

Original Research Article

Otomycosis among patients presenting with ear discharges at a tertiary hospital in south western Uganda

ABSTRACT

Aims: To determine the prevalence, mycology profile, associated symptoms and risk of otomycosis among patients that present with an ear discharge.

Study design: This was across sectional study

Place and Duration of Study: Departments of Ear Nose and Throat (ENT) and Microbiology, Faculty of Medicine, Mbarara University Teaching Hospital, between 2013 and 2015

Methodology: We recruited 117 patients (52 men, 65 women of age range 1-69 years) with discharging ear. Both new and followup patients were included in the study. Clinically, patients were also assessed for symptoms and possible predisposing factors. For laboratory diagnosis, ear swabs were aspectically collected and mycology profile determined using both direct examination and culture techniques. Fungal identification was through stimulation of fruiting bodies such as conidia or chlamydospores and biochemical identification.

Results: Of the 117 participants enrolled, fungal aetiology was detected in 24(20.51%) with direct microscopy and confirmed in 16(13.68%) by culture. Otomycosis was more common among the youth (54%, p -value = 0.02). There were no significant symptoms associated with otomycosis; however, HIV/AIDS and mastoidectomy were equally significant predisposing factors (p -value; 0.001 and 0.002, respectively). *Aspergillus species*, *Candida albicans* and *Cladosporium species* were the commonest agents isolated (p -value=0.000).

Conclusion: Otomycosis is common and an important disease of the external ear in this era of immune suppression. In southwestern Uganda *Aspergillus* and *Candida albicans* are predominant aetiological agents but aetiology due to opportunistis can be common. Thus, a need for robust diagnostic tools as means of evidence based patient management is now inevitable

Keywords: Otomycosis, ear discharge, fungi, *Aspergillus*, *Candida*, *Cladosporium*

1. INTRODUCTION

Otomycosis is a fungal infection of the external auditory canal (1-4). This infection can develop as a super imposed secondary infection alongside bacterial otitis. It is very common in the sub-tropical regions and usually presents as an acute, chronic or sub-acute inflammation with relatively mild but very damaging symptoms such as otorrhea, otalgia, scaling, pruritis, discomfort, maldorous discharge, and hear loss (1, 2, 5-7). On the other hand, a discharging ear can increase the risk of contracting otomycosis as ear exudates can trap airborne fungal propagules and act as a nutrient source for saprophytic fungi. In addition there are several other risk factors for otomycosis including but not limited to bacterial otitis, seborrhoeic dermatitis, swimming, diabetes, HIV/AIDS, warm temperatures, eczema and recently head phone usage (2, 4, 6, 7). Accordingly, otomycotic infections need to be differentiated from other causes of ear diseases. This is because common symptoms associated with ear disease are often not specific to otomycosis especially in patients that present with ear discharges. Furthermore, the main aetiological agents of otomycosis often reported are saprophytic fungi such as *Aspergillus species* (8-12). This calls for extra vigilance during clinical management and laboratory diagnosis as these can easily be mistaken for contamination. Thus, it is

important aetiology, risk factors and symptoms associated with otomycosis be evaluated in order to improve prognosis of these cases. In this study therefore we employed basic mycological techniques to demonstrate prevalence, mycological profile, symptoms and predisposing factors of otomycosis among patients presenting with ear discharges at a tertiary hospital in the south western region of Uganda.

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36 2. EXPERIMENTAL DETAILS

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39 2.1 Patients

40 This was a cross sectional study that recruited 117 patients. Only patients presenting with an ear discharge attending Ear Nose and Throat (ENT) clinic for the first time or on follow up treatment at the time of recruitment were included in the study. The patient's profiles were captured using a questionnaire and the data checklist included demographic information, treatment history (such as antibiotic, none sterile oils or antifungal usage), symptoms (such as itching, otorrhea, blockage, pain or burning sensations) and possible predisposing factors (such as HIV/AIDS, mastoidectomy, diabetes, pregnancy and ear manipulation with objects)

47 2.1.1 Mycology examination

48 Ear swabs were collected and aseptically processed both for direct examination and fungal culture. Both smears for gram staining and 20% potassium hydroxide (KOH) wet mount were prepared and examined. For fungal isolation, samples were primarily cultured on sabouraud dextrose agar (SDA) (-/+ antibiotics and incubated at 25°C and 37°C for 2-4 weeks and evaluated every 2-3 days. Positive fungal colonies were further sub cultured on potato dextrose agar (PDA) or cornmeal agar (CMA) 25°C and 37°C for 2-4 weeks to stimulate fruiting. Definitive diagnosis of otomycosis was done based upon presence or absence of fungal elements in a direct examination and/or microscopic identification of the characteristic structural fungal fruiting bodies for filamentous fungi and yeasts on CMA. Analytical profile index (API) was also performed on yeast isolates.

57 2.3 Data analysis

58 Data were analyzed using Graphpad prism, percentages and confidence interval of 95% used for categorical variables. Quantitative data presented as mean $\pm$ standard deviation, Chi-square tests for binary outcomes were also done and $P < 0.05$ were considered as statistically significant.

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64 3. RESULTS AND DISCUSSION

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66 Demographic distribution

67 The study recruited a total of 117 patients that presented with ear discharge. The females (55.56%) were the most common gender among the participants with children (32.48%) and youth (33.33%) as the most common age groups to present with ear discharges (**Table 1**).

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71 **Table 1.** Demographic data

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Variable	Number (%)
Age* groups (years)	
Children (1-13)	38(32.48)
Adolescents (14-17)	13(11.11)
Youth (18-34)	39(33.33)

Middle aged (35-64)	23 (19.66)
Elderly (>64)	4(3.42)
Total	117 (100%)
Gender	
Male	52(44.44)
Female	65(55.56)
Total	117 (100%)

Otomycosis cases by age, gender, mycological profile, predisposing factors, treatment history and symptoms.

Direct examination of samples showed more sensitivity when compared with culture results (Table 2). However combining results for both techniques, the highest prevalence of otomycosis was seen in youth 14 (58.33%) and among male participants 15(62.50%) (Table 3). When possible predisposing factors were analyzed, we observed preponderance of HIV/AIDS 6(25.00%) and mastoedectomy 5(20.83%). The treatment history analysis established that most of the patients had mainly been managed with antibiotics therapy 17(70.83%) (Table 3). While the most prevalent symptoms among otomycotic patients were itching 14(58.33%), reduced hearing 3(12.5%) plus a combination of otorrhea and itching 2(8.33%) with most of the other symptoms occurring in equal measures 1(4.17%) with exception of burning sensation 0(0.00%) (Table 3).

Table 3. Otomycosis cases by age, gender, predisposing factors, treatment history and symptoms.

Variable	KOH(n=24)			Culture (n=16)		
	proportion (%)	odds(95% CI)	p-value	proportion (%)	odds(95% CI)	p-value
Age groups			0.0982			0.064
Children (1-12)	4(16.67)	1		2(12.50)	1	
Young adults (13-18)	6(25.00)	2.9(0.72-11.80)		3(18.75)	2.60(0.40-17.01)	
Youths (19-45)	14(58.33)	3.39(1.01-11.44)		11(68.75)	5.19(1.07-25.17)	
Adults (>45)	0(0)	-		0(0)	-	
Gender			0.0461			0.1184
Male	15(62.50)	2.52(1.00-6.36)		10(62.50)	2.34(0.79-6.94)	
Female	9(37.50)	1		6(37.50)	1	
Predisposing factors			0.0483			0.0015
HIV	6(25.00)	4.12(1.22-13.87)		6(37.50)	12.5(2.96-52.85)	
HIV & mastoedectomy	0(0)	-		0(0)	-	
Diabetes	1(4.17)	2.06(0.20-21.63)		1(6.25)	6.25(0.53-74.38)	
Malignancy	0(0)	-		0(0)	-	
Pregnancy	0(0)	-		0(0)	-	
Mastoedectomy	5(20.83)	6.18(1.53-24.91)		4(25.00)	12.5(2.96-52.85)	
Cleaning ears with objects	1(4.17)	2.06(0.20-21.63)		1(6.25)	6.25(0.53-74.38)	
None	11(45.83)	1		4(25.00)	1	
Treatment history			0.779			0.7076
Antibiotics	17(70.83)	1.04(0.34-3.21)		9(56.25)	0.48(0.14-1.62)	
Antibiotics & Non-sterile oils	0(0)	-		0(0)	-	
Antifungals	1(4.17)	0.51(0.05-5.22)		1(6.25)	0.51(0.05-5.22)	
Non-sterile oils	1(4.17)	0.45(0.04-4.50)		1(6.25)	0.45(0.04-4.50)	
None	5(20.83)	1		5(31.25)	1	
Symptoms			0.7802			0.6233
Otorrhea	1(4.17)	1		0(0)	-	
Otorrhea & itching	2(8.33)	0.2(0.01-4.72)		1(6.25)	1	
Otorrhea & blockage	1(4.17)	1		1(6.25)	1	
Itching	14(58.33)	0.13(0.04-5.09)		10(62.50)	7.00(0.30-162.2)	
Itching & pain	1(4.17)	1		0(0)	-	
Itching & blockage	1(4.17)	1		1(6.25)	1	
Itching, pain & blockage	0(0)	-		0(0)	-	
Pain	1(4.17)	1		1(6.25)	1	
Burning sensation	0(0)	1		0(0)	-	
Burning sensation & blockage	0(0)	1		0(0)	-	
Reduced hearing (blockage)	3(12.50)	0.46(0.03-6.93)		2(12.50)	1.01(0.20-5.14)	

Aetiology of otomycosis

We determined the aetiological agents of otomycosis to be *Aspergillus fumigatus* 8(47.06%), *Apergillus flavus* 4(23.53%), *Candida albicans* 3(17.65%), *Aspergillus niger* 1(5.88%) and *Cladosporium* species 1(5.88%) (Figure 1).

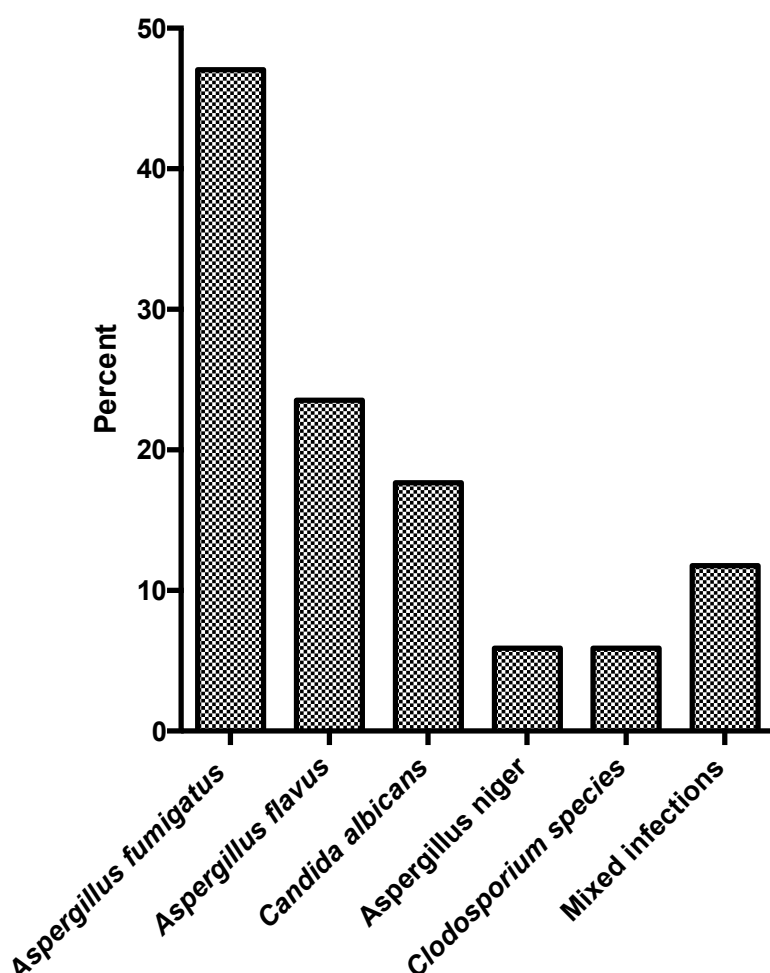


Figure 1. Otomycosis by aetiology

Discussion

It is possible that most otomycotic infections are secondary in nature and their significance can no longer be ignored. Otomycosis can be a common infection among patients that present with ear diseases with an estimated incidence of between 5-80% worldwide (13, 14). In this study we report the prevalence of otomycosis to be 20.51% in patients that presented with ear discharges at our ENT clinic. The prevalence of 20.51% recorded here is similar to many other studies that have reported similar figures of between 5-40% (1, 2, 5, 13, 15-19). This is however lower than several studies that have reported higher prevalences of between 70-80% (3, 6-9, 12, 13, 20-22). We also established that the most affected gender and age group were males and youth of age (19-45 years) respectively, a finding similar in age group comparison to many other studies but somewhat differed in gender comparison to some studies that have demonstrated females as the main victims of this infection (8, 18, 22, 23). Our findings though could not explain why men were the main sufferers but perhaps could be attributed to the life style and nature of work by this gender and age category. The

assessment of risk factors revealed HIV/AIDS, mastoedectomy and diabetes as the main predisposing factors to otomycosis (**Table 3**). These findings are similar to those by others that have reported several immunosuppressive conditions such as malignancies, diabetes mellitus or HIV/AIDS as key predisposing factors for otomycosis (2, 19, 24). Yet other risk factors often associated with otomycosis have also included usage of cotton buds, ear manipulation, use of ear drops and self-cleaning (22). Indeed, HIV has been reported as a major risk factor for chronic ear disease and this could explain our findings here in addition to the fact that south western Uganda is one of the regions with high incidence rates of HIV/AIDS in Uganda (25, 26). The influence of treatment history on manifestation of otomycosis also seemed crucial. Indeed, others have also reported treatment history as a risk factor for this infection (8). Here we report that majority of the study subjects had a history of antibacterial treatment when compared to those with antifungal management history (**Table 3**). This was not a surprising finding given the target population for the study. That is, a patient presenting with a discharging ear could have easily been mistaken to only have a bacterial infection. However, much as this can be a fact, the findings here further show the possibility that ear diseases can be worsened by a fungal infestation even when the the primary aetiology is or not fungal. However, other confounding factors such as misdiagnosis and negligence can also be linked to this outcome especially in patients that present with an ear discharge. Furthermore, among our participants, were also patients that employed non sterile oils as a treatment remedy but none of them presented with otomycosis. However, it is too early to determine the extent of damage these remedies can trigger because oil remedies such as masturd oil application have been highlighted by other studies as a risk factor for otomycosis (22). On the other hand, our analysis of the symptoms associated with otomycosis revealed that most of the symptoms seen in other cases of otitis externa are also seen during otomycosis. We established itching 58.33% and reduced hearing or blockage 12.50% as the most prevalent symptoms (**Table 3**). These findings were similar to what has been reported by other studies (4, 5, 22). However, these results indicate that otomycosis cannot be evaluated on the basis of symptoms alone since similar symptoms can be manifested by other ear infections. Finally, we also report here that otomycosis aetiology is dominated by Aspergilli species. We particularly recorded *Aspergillus fumigatus* as the most prevalent species (Figure 1). Other aetiological agents included *Candida albicans* and *Clodosporium* species. These findings are similar to many other studies that name Aspergilli species as the most common aetiological agents of otomycosis but differ in the fact that *A. niger* though widely reported as the most prevalent of them all *A. fumigatus* was the most prevalent here (2, 5, 6, 8, 10, 12, 13, 18, 23, 24, 27-29). As for the non Aspergillus isolates, we established *C. albicans* as the third most common isolate similar to many other studies as well (14, 18, 27, 29, 30). The other isolate was *Clodosporuim* species and so far this is the first study to associate *Clodosporuim* species with otomycosis. Indeed, *C. albicans* is a common isolate among these patients but not *Clodosporuim* species. However, the isolation of *Clodosporium* species here was of no surprise specifically because it was from a patient with a history of mastoedectomy. This is because our recent laboratory records show an increase in the prevalence of dermaticious fungi such as *Clodosporium* species among patients with history of trauma in this region (un published data). Dermaticious fungi are generally environmental opportunists that can contaminate wounds, and a discharging ear would be a suitable niche for such fungal organisms. Additionally, we also found mixed fungal infections (11.76%) similar to findings by Argrwal and Devi, 2017 (22). Mixed fungal infection can be a common feat especially in patients that present with hallmark underlying risk conditions.

4. CONCLUSION

This study does indicate that Otomycosis is common among patients that present with ear discharges. Thus, identification and differentiation of otomycotic aetiology is vital for appropriate management of patients in South Western Uganda. Most of the underlying conditions to opportunistic fungal infections can also predispose one to otomycosis and there are no clear cut symptoms for

otomycosis. So patients that present with some of the underlying conditions and symptoms reported here should be examined for fungal aetiology. Furthermore, we also show that *Aspergilli* species are the main aetiological agents of otomycosis in this region. However, aetiology due to other fungal agents such as *Candida albicans* and *cladosporium* species may not be uncommon.

CONSENT

All authors declare that written informed consent was obtained from the patients. A copy of the written consent is available for review by the Editorial office/Chief Editor/Editorial Board members of this journal."

ETHICAL APPROVAL

Approval for the study was obtained from Mbarara Univesity of Science and Technology instutional reveiw committee (MUST-IRC)

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