

Epidemiological and Mycological Profile of Otomycosis Diagnosed At the Oto-Rhino-Laryngology Department at Batna PHE – ALGERIA

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Submitted : 29 Nov 2024 ; Published : 6 Jan 2025

Citation: Hamouda, O & Kalla, N (2025). Epidemiological and Mycological Profile of Otomycosis Diagnosed At the Oto-Rhino-Laryngology Department at Batna PHE – ALGERIA. I J Infectious Disea 6(1):1-6. DOI : <https://doi.org/10.47485/2693-2326.1038>

Introduction: Fungal otitis or otomycosis is a relatively common pathology. Its prevalence represents according to studies 5 to 30% of all external otitis, most often chronic or subacute and benign. It can also affect the middle ear and even in some serious cases the inner ear. The main objective was to describe the epidemiological and mycological characteristics of fungal otitis and to determine their prevalence.

Materials and Methods: This study is prospective descriptive, carried out in the parasitology department at the Batna University Hospital, in collaboration with the Otolaryngology department at the PHS Batna, during a period of four months. We included in our study patients with clinical symptoms pointing towards the diagnosis of infectious otitis. Each patient had an ear sample taken using a sterile, dry cotton swab. They are inoculated in suitable mycological media. The cultures are then incubated in an incubator at 27°C and 37°C for 48 hours up to one week. The identification of the different species of filamentous fungi is based on the macroscopic and microscopic aspects of the colonies. The identification of the yeast species was done by the auxacolor gallery.

Results: We included 65 patients in our study, 23 of whom had proven fungal otitis (35%). We noted a predominance of the male sex (52.17%), with a sex ratio M/F = 1.09. The average age of our patients was 46.34 years, the age groups [31-45] and [46-60] were the most affected. Cleaning with cotton swabs was the most frequently found risk factor (52.27%), followed by swimming (34.43%). The most frequently found reasons for consultation were earache (48%), followed by otorrhea (31%). The location at the external auditory canal was the most frequently found (91%). We obtained 25 positive cultures; *Aspergillus Niger* was the most frequently isolated species (44%).

Conclusion: The pathogenic role of fungi in the etiology of ear pathologies remains underestimated or even ignored. Currently, it is a well-defined pathology and a recurring problem whose involvement of fungi as pathogenic agents is increasing. This is favored by a certain number of predisposing factors. However, prophylactic measures are essential. Practitioners must advise patients on environmental and body hygiene.

Keywords: Fungal otitis, otomycosis; filamentous fungi; yeasts, *Aspergillus Niger*.

Introduction

Otomycosis is a fungal infection mainly affecting the external ear. It is sometimes associated with a bacterial infection in its status as an opportunistic infection. The epidemiology of otomycosis is global; however, the hot, humid and dusty environment of tropical and subtropical regions makes otomycosis more prevalent in these regions (Joy et al., 1980). The infection can be acute, subacute or chronic (Kaur, et al., 2000). Currently, it is a well-defined pathology and a recurring problem whose involvement of fungi as pathogens is increasing. This is favored by a number of predisposing factors, namely: the use of broad-spectrum antibiotics and corticosteroids for the treatment of bacterial otitis, the terrain

(diabetes, immunosuppression, AIDS, etc.), the tropical climate and local and post-surgical trauma (Kaur et al., 2000; Geaney, et al., 1967). A fungal etiology should be considered in chronic suppurative otitis media, when otorrhea is persistent. Invasive mycotic otitis are very rare and serious forms and correspond to a necrotizing evolution of the infection. The main pathogens encountered are: *Aspergillus* spp and *Candida* spp (Kim et al., 2002; Bordure, 1995). The most suggestive clinical signs of otomycosis are otorrhea, otalgia and ear pruritus (Kaur, et al., 2000; Fasunla et al., 2008). The diagnosis of fungal otomycosis is essentially based on clinical presumption and mycological diagnosis in order to identify

the fungal agent responsible (Aboulmakarim et al., 2010). The difficulty of managing otomycosis lies on the one hand in the virtual absence of galenic forms of antifungals adapted to the external auditory canal, and on the other hand in the difficulties of treating chronic or recurrent forms. Our study is prospective descriptive, carried out in the parasitology department at the Batna University Hospital, in collaboration with the Oto-Rhino-Laryngology department at the PHE of Batna, during a period of four months.

Our main objective was to describe the epidemiological characteristics of fungal otitis.

And as secondary objectives:

- Determine the risk factors.
- Describe the different fungal species isolated.
- Establish a strategy for good management and prophylaxis

Materials and Methods

Study Setting: Our study was carried out at the ORL department at the PHE of Batna in collaboration with the parasitology department at the Batna University Hospital.

Type and Duration of the Study: Our study is prospective descriptive cross-sectional, which took place over a period of 4 months between January 2022 and April 2022.

Study Population: Our study population included all patients who consulted for infectious otitis.

Inclusion Criteria

- Patients with clinical symptoms pointing towards the diagnosis of infectious otitis.
- Patients whose ear mycological samples were positive on direct examination and/or culture.

Exclusion Criteria

- Patients who consulted for another ORL problem.
- Patients under antifungal treatment.

Data Collection: Data was collected from information sheets that contain general and specific information on fungal otitis.

Data Processing and Analysis: The data collected were entered and analyzed on Excel 2016 software.

Ethics: Free and informed consent was obtained from each patient before the examination through a detailed explanation of our study, professional secrecy was maintained; confidentiality and anonymity are essential.

Methodology

Ear samples were taken under otoscopic control, using sterile and dry cotton swabs. The samples are quickly sent to the parasitology department. Before inoculating the samples, all sterility conditions were respected. The samples were cultured in Sabouraud medium supplemented with chloramphenicol. The cultures were then incubated in an incubator at 27°C and 37°C, for 24 to 48 hours for yeasts and up to a week for

filamentous fungi. The identification of the fungi was based on a number of macroscopic and microscopic criteria of the cultures. The auxacolor gallery, the principle of which is based on the assimilation of sugars, was used for the identification of yeast species.

Results

Overall Data: We included in our study 65 patients, 23 of whom had proven fungal otitis with a positive mycological culture; a prevalence of 35% (Fig1).

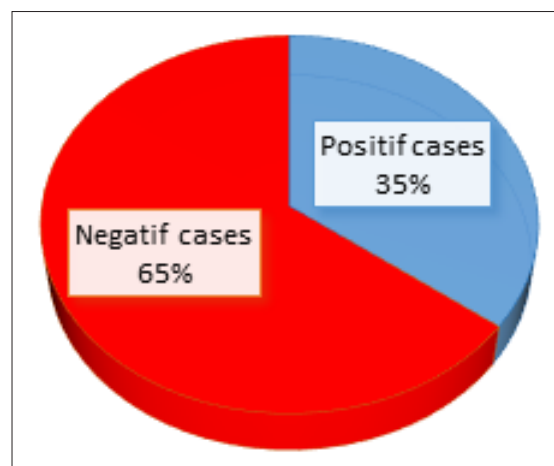


Figure 1: Prevalence of fungal otitis during the study period

Distribution of Patients by Gender: We noted a predominance of the male sex, 12 men (52.17%) compared to the female sex, 11 women (47.83%), with a sex ratio M/F = 1.09. (Fig2).

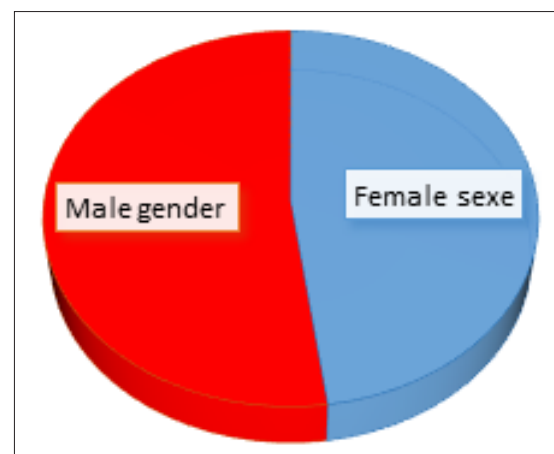


Figure 2: Distribution of patients by gender.

Distribution of Patients by Age: The average age of our patients was 46.34 years, the age groups [31-45] and [46-60] were the most affected. (Fig3).

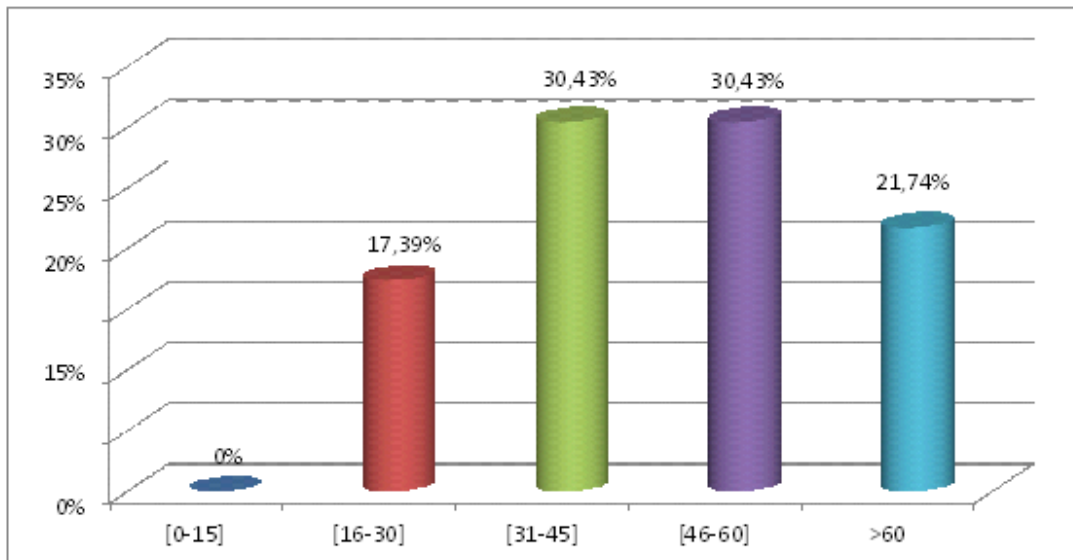


Figure 3: Distribution of patients by age.

Distribution of Patients according to risk factors: Several risk factors were sought. The presence of a risk factor was found in 15 patients; a prevalence of (65.21%). Cleaning with cotton swabs was the most frequently found risk factor (52.27%) followed by swimming (34.43%). The other risk factors are illustrated in Table 1.

Table 1: Distribution of patients according to risk factors.

Risk Factors	Number of Cases	Percentage (%)
Cleaning with cotton swab	12	52,17
frequent swimming	08	34,43
Corticosteroid therapy	03	13,04
Diabetes	01	04,34

Distribution of patients according to clinical signs: The most frequently found reasons for consultation were earache (48%) followed by otorrhea (31%) (Fig 4).

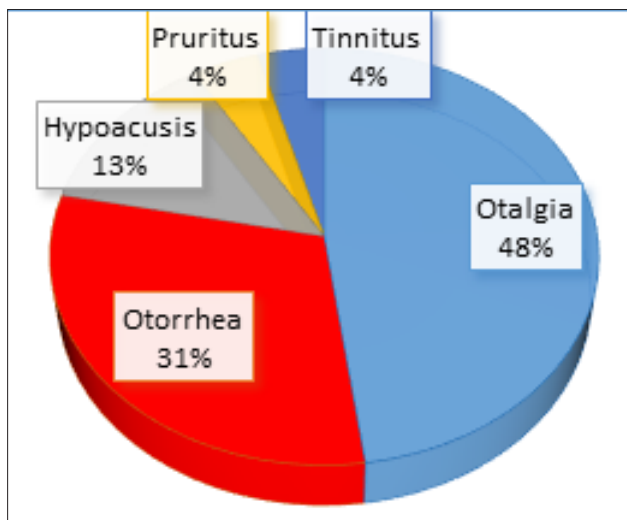


Figure 4: Distribution of patients according to clinical signs

Distribution of fungal otitis according to location: Location at the level of the external auditory canal was the most frequently found in our study 21 cases out of all 23 cases or (91%). (Fig5).

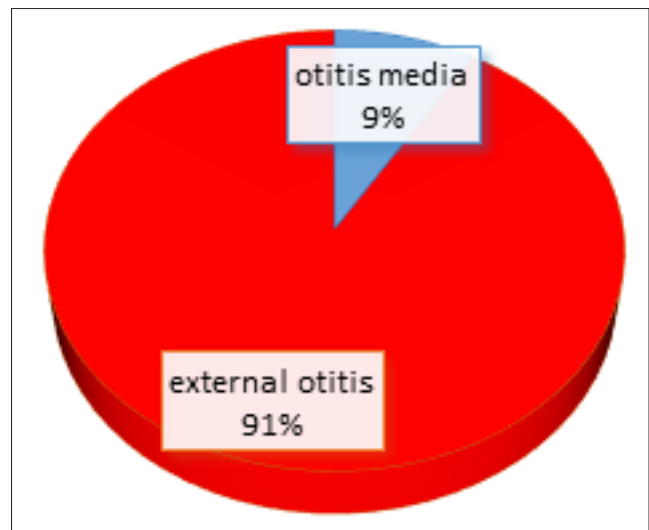


Figure 5: Distribution of fungal otitis according to location.

Mycological Data: We obtained 25 positive cultures. Identification revealed 10 fungal species (Table 2). *Aspergillus niger* was the most frequently isolated species (44%).

Table 2: Number and percentage of fungal species isolated in culture.

Fungal Species	Number	Percentage (%)
<i>Aspergillus niger</i>	11	44%
<i>Aspergillus fumigatus</i>	02	8%
<i>Candida parapsilosis</i>	04	16%
<i>Candida famata</i>	01	04%
<i>Candida ciferrii</i>	01	04%
<i>Candida dubliniensis</i>	01	04%
<i>Candida albicans</i>	01	04%
<i>Cryptococcus albidus</i>	02	08%
<i>Trichosporon sp</i>	01	04%
<i>Trichophyton rubrum</i>	01	04%
Total	25	100%

Discussion

It is important to note that fungal ear disease constitutes a third of all patients who were used for this study. In view of these results, it seems useful to compare the prevalence of otomycosis in our study which is (35%) with those of other studies carried out whether national or international. The prevalence of otomycosis recorded in our study appears very close to the results obtained by Cheriet et al. (2017), in their study on otomycosis in the Guelma region with a sample size of 65 samples, these authors recorded a rate of (34.84%) (Cheriet et al., 2017). Meradji et al, found a rate of (41.81%) during a study carried out at the Saadna Sétif University Hospital (Meradji et al., 2013). Furthermore, internationally, Riah (2010) in Rabat revealed an isolation rate of (37.5%) (Riah, 2010) which is close to our result. However, in India (Aneja et al., 2010) and Turkey (Degerli et al., 2012) reported relatively higher rates of (78%) and (70.10%) respectively (Aneja et al., 2010; Degerli et al., 2012).

This variation in prevalence would be mainly linked to climatic conditions, environmental hygiene, the combined action of heat and excessive humidity which are among the factors favoring the growth of fungal agents.

On the epidemiological level, we noted the predominance of the male sex, with a sex ratio of 1.09. Our result is similar to that obtained by Hueso et al. (2005) in Spain, who showed that men (55.8%) suffer more from otomycosis than women (44.2%) (Hueso et al., 2005). The explanation for the male predominance is the fact that men engage in more outdoor activity than women, and are therefore more exposed to airborne spores (Bineshian et al., 2005).

Age was also a contributing factor since we were able to establish a distribution that is not homogeneous according to the age group considered, with a maximum incidence between 31 and 60 years. This age group corresponds to the most active period of life. Our observations are consistent with those recorded by Cheriet et al. (2017), who found that the most affected age group is between 41 and 70 years, a (47.61%)

of otomycosis cases (Cheriet et al., 2017). These results are also close to those obtained by Riah et al (2010) in their study conducted on otomycosis in Rabat, where they recorded a predominance of cases of otomycosis in subjects whose age group included [41 and 70 years] (Riah, 2010).

In our context, certain common habits would be factors favoring the occurrence of otomycosis. Indeed, cleaning with cotton swabs (52%) and frequent swimming (34%) were the main risk factors in patients with otomycosis. However, corticosteroid therapy (13%) and diabetes (4%) are not really frequent risk factors. Our results were similar to those conducted by Iken et al (2015) in their study on the epidemiology of otomycosis in Morocco, where they found that frequent cleaning of the ear canal is the main factor promoting otomycosis (37.3%), followed by frequent swimming (29.3%) (Iken et al., 2015). Indeed, cleaning the ears with cotton swabs causes trauma and an imbalance of the auricular microbial flora and increases the frequency of otomycosis. Swimming is an obvious risk factor for fungal otitis, it reduces the acidity of the skin of the external ear canal and alters the protective ceruminous film. Garcia et al. (1993) in their study, showed that (90%) of otomycosis were linked to swimming in the sea (Garcia et al., 1993). In Turkey, (27%) of patients with otomycosis frequently bathed in the pool or the sea and (23%) frequented thermal baths (Ozcan et al., 2003).

Clinically, the location of fungal infection in the ear was divided between the external ear (fungal otitis externa) and the middle ear (fungal otitis media). Fungal otitis externa in our study was more common than fungal otitis media. It appears from these results that this type of fungal infection prefers as anatomic location, the external ear (fungal otitis externa) with a frequency of (91%). On the other hand, otitis media occupies only 9% of cases. Our result is similar to that obtained by Cheriet et al. (2017), who noted that (95%) of cases of otomycosis affecting the external ear (Cheriet et al., 2017). In another study by Vennewald et al, fungal infection was detected in the external ear canal in 54 patients, while only 5 patients had fungal otitis media (Vennewald et al., 2003).

On the other hand, Aboulmakarim et al. (2010), found the high frequency of otitis media compared to otitis externa, this is explained by the fact that most patients had consulted at a late stage of the disease, the involvement of the external auditory canal often goes unnoticed and is secondarily complicated by otitis media (Aboulmakarim et al., 2010).

In our study, the most common symptom in our patients was otalgia (48%) followed by otorrhea (31%), hypoacusis (13%), pruritus (4%) and tinnitus (4%). Dehan S et al (2019) in their study on otomycosis in Algeria, noted that otalgia was the most common symptom in patients with otomycosis (35.7%) (Dehane et al., 2019). Similarly Cheriet et al. (2017), showed that the reasons for consultation of patients with otomycosis are in most cases: otalgia (42.85%), pruritus (38.09%), hearing loss (14.28%) and otorrhea (4.76%) (Cheriet et al., 2017).

On the biological level, during our study, cultures allowed the isolation of 25 strains. Molds come first in our isolates (52%) followed by yeast fungi (44%) and a single isolate of a dermatophyte fungus (4%). A similar predominance of molds was noted in the study of Cheriet et al. (2017), who found a percentage of (69.56%) and (30.43%) of yeasts (Cheriet et al., 2017). Molds colonize the ear canal directly, via dust contaminated by conidia which germinate and produce mycelia, leading to aspergillosis of the ear canal which can be complicated later by otitis media.

Conclusion

The study of fungal otitis in the Batna region was conducted in this survey. And it is to have an idea of the epidemiological situation of this type of otitis. We can suggest in light of the results of our study, that there is a resurgence of cases of otitis of fungal origin compared to that of bacterial origin. From there, recommendations will be imposed to fight against this type of infection:

- The elimination of certain common habits such as the use of cotton swabs could help reduce the occurrence of fungal otitis, thus preserving the functional hearing state.
- The acquisition of the reflex of drying the external auditory canal with a hair dryer after each swim.
- The management of otomycosis must target at the same time fungi and potentially pathogenic bacteria since one can be a factor promoting and triggering the implantation of the other.
- Clinicians should have the reflex to think of otomycosis each time that otitis does not heal under ATB treatment.
- Request a mycological study of an ear sample, which will guide the therapeutic management. -The therapeutic choice of antifungals must take into consideration the pathogen incriminated in the otomycosis.
- The importance of mycological control in order to ensure the effectiveness of the treatment.

Conflicts of Interest

None related to this article.

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