

Otomycosis and its Predisposing Factors in Out-Patient Department of Otorhinolaryngology in a Tertiary Care Centre

Bhuwan Raj Pandey,^{a,d} Madan Mohan Singh,^{b,d} Kishor Bajracharya^{c,d}

ABSTRACT:

Introduction: Otomycosis is a fungal infection of external auditory canal frequently encountered by otorhinolaryngologists. It causes discomfort to patients with varied symptoms of pruritus, otorrhea, aural fullness and earache. People with a habit of using unnecessary ear drops, cleaning ear with unsterilized objects and those who use mustard oil are all prone to otomycosis. This study aims to find out the association between otomycosis and its predisposing factors. **Methods:** This study was undertaken in the Department of Otorhinolaryngology of a tertiary hospital from March 2018 to February 2019 and a total of 300 clinically diagnosed cases of otomycosis were enrolled for the study. **Results:** The mean age \pm SD of the patients was 37.7 ± 18.8 years. Females (n=172, 57.3%) were more prone to otomycosis than males (n=128, 42.7%). The most common presenting symptom was pruritus only (n=95, 31.7%) with unilateral involvement being more common. The most common predisposing factor was mustard oil instillation (n=124, 41.3%). *Aspergillus niger* was the most common fungus causing otomycosis in this study (n=104, 34.7%). Positive fungal cultures were observed in 285 specimens (95%). The fungal growth (n=285) was high in patients with the history of instilling mustard oil (42.8%) into the ear, 34.0% in topical steroid containing ear drops and 23.2% in self-cleaning group. **Conclusion:** Otomycosis is common in people using unnecessary steroid containing ear drops, cleaning ear with unsterilized objects and instillation of mustard oil.

Keywords: Otitis externa, Otomycosis, Predisposing factor

INTRODUCTION:

Otomycosis is a superficial fungal infection that can affect external auditory canal, middle ear and post-operative mastoid cavity. It accounts for approximately 10 % to 30.4% of otitis externa.[1,2] It is common in hot and humid climate. It occurs when protective lipid/acid balance of ear is lost.[3] Patients presenting with symptoms of ear itching, discharge, earache, ear fullness, hearing loss and tinnitus along with otoscopic findings of black, grey, green, yellow or whitish discharge with debris resembling wet newspaper are considered to have

clinical otomycosis. The definitive diagnosis is made by fungal growth.

The treatment for otomycosis is ear toileting, removal of the debris and use of antifungal ear drops. Unnecessary use of topical, especially steroid containing antibiotic ear drops, self-cleaning and use of mustard oil for the treatment of otitis externa have been linked to an increased prevalence of otomycosis.[4] The aim of this study was to find out the association between otomycosis and these predisposing factors.

METHODS:

This was an observational cross-sectional study conducted in the Out-Patient Department (OPD) of Otorhinolaryngology, Lumbini Medical

Submitted: 9 July, 2019.

Accepted: 4 December, 2019.

Published: 29 December, 2019.

a - Lecturer, Department of Otorhinolaryngology

b -Associate Professor, Department of Otorhinolaryngology

c - Lecturer, Department of Microbiology

d - Lumbini Medical College and Teaching Hospital, Palpa, Nepal.

Corresponding Author:

Bhuwan Raj Pandey

e-mail: mrpandey@hotmail.com

ORCID: <https://orcid.org/0000-0002-4698-1946>

How to cite this article:

Pandey BR, Singh MM, Bajracharya K. Otomycosis and its Predisposing Factors in Out-Patient Department of Otorhinolaryngology in a Tertiary Care Centre. *Journal of Lumbini Medical College*. 2019;7(2):76-80. DOI: <http://doi.org/10.22502/jlmc.v7i2.291> Epub: 2019 December 29.



College and Teaching Hospital over a period of one year from March 2018 to February 2019. Ethical approval was obtained from the Institutional Review Committee of the institution. A total of 1130 patients with otitis externa attended the OPD of which 300 patients were clinically diagnosed as otomycosis. Informed consent was taken from the study participants.

The sample size was calculated using the following formula: $N=Z^2pq/e^2$ where, $Z= 1.96$; Prevalence of otomycosis (p) =23% [7]; $q=1-p$ and margin of error (e) =5%. The minimum sample size thus calculated was 273.

All patients presenting to the OPD with symptoms of ear itching, discharge, fullness, and earache were evaluated. Those with usage of steroid containing ear drops, self-cleaning and mustard oil instillation were included. If more than one predisposing factor were present, the patient was asked what the first thing they used was.

Patients with previous diagnosis of otomycosis, acute or chronic suppurative otitis media, diabetes mellitus, tuberculosis and generalized fungal infection were excluded.

Ear canal was examined with an otoscope and clinical diagnosis was made based upon the history and clinical examination. Clinical symptoms at time of presentation, demographic variables and predisposing factors were noted.

Patient's ear canal was cleaned by dry mopping method with cotton on Jobson Horne probe with ring curettage. Materials from ear canal were taken using sterile swab and sent to Department of Microbiology for processing within half an hour of collection. Swab was subjected to microscopic examination with 10% Potassium Hydroxide (KOH) preparation which was used to reveal fungal elements like hyphae and budding yeast cells and then inoculated in Sabourauds dextrose agar media at 25 °C to 30 °C until there were visible colonies. Cultures were examined frequently, at least three times a week, and then were examined macroscopically which resembled the colonies along with surface pigmentation. Lactophenol cotton blue mount was performed for identification of fungal structure and gram staining for candida species. All patients received clotrimazole antifungal ear drops, three drops daily for two weeks. They were asked to avoid predisposing factors and followed up in two weeks.

Data was entered to and analyzed with Statistical Package for Social Sciences (SPSS™)

software version 16. Descriptive statistics was presented as frequencies, percentage, mean and standard deviation (SD). Categorical variables were analyzed using Chi Square test. p-value less than 0.05 was considered statistically significant.

RESULTS:

A total of 300 patients clinically diagnosed with otomycosis were enrolled in the study. The mean age of the patients was 37.7±18.8 years. The sample consisted of 172 females (57.3%) and 128 males (42.7%) with a female: male ratio of 1.3:1.

Right ear (n=160, 53.3%) was affected more than the left (n=110, 36.7%) with bilateral involvement being only 10% (n=30) (Table 1).

Table 1. Clinical characteristics of patients (N = 300)

Variables	Frequency (%)
Laterality Distribution	
Right ear	160 (53.3)
Left ear	110 (36.7)
Both ear	30 (10.0)
Symptoms	
Pruritus only	95 (31.7)
Pruritus and Otorrhea	77 (25.7)
Otorrhea only	35 (11.7)
Aural fullness	26 (8.7)
Hearing loss	25 (8.3)
Earache	30 (10.0)
Tinnitus	12 (4.0)
Predisposing Factors	
Mustard oil instillation	124 (41.3)
Topical antibiotic (containing steroid) ear drop	106 (35.3)
Self-cleaning	70 (23.3)
Fungal Organism	
<i>Aspergillus niger</i>	104 (34.7)
<i>Candida</i>	78 (26.0)
<i>Aspergillus flavus</i>	55 (18.3)
<i>Aspergillus fumigates</i>	40 (13.3)
No growth	15 (5.0)
Mixed growth	8 (2.7)

Pruritus only was the most common presenting symptom in patients with otomycosis in our study. It was the most common symptom in

patients with self cleaning and also in patients with mustard oil instillation. However, pruritus with otorrhea was the most common presenting complaint in the patients who used topical ear drops (Table 2).

Table 2. Distribution of Pre-disposing Factors with Fungal Organism and Clinical Characteristics (N = 300).

Fungal organism	Self - cleaning	Mustard oil instillation	Topical antibiotic ear drop
<i>Aspergillus niger</i>	35 (50.0%)	40 (32.3%)	29 (27.4%)
<i>Candida</i>	12 (17.1%)	29 (23.4%)	37 (34.9%)
<i>Aspergillus flavus</i>	3 (4.3%)	30 (24.2%)	22 (20.8%)
<i>Aspergillus fumigates</i>	16 (22.9%)	20 (16.1%)	4 (3.8%)
No growth	4 (5.7%)	2 (1.6%)	9 (8.5%)
Mixed growth	0	3 (2.4%)	5 (4.7%)
Symptoms			
Pruritus	22 (31.4%)	43 (34.7%)	30(28.3)
Pruritus and otorrhea	11 (15.7%)	27 (21.8%)	39 (36.8%)
Otorrhea	8 (11.4%)	18 (14.5%)	9(8.5%)
Aural fullness	8 (11.4%)	11(8.9%)	7(6.6%)
Hearing loss	8 (11.4%)	8(6.5%)	9(8.5%)
Tinnitus	4 (5.7%)	4 (3.2%)	4(3.8%)
Earache	9 (12.9%)	13 (10.5%)	8(7.5%)

The most common predisposing factor was mustard oil instillation (n=124, 41.3%). Similarly, *Aspergillus niger* was the most common fungus causing otomycosis in this study (n=104, 34.7%).

Aspergillus niger (n=35, 50.0%) and *Aspergillus fumigates* (n=16, 22.9%) were common in self-cleaning group, *Aspergillus niger* (n=40, 32.3%) and *Aspergillus flavus* (n=30, 24.2%) were common in mustard oil instillation group. *Candida* was the most common causative agent (n=37, 34.9%) in patients using steroid containing antibiotic ear drops (Table 2).

Fungal growth was seen in 285 patients (95%) with the highest growth in patients with mustard oil instillation (n=122, 42.8%) (Table 3).

Table 3. Association of fungal growth with predisposing factors(N=300)

Fungal growth	Predisposing factors			Statistics
	Self cleaning	Mustard oil instillation	Topical steroid containing ear drops	X ² = 5.789, df= 2, p= 0.055
Yes	66 (23.2%)	122 (42.8%)	97 (34.0%)	
No	4 (26.7%)	2 (13.3%)	9 (60.0%)	

DISCUSSION:

Otomycosis is a superficial fungal infection that can affect external auditory canal, middle ear and post-operative mastoid cavity. It is a common condition encountered by otorhinolaryngologists. This paper aimed to study the predisposing factors of otomycosis and their association.

In this study, the prevalence of otomycosis was high in the middle age with mean age of 37.7 ± 18.8 years. The higher prevalence in these patients may be due to their active working conditions and more concern regarding their health, thereby visiting hospital for further treatment.

In our study, females were affected more by otomycosis similar to that reported by Pontez ZB et al.,[5] and Fasunla J et al.[6] Other studies also showed higher prevalence of otomycosis in female while in some studies there was male predominance of otomycosis.[7,8]

Otomycosis is usually a unilateral disease and bilateral involvement is very low. Our study showed right sided predominance (53.3%) compared to the left side (36.7%). Bilateral involvement was seen in only 10% which is similar to the study by Ho T et al.[1] Right ear is more commonly involved because of more frequent self-cleaning of right ear with unsterile objects as most people are right handed.

The most common symptom of otomycosis is pruritus. In our study too, pruritus was the main symptom. The study by Paulose et al.[9] and Jia X et al.[10] also showed the presence of pruritus was most common.

Ear scratching with wooden sticks or metal wax picks to clean cerumen and rubbing of ear to get relief from itching can cause minor skin

trauma of external auditory canal with deposition of fungal spore in the wound that later can cause fungal infection.[10] In our study, nearly one fourth (23.2%) of the patients with otomycosis had habit of self-cleaning of ears which is comparable to findings of Prasad SC et al.[11]

There is a popular belief that instillation of mustard oil relieves itching and cures ear problems. Our study showed 42.8% of patients with otomycosis had used mustard oil similar to the result of Pradhan B et al.[7] Oil has been reported to be sporostatic and a study by Jain SK et al.,[12] showed *Aspergillus* species to be present in mustard oil.

The presence of bacterial infection with or without treatment by topical or systemic antibiotic appears to change the physiochemical environment of the meatus and facilitate fungal growth. It was found that patients who used unnecessary steroid containing ear drops had more chances of having otomycosis.

Normal flora of external auditory canal is one of the host defense mechanisms against fungal infection and this mechanism is altered in patients using antibiotic ear drops thus making them more susceptible to otomycosis.[13] In the present study 34.0% of patients with otomycosis had used ear drops. In the study by Fasunla J et al.,[6] 13.76% patients had prior topical antibiotic treatment following misdiagnosis. Similar results were shown in the study by Munguia et al.[4]

In the present study growth was seen in 95% of cases. In the study by Pradhan B et al.[7] 81.3% had positive fungal cultures. The incidence of growth of fungal growth was high in patients with the history instilling mustard oil (42.8%) into the ear, 34.0% in topical steroid containing ear drops and 23.2% in self-cleaning group which was similar study done by Prasad SC et al.,[11] whose studied showed 42% in mustard oil instillation, 20% using topical steroid containing ear drops and 32% self-cleaning.

It was observed that *Aspergillus niger* species was cultured most commonly (34.7%) in the present study, which correlates with the findings of the study by Paulose et al.[9] This is in contrast to the study done by Kaur RK et al.,[8] which showed *Aspergillus fumigatus* was the most common in otomycosis.

Candida species have hydrolytic enzyme and protease activity helping in invasion of host tissue thus playing an important role in the pathogenesis of otomycosis.[3] It colonizes the skin and penetrates the host cells which causes infection to ear.[14] In

our study there were 26% of cases with *Candida* infection. In the study by Jia X et al.[10] it was 16.52%. So most of the time patients are infected either with *Aspergillus* or *Candida* in otomycosis.

This study was conducted only with patients using mustard oil. Other types of oil usage could have been included.

CONCLUSION:

Otomycosis commonly presented with clinical symptoms of pruritus, and combination of pruritus and ear discharge. It was found to be more common in people who instilled mustard oil into the ears, used unnecessary ear drops and cleaned ears with unsterilized objects. There is a need to educate patients about the consequences of using such remedies for ear problems.

CONFLICTS OF INTEREST: Authors declare that no competing interest exists.

SOURCE OF FUNDS: No funds were available.

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