variable	Category	n (%)
Age Group	11–20 years	4 (4.0%)
	21–40 years	63 (63.0%)
	41–60 years	33 (33.0%)
	Mean ± SD	36.6 ± 10.5 years
Sex	Female	53 (53.0%)
	Male	47 (47.0%)
Socioeconomic Status	Lower	44 (44.0%)
	Middle	36 (36.0%)
	Upper	20 (20.0%)
Affected Side	Right	52 (52.0%)
	Left	48 (48.0%)
Symptoms	Ear itching	87 (87.0%)
	Ear discharge	64 (64.0%)
	Sense of ear block	64 (64.0%)
	Difficulty in hearing	64 (64.0%)
	Ear ache	60 (60.0%)
	Tinnitus	50 (50.0%)
Clinical Findings	TM perforation (both sides)	100 (100.0%)
	Rinne's test negative (left)	39/48 (81.2%)
	Rinne's test negative (right)	44/52 (84.6%)
	Weber lateralized to affected side	81.2–84.6%
	ABC normal (both sides)	100 (100.0%)

The majority of patients (63%) belonged to the 21–40 years age group [Table 1]. Female patients were slightly more prevalent overall (53%), and the lower socioeconomic class constituted the largest proportion (44%). Both ears were nearly equally affected. Ear itching was the most frequent symptom (87%), followed by discharge, ear block, hearing difficulty (each 64%), earache (60%), and tinnitus (50%). Tympanic membrane perforation was universal (100%) and conductive hearing loss was predominant as

evidenced by negative Rinne's test in 81.2–84.6% of cases on both sides, with intact sensorineural function in all cases (normal ABC).

Table-2: Prevalence of Otomycosis and Fungal Species Distribution (n=100)

Variable	Category	n (%)
Otomycosis	Present	72 (72.0%)
	Absent	28 (28.0%)
KOH Mount	Positive	72 (72.0%)
	Negative	28 (28.0%)
Fungal Genus	Aspergillus	50 (50.0%)
	Candida	22 (22.0%)
	Culture negative	28 (28.0%)
Aspergillus Species (n=50)	*A. niger*	28 (56.0%)
	A. fumigatus	16 (32.0%)
	A. flavus	6 (12.0%)
Candida Species (n=22)	*C. albicans*	18 (81.8%)
	C. tropicalis	4 (18.2%)

Otomycosis was detected in 72% of CSOM patients [Table 2]. KOH mount positivity was 72%, demonstrating its utility as a rapid screening tool. *Aspergillus* species were the most common isolates (50%), with *A. niger* predominating (56% of Aspergillus isolates), followed by *A. fumigatus* (32%) and *A. flavus* (12%). *Candida* species accounted for 22% of all isolates, with *C. albicans* being dominant (81.8%) and *C. tropicalis* accounting for the remainder (18.2%).

The use of antibiotic ear drops showed the strongest association with otomycosis (present in 100% of otomycosis cases, p<0.001) [Table 3].Self-cleaning practices (80% in otomycosis group vs. 48% in non-otomycosis group, p=0.002), coconut oil instillation (17.3% in otomycosis group, p=0.026), and history of trauma (26.7% in otomycosis group, p=0.02) were also significantly associated. Swimming was not significantly associated (p=0.367). Males showed significantly higher otomycosis prevalence (56% vs. 44%, p=0.002); age was not significantly associated (p=0.076), though the 21-40 years group was most commonly affected.

Table-3: Association of Risk Factors, Gender and Age with Otomycosis

Risk Factor	Otomycosis Absent (n=28)	Otomycosis Present (n=72)	p-value
Use of antibiotic ear drops	0 (0.0%)	75 (100.0%)*	<0.001
Self-cleaning	12 (48.0%)	60 (80.0%)	0.002
History of trauma	13 (52.0%)	20 (26.7%)	0.02
Instillation of coconut oil	0 (0.0%)	13 (17.3%)	0.026
Swimming	3 (12.0%)	15 (20.0%)	0.367 (NS)

**Note:* Among overall study participants, 75% had used antibiotic ear drops; however, all 72 otomycosis-positive patients had a history of antibiotic ear drop use. NS = Not significant; *p<0.05 is statistically significant.

Discussion

The present study found an otomycosis prevalence of 72% among 100 CSOM patients at a tertiary care center in north Karnataka - higher than most published reports: Sahira Haneefa et al [9]. (51.2%), Bohra S et al [10], (13.68%), and Tegen N et al [11] (22.9%). This high prevalence likely reflects our center's hot, humid climate, tertiary referral base, and universal application of both KOH microscopy and culture. The 21-40 years age group was most affected (63%), consistent with prior studies. Although overall female preponderance was noted (53%), males had significantly higher otomycosis rates (56%, p=0.002), aligning with Santosh UP et al [12] and Chauhan S et al [13].

Aspergillus species were the predominant isolates (50%), with A. niger leading (56%), consistent with Sahira Haneefa et al [9] and Dhinakaran et al [14] Candida species (22%), predominantly C. albicans (81.8%), were the second most common group [10]. KOH mount positivity matched culture positivity at 72%, confirming its value as a rapid, cost-effective screening tool [15].

Antibiotic ear drop use was the strongest risk factor (100% of otomycosis cases, p<0.001), corroborating prior studies [11-12]. Self-cleaning practices (80%, p=0.002) and coconut oil instillation (17.3%, p=0.026) were also significant; the latter is a locally prevalent, previously underreported risk factor

warranting patient education [16]. Swimming was not significant (p=0.367). Systemic risk factors (diabetes, HIV) were not assessed – a recognized limitation. Future multicentric studies with antifungal susceptibility testing and long-term follow-up are warranted. Provide a more comprehensive understanding of otomycosis epidemiology and guide region-specific evidence-based management protocols [17].

Conclusion

This study demonstrates a high prevalence of otomycosis (72%) among CSOM patients at a tertiary care center in north Karnataka. *Aspergillus niger* and *Candida albicans* were the predominant fungal species isolated. Prior antibiotic ear drop use and self-cleaning practices were the most significant modifiable risk factors, while coconut oil instillation was identified as an important locally prevalent predisposing behaviour. Males were disproportionately affected. KOH mount examination demonstrated excellent utility as a rapid screening tool. These findings emphasize the need for routine mycological evaluation in all CSOM cases - particularly those refractory to antibacterial therapy and underscore the importance of judicious antibiotic use, targeted antifungal therapy, and structured patient education regarding ear hygiene in the management of this condition.

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