Original Research Article

Mycology of Otomycosis in Port Harcourt

Abstract

Tropical climate favors the growth of fungal infection in the ear resulting in otomycosis. This study is aimed at determining the predisposing factors, symptoms, prevalence and demographic data of patients diagnosed with otomycosis. This is a 1 year prospective hospital based study, between June 2017 to June 2018 at University of Port Harcourt Teaching Hospital (UPTH) , Rivers State, Nigeria. Clinical features, predisposing factors and examination findings were noted on the administered questionnaire. Patients were examined and specimen collected for microscopy, culture, sensitivity and mycological studies. Our results show isolated fungi were present in 34 out of 120 ear swabs of patients and in 5 out of 120 ear swabs from the control group. The prevalence of otomycosis was 2.7 %, while the ear symptom with the highest frequency was itching (86.7 %) and debris in ear canal (67.6 %). Patients with positive growth constitute 53 % females and 47 % males. Age groups 10-29 and 40-49 years had the highest and lowest number of infected patients, respectively. Candida was the commonest organism isolated accounting for 61.8 % followed by Aspergillus spp. (23.5%) and Penicillium (8.8%).

Key words: Otomycosis, mycology , prevalence, demographics

INTRODUCTION

When external auditory canal is affected by fungal infection, it is known as fungal otitis externa or otomycosis [1]. Although otomycosis occurs globally, its occurrence is predominant in warm, wet humid and dusty environments, hence its prevalence in sub-Saharan Africa [2;3]. Otomycosis is commonly reported in the tropics associated with hot and humid climatic condition [4;5;6].

The most commonly identified fungal species associated with otomycosis are namely *Aspergillus niger, Aspergillus fumigatus*, and *Candida albicans* [4]. Other fungal species are *Penicillium* and *Pitirosporum* [2;3;7].

Otomycosis could result from prolonged treatment with topical antibiotics while those that are immune compromised are predisposed to the infection [1;4 ;5;6]. Other predisposing factors include poor personal hygiene ,contaminated objects or fingers into the ear, frequent use of cotton buds as well as head covers in some parts of the world [8]. In a study done by Rao et al occurrence of otomycosis was 78.3 % in a tertiary care teaching hospital in Karnataka, India [9]. High prevalence of otomycosis is attributed to hot, humid, and dusty places in tropics and subtropics [10].

Port Harcourt, Rivers State, Nigeria popularly known for crude oil production has mean maximum monthly humidity and temperature of 112.47 % and 31.29 ^{o}C respectively with a

203.03 mm monthly rainfall [11]. The reoccurrence of otomycosis is common and treatment is usually long-term [12].

Onotai et al in a retrospective study of patients with otomycosis in the Ear, Nose, and Throat (ENT) clinics in University of Port Harcourt Teaching Hospital (UPTH) from January 2009-Decemeber 2013 recorded 1115 patients with otomycosis and a prevalence of 14.9 % [13]. To the best of our knowledge, a similar study had not been repeated in the same facility to ascertain its current prevalence. Therefore, this prospective study seeks to evaluate the prevalence of otomycosis among patients who recently visited ENT clinic, UPTH.

MATERIALS AND METHODS

3.1: Duration and Study Area

This is a 1 year prospective study carried out from June 2017 to June 2018 in the Ear, Nose and Throat clinic, University of Port Harcourt Teaching Hospital (UPTH) which serves as a reference hospital within the state as well as referrals from other South- South States.

3.2: Sample collection

The study comprised of 120 subjects and 120 controls involving all age groups who presented with symptoms of ear pain, intense itching of the ear, aural fullness, tinnitus, reduced hearing and/or ear discharge with one sign from examination findings of either tragal tenderness, inflamed or narrowed external auditory cannal, ear discharge and/or debris in the canal. The control group comprises of patients who are age (±5 years) and sex matched, presenting in ENT clinics with no otologic symptoms. Individuals who did not give consent or had commenced anti biotics or antifungal agents were excluded from the study.

Ethical approval was sought and obtained from the ethics review committee of UPTH. Informed consent was obtained from the patients or parents/guardian present in the clinic with details of the procedure and benefits of the results. There is confidentiality of the patient's information and results. The procedure of specimen collection was done with care, to prevent harm to the patient. The study was at no extra cost to the patient.

3.3: ANALYSIS

A detailed ear examination was done and findings noted. With the aid of an otoscope, the EAC and TM were examined. Any discharge or debris in the EAC was noted and sample was aseptically collected using sterile swab. Two samples were taken from the affected ear of each subject. First swab was used for direct Gram stain and KOH mount and second swab for fungal culture; Swabs were inoculated on freshly prepared acidified Sabouraud Dextrose Agar (SDA) plates amended with 250mg Tetracycline then incubated at 25±2 ^{o}C (room temperature) for 7 days.

3.4: Identification of the Fungal Isolates

The fungal isolates were identified based on morphological and microscopic characteristics such as colony growth pattern, conidial morphology, and pigmentation. The technique described by Odokuma and Okpokwasili [24], was also adopted for the identification of the isolated fungi using cotton blue in lactophenol stain. This was done by placing a drop of the stain on clean slide with the aid of a mounting needle, where a small portion of the aerial mycelia from the representative fungi cultures was removed and placed in a drop of lacto phenol. The mycelium was well spread on the slide with the needle. A cover slip was gently placed with little pressure to eliminate air bubbles. The slide was then mounted and viewed under the light microscope with ×10 and ×40 objective lenses. The morphological characteristics and appearance of the fungal isolates seen were identified in accordance with standard scheme for identification of fungi as adopted by Okerentugba and Ezereonye [27].

RESULTS

There was a total of 1,254 new patients seen in the ENT clinic during the time of review, of which a total of 120 subjects were diagnosed of otitis externa giving a prevalence of 9.6% with a prevalence of 2.7% for positive growth of otomycosis .

The most common presenting symptom amongst patients with fungal isolates in this study was itching 94.1% , this was followed by otalgia 85.3% and aural fullness 79.4% with ear discharge as the least accounting for 44.1% (Table 2).

The examination findings of patients with otomycosis was analysed which shows debris within the EAC as the most common finding, followed by an inflamed or edematous EAC. This is represented in Table 3.
The most common fungal isolates amongst the subjects were *Candida* spp. ,with a total of 21 isolates (61.8%) followed by Aspergillus 8 (23.5%) , *Penicillium* 3 (8.8%) and the least being the co infection of two fungal isolates in the same ear viz *Candida* and *Penicillium* 2 (5.9 %). Among the control candida was the only fungal isolate seen (100 %) These are illustrated in Table 4. The age range between 10 and 29 years had the highest frequency of occurrence as illustrated in Table 1. Further analysis showed bacteria co infection in 38.20% of subjects with otomycosis (Fig 2) .

Table1: Age Distribution among Patients with Otomycosis

Age category	Frequency	Percentage (%)
<10 years	6	17.6
10 – 19 years	8	23.5
20 – 29 years	8	23.5
30 – 39 years	5	14.8
40 – 49 years	1	2.9
50 – 59 years	2	5.9
≥60 years	4	11.8
Total	34	100.0

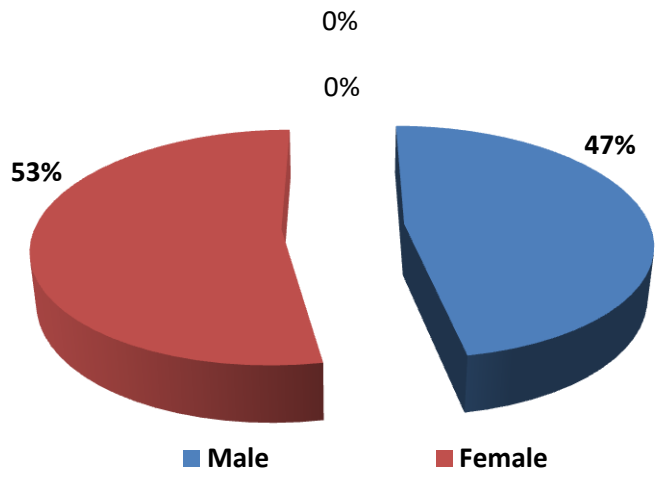

Fig 1 . Gender distribution among subjects with otomycosis

Figure 1 illustrates a gender distribution of 18 females and 16 males accounting for 52.9% and 47.1 % respectively in this study.

Table 2: Ear symptoms associated with otomycosis

Ear symptoms	Frequency (N=34)	Percentage (%)
Itching	32	94.1
Otalgia	29	85.3
Aural fullness	27	79.4

Tinnitus	24	70.6
Hearing impairment	22	64.7
Discharge	15	44.1

Table 3: Ear examination findings of patients with otomycosis

Ear symptoms	Frequency(N=34)	Percentage (%)
Debris in ear canal	23	67.6
Inflammed ear cannal	18	52.9
Tragal tenderness	9	26.5

Table 4 : Fungal isolates in otomycosis and control

Fungal isolates	**Subjects (34) n (%)**	**Control (5) n (%)**
Candida	**21 (61.8)**	**5 (100)**
Candia albican	7	5
Candida tropicalis	3	0
Candida rugose	5	0
Candida krusei	6	0
Aspergillus	**8 (23.5)**	**0 (0.0)**
Aspergillus niger	4	0
Aspergillus fumigatus	4	0
Penicillum	**3 (8.8)**	**0 (0.0)**
Candida albicans and Penicillum	**2 (5.9)**	**0 (0.0)**
Total	**34 (100.0)**	**5 (100.0)**

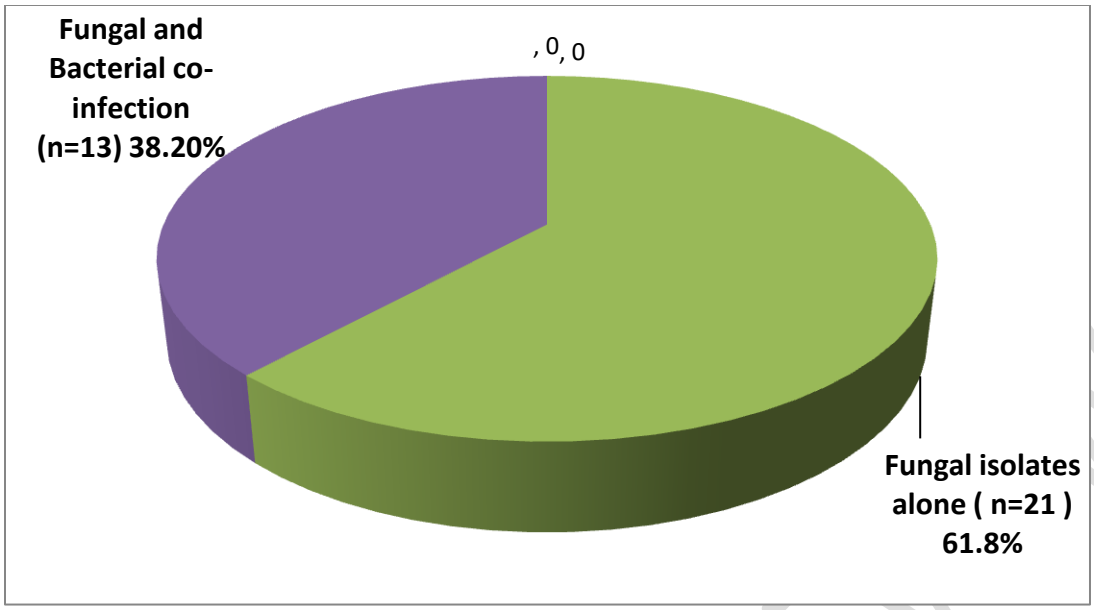

Fig 2. Distribution of Bacteria and fungal co infection in otomycosis

Table 5. Predisposing factors of fungal ear infection among subjects

Variables *	**Subjects with fungal growth (n=34)**
Non- infectious dermatological conditions (eczema,dermatitis, psoriasis)	4 (11.8%)
Subjects who are Immunocompromised (diabetes ,HIV etc)	2 (5.9%)
Use of fomites (cotton buds, sticks, feather, paper, pen)	20 (58%)

***none of the respondents used ear plugs nor hearing aids**

DISCUSSION

Age and sex matching of the subjects and the control used for this study revealed no statistical difference between both groups. Taking the age and gender of the subjects used in this study into consideration statistically, the *p- value* was 0.24 and 1.00, respectively as shown in Table 1.

The prevalence of otomycosis in University of Port Harcourt Teaching Hospital between June 2017 to June 2018 was 2.7 %. This prevalence is lower than a 5 year retrospective study carried out by Onotai et al in the same institution between January 2009 - December 2013 which reported otomycosis prevalence of 14.9 %[13]. A similar retrospective study also carried out by Fasunla *et al.* in the University College Hospital, Ibadan from 1996-2005 reported 6.54 % as

prevalence of otomycosis [14]. The lower prevalence in this study is probably due to the increased community enlightenment on ear care over the years.

However in Northern Nigeria, a similar study carried out by Musa *et al.* (2015) in the National Ear Care Center Kaduna between January 2009-March 2013 showed 1.0 % prevalence [15]. It is possible that climatic condition could have played a key role in low prevalence of otomycosis recorded in North geopolitical zones in Nigeria where there is usually less rainfall compared with South-South geopolitical zone which was the location for this study.

Previous studies reported that otomycosis can affect any age group [12]. The age group that recorded highest percentage frequency of fungal ear infection in this study was 10-19 years and 20-29 years which is similar to the findings by Mgbe *et al* [16]. This could be attributed to the involvement of swimming, water games and insertion of fomites into the ear canal that predispose them to otomycosis.

This study revealed that among the 34 patients diagnosed with otomycosis, 18 were females and 16 males which represent 52.9 % and 47.1 %, respectively. This result is in agreement with research findings by *Pontes et al.*[3] and *Rao et al.* [9] .The higher prevalence of otomycosis in females than males could be attributed to use of chemicals getting into the ear canal during hair treatments in the salon.

Based on our research findings, itching of the ear was the most common symptom associated with otomycosis with a frequency of 94.1 %. This result corroborates the research findings by Abdelazeem *et al.* which reported 100 % itching from patients diagnosed with otomycosis [17]. Although other ear symptoms such as otalgia (85.3%), ear fullness (79.4%), tinnitus (70.6%), hearing impairment (64.7%) and ear discharge (44.4%) may be associated with otomycosis as noted in a similar study by *Fasunla et al* [14], it is probable that most patients have itching as the initial symptom due to the presence of microorganism in the ear canal or absence of cerumen. This can cause increased irritation of the skin, which may result in trauma to the canal from scratching resulting in inflammation.

The ear examination findings of patients with otomycosis revealed that debris in ear canal had the highest frequency of occurrence (67.6 %), while 18 (52.9 %) patients had inflamed/oedematous EAC and 9 (26.5 %) patients had tragal tenderness .This is probably due to the nature of fungi, which may be unicellular or filamentous and reproduce by spores [7]. Their presence in the warm ear canal creates a favorable environment for fungi growth.

Candida albican which is an opportunistic fungi is seen on the skin ,it is capable of pathogenicity when the host mechanism has been suppressed. This may account for *Candida spp* (61.8%) as the highest fungal isolate seen in this study and is in agreement with works done by *Adoga et al* [18] and *Fayemiwo et al* [19]. However varies from *Nwabuisi et al* [20] and *Gugnani et al* [21] who discovered more of *Aspergillus spp* in their studies.

Considering the predisposing factors of fungal ear infection among those that participated in this study, our results revealed the use of fomites (cotton buds, sticks, feather, paper, pen etc) accounted for the highest risk factor with a value of 58.8% of patients with otomycosis . The use

of cotton bud was also noted as a predisposing factor in studies done by *Moshe et al* [22], *Yavo et al* [23] and *Oladeji et al* [24]. Cotton buds is commonly used by the public to clean their ears and manage ear itching. This may result in trauma of the canal or direct introduction of organisms into the ear. In a study by *Abdullahi et al*, the use of cotton buds accounted for 73.9 % of materials introduced into ear canal [25].

The proportion of bacteria co infection (38.2%) was high among patients with otomycosis. This is similar to a study done by *Panchal et al* which had a co infection of 26.08% in a prospective study on otomycosis in India [26]. It is possible the presence of bacteria infection in the external ear creates a conducive environment for the fungal commensals to be infective .This gives a clearer picture to the prolonged treatment and recurrent infection when treating with monotherapy

CONCLUSION

This study revealed the prevalence of otomycosis among patients who attended the ENT clinic of University of Port Harcourt Teaching Hospital, Rivers State as 2.7 %. Otomyosis affects all age groups and both sex, with *Candida spp.* as the most common fungal isolate. In the management of recurrent otitis externa there should be a high index of suspicion of otomycosis.

CONSENT AND ETHICAL APPROVAL

As per international standard or university standard guideline participant consent and ethical approval has been collected and preserved by the authors.

DISCLAIMER

The company name used for this research is commonly and predominantly selected in our area of research and country. There is absolutely no conflict of interest between the authors and company because we do not intend to use this company as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the company rather it was funded by personal efforts of the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist

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