

Article

Evaluation and Treatment of the Incidence of Otomycosis in Patients Visiting the ENT Clinic

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Abstract: Otomycosis is a fungal infection of the outer ear that causes more than 9% of external otitis, and 80% of cases are caused by *Aspergillus*. This study aimed to analyse and assess outcomes related to patients with otomycosis during visits to the ENT clinic. The current study conducted a comprehensive evaluation of patients with otomycosis, which include 110 who underwent treatment during the first and second visits to the ear, nose, and throat clinic, which lasted 30 days. The clinical results of the patients were collected before and after treatment, which included medications associated with the treatment of otomycosis, which included both betadine and clotrimazole, which lasted 30 days during the first and second visits. This study evaluated patients with otomycosis before and after treatment in terms of the severity of symptoms, degree of pain, and patient's quality of life. This study recorded the results of patients with otomycosis, which showed that patients between the ages of 40 and 49 had the highest rate of 36.36%. The most common symptoms are itching, which included 77 patients, and pain, which included 22 patients. The reasons that make patients more they are susceptible to otomycosis as 33 patients were infected as a result of using a hearing aid, 28 patients were infected as a result of water entering the ear, and 20 patients were infected as a result of using a hearing aid. In the presence of oil in the ear, 14 patients responded to betadine treatment, and ten patients responded to clotrimazole treatment in the first visit period. We also found that 87 patients responded to betadine treatment, and 97 patients responded to clotrimazole treatment in the second visit period. We evaluated symptom severity in patients with otomycosis, where the symptom score was 89.10 ± 4.25 at the first visit and 11.79 ± 2.58 at the second visit. Our study confirmed that the treatments betadine and clotrimazole demonstrate the effectiveness of their therapeutic effects on patients with otomycosis.

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1. Introduction

Otomycosis is a superficial fungal infection of the outer ear. Fungi, which are part of the normal flora of the external auditory canal, can behave as opportunistic agents in situations where general cellular immunity is compromised, in terms of diabetes, prolonged steroid administration, HIV infection, chemotherapy, and neoplastic diseases. *Candida albicans* is the most common agent in immunocompromised patients. However, this agent can also cause infection in immunocompetent [1], [2], [3]. Otomycosis usually occurs as a unilateral, subacute, or chronic infection with inflammation and exudate, where the main symptoms are pruritus, otalgia, otorrhea, a feeling of tinnitus, and hearing loss [4], [5].

Otitis is an entity of frequent presentation in small animal medicine and is defined as the inflammation of the ear canal, which can involve the external, middle, or internal regions of the ear. These inflammations may be accompanied by pain, itching, and abnormal secretions. It is a complex pathology that is associated with infections caused by bacteria and yeast, and that often does not respond well to treatments [6], [7], [8].

Otitis externa (OE) is the most common pathology of the ear canal in dogs, and it is estimated that its incidence is approximately 20% in the canine population [9]. These are pathologies of multifactorial etiology, whose causes have been classified as primary, predisposing, and perpetuating by several authors [10].

The most common primary causes include the presence of parasites, allergic diseases, foreign bodies, endocrine disorders, and dermatological problems [11]. Among the predisposing ones, the most important is the abnormal conformation of the ear canal [12]. While the perpetuating ones include otitis media, bacterial infection, yeast infection, and progressive pathological changes that occur in the course of the same infection [13].

Although it is usually unilateral, it is considered more likely to occur bilaterally among immunocompromised patients. Of the tympanic membrane with middle ear infection and of the temporal bone, mostly associated with immunosuppressed patients [14]. Patients with *Candida albicans* infection have more frequently experienced tympanic membrane perforation. The diagnosis of otomycosis requires a high index of suspicion since the presentation of the most common symptoms is not specific [15]. Confirmation of the diagnosis is possible by direct microscopic examination and culture in selective media [16]. In addition, all relevant hematological tests should be performed on immunocompromised and diabetic patients, and blood glucose levels should be monitored to avoid complications [17].

Treatment should include cleaning of the external auditory canal and the application of local antifungal agents [18]. Azoles are the most effective drugs against otomycosis agents without any ototoxicity [19]. On the other hand, oral and intravenous preparations of antifungals are used in severe infections in immunocompromised patients; however, the chances of cure are low in the absence of local care [20].

2. Materials and Methods

2.1. Study design

We conducted a cross-sectional study of patients with otomycosis, which included 110 patients whose ages ranged between 20 and 60 years. All patients underwent betadine and clotrimazole treatment during the period of the first visit and the second visit, which lasted 30 days. Clinical and demographic data for patients with otomycosis were collected from the ear, nose, and throat clinic, which included age, sex, body mass index, comorbidities, symptoms, ASA classification, smoking status, education level, employment level, and income level. Furthermore, this study identified symptom-related outcomes that included itching, pain, ear blockage, ear discharge, and tinnitus. In addition, we identified and distributed the factors causing otomycosis to patients, which included the use of hearing aids, water in the ear, oil in the ear, ear drops, and other factors. Also, this study distributed the fungal species among patients suffering from otomycosis during the visit period in the ENT clinic, which includes *Aspergillus Niger*, *Aspergillus flavus*, *Aspergillus fumigatus*, *Candida albicans*, *Candida non-albicans*, and *Penicillium* species. One hundred ten patients underwent treatment for mycosis, which included betadine and clotrimazole, and the rate of patients who responded to treatment was determined during the first and second visits for 30 days. We also identified secondary outcomes for patients with otomycosis who underwent treatment during an ENT clinic visit, which included ear canal and eardrum status, secretory parameters, and affected ear.

Moreover, our study recorded the severity of symptoms and scores for patients suffering from otomycosis during the first and second visits within 30 days using the SNOT

22 scale to measure the severity of symptoms, where the average total score ranges between 0 and 110, where higher values represent worse symptoms. We also conducted a health questionnaire. To evaluate the quality of life for patients suffering from otomycosis in the first and second visits to the ENT clinic, where the criteria included physical function, ear symptoms, hearing function, and mental health factors.

2.2. Data collection and analysis

One hundred ten patients aged between 20 and 60 years were recruited for patients with otomycosis who underwent treatment during the visit to the Ear, Nose, and Throat Clinic (ENT Clinic), which lasted for 30 days. This current study was conducted between May 5, 2022, and August 24, 2023.

2.3. Selection criteria and recruitment of participants

This study conducted a selection that included inclusion and exclusion criteria for patients with otomycosis, which included 102 patients. Samples were collected from the ear, nose, and throat clinics in different hospitals in Iraq. The inclusion criteria included both patients with otomycosis between the ages of 20 and 60 who had the disease. Obesity, hypertension, diabetes, and other diseases, patients who were associated with severe symptoms, while the exclusion criteria included patients who were less than 20 or more than 60, patients who were pregnant or had infectious or serious diseases, or patients who had undergone previous ear surgeries.

2.4. Statistical analysis

Our study analyzed and designed a clinical outcomes methodology for patient data based on SPSS version 22.0.

2.5. Ethical considerations

Written consent was obtained from patients residing in Iraq at the clinic from which data were collected, and the general administration cooperated to conduct this study.

3. Results

Table 1. Demographic and preoperative characteristics outcomes of patients with otomycosis

Characteristics	Number of patients [110]	Percentage [%]
Age		
20 – 29	24	21.82%
30 – 39	31	28.18%
40 – 49	40	36.36%
50 – 60	15	13.64%
Sex		
Male	66	60.0%
Female	44	40.0%

BMI, [kg/m²]		
18.5 – 25.0	32	29.09%
25.5 – 30.0	40	36.36%
> 30.0	38	34.55%
Comorbidities		
Non – comorbidity	22	20.0%
With comorbidity	88	80.0%
Hypertension	60	54.55%
Diabetes	35	31.82%
Cardiovascular diseases	22	20.0%
Chronic obstructive pulmonary disease	24	21.82%
Obesity	55	50.0%
ASA classification (%)		
I	18	16.36%
II	15	13.64%
III	30	27.27%
IV	47	42.73%
Smoking status		
Yes	44	40.0%
No	66	60.0%
Education status		
Elementary	12	10.91%
Secondary	16	14.55%
College/university	82	74.55%
Employment status		
Employed	80	72.73%
Non – employed	30	27.27%
Income status, \$		
< 800	66	60.00%
800 – 1000	25	22.73%

> 1000	19	17.27%
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The results of the age rates of patients suffering from otomycosis were recorded, as it was found that patients between the ages of 40 and 49 were the highest at 36.36%, followed by patients in the age group of 30 and 39 years, which was 28.18%. This study found that male patients accounted for 60. % Of the total rate and females for 40%. As body mass indexes appeared, which were 18.5–25.0 in 32 patients, 25.5–30.0 in 40 patients, and >30.0 in 38 patients, the most prominent accompanying diseases were high blood pressure, which included 60 patients. Diabetes included 35 patients, obesity included 55 patients, and smoking included 44 smoking patients and 66 non-smoking patients.

Table 2. Determine symptoms related to patients with otomycosis

Symptoms	Number of patients [110]	Percentage [%]
Itching	77	70.0%
Pain	22	20.0%
Sense of blocked ear	5	4.55%
Ear discharge	4	3.64%
Tinnitus	2	1.82%

Our study identified the symptoms or indicators that were present in patients with otomycosis, and the most common symptoms were itching, which included 77 patients, and pain, which included 22 patients.

Table 3. Distributes the predisposing factors among patients with otomycosis

Predisposing factors	Number of patients [110]	Percentage [%]
Earbud usage	33	30.0%
Water in the ear	28	25.45%
Oil in the ear	20	18.18%
Ear drops	16	14.55%
Other factors	13	11.82%

These results identified the causes that resulted in otomycosis, as we found that 33 patients were infected because of using a hearing aid, 28 patients were infected because of water entering the ear, and 20 patients were infected as a result of the presence of oil in the ear.

Table 4. Distribution of fungal species into patients who suffered of otomycosis during the visit period at the ENT Clinic

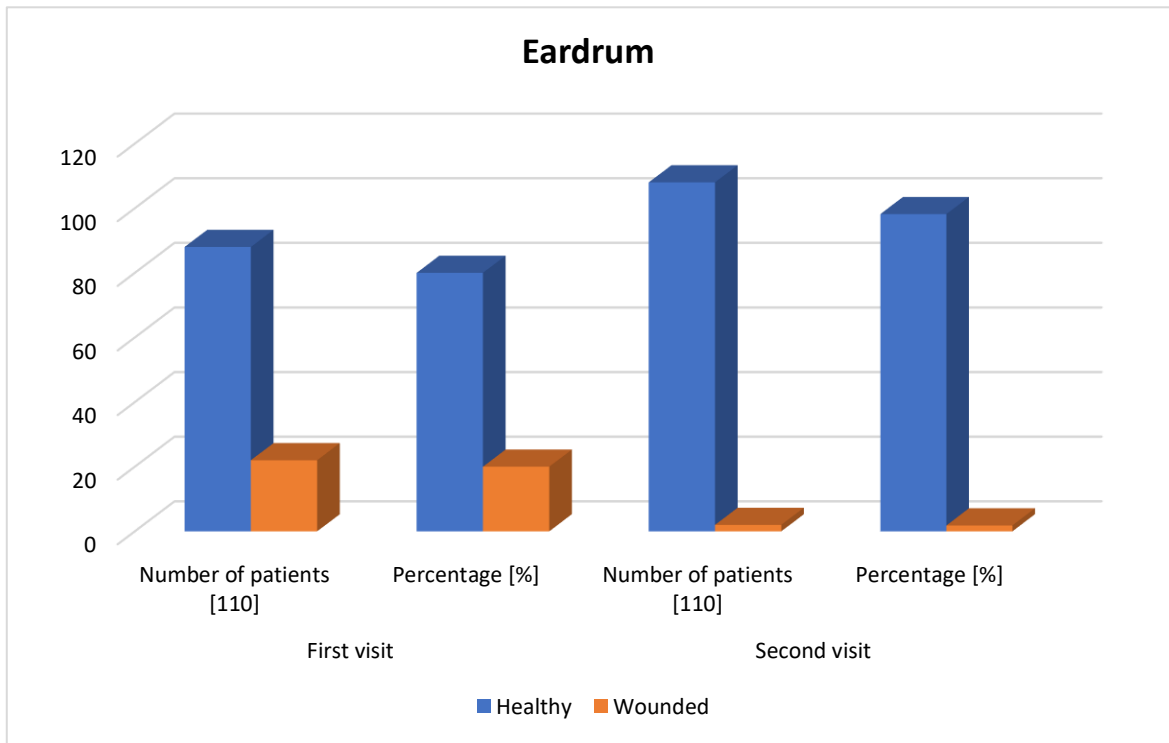
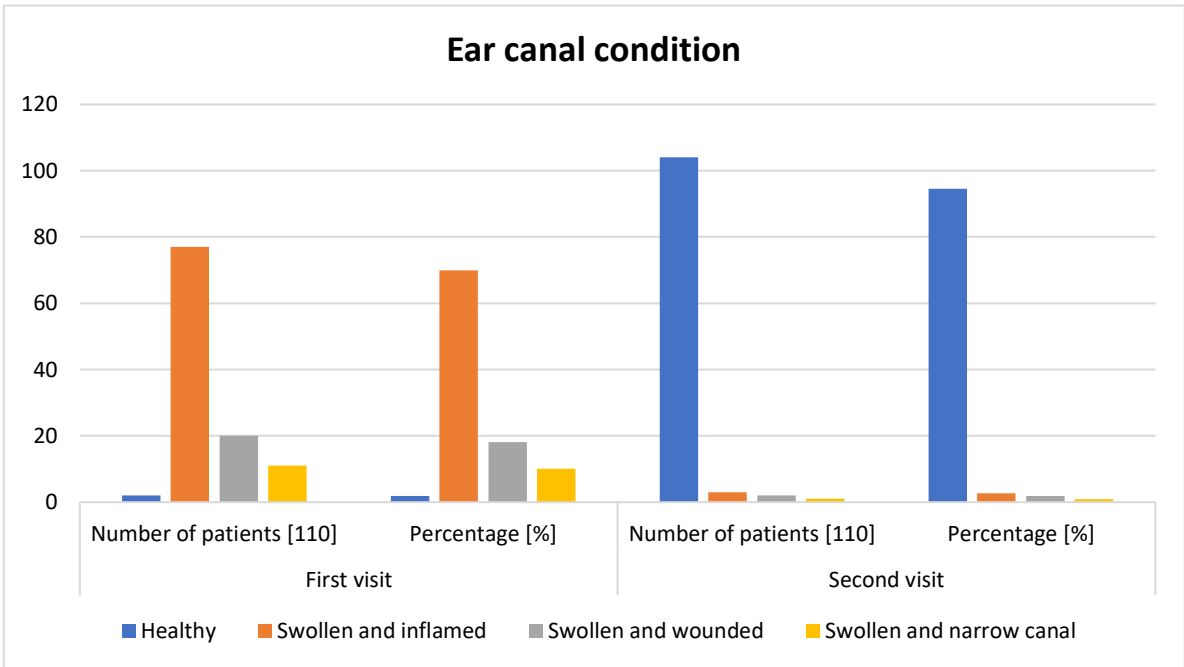
Predisposing factors	Number of patients [110]	Percentage [%]
Aspergillus Niger	55	50.00%
Candida albicans	33	30.00%
Aspergillus fumigatus	9	8.18%
Aspergillus flavus	6	5.45%
Candida non-albicans	5	4.55%
Penicillium species	2	1.82%

The diagnostic results in this Table showed the presence of various fungi that recorded varying differences in morbidity rates, the most prominent of which were *Aspergillus Niger*, at a rate of 50% of patients with otomycosis, and *Candida albicans*, which was at a rate of 30% of patients with otomycosis.

Table 5. Identify the response of treatments used in patients with otomycosis during the first visit and second visit

Number of visits (Time)	Types of Treatment	N (%)
First visit (10 days)	Betadine	14 [12.73%]
	Clotrimazole	10 [9.09%]
Second visit (30 days)	Betadine	87 [79.09%]
	Clotrimazole	97 [88.18%]

This study showed the extent of patients' responded to the two treatments for both betadine and clotrimazole during the first and second visits. We found that 14 patients responded to betadine treatment, and ten patients responded to clotrimazole treatment in the first visit period. We also found that 87 patients responded to betadine treatment, and 97 patients responded to clotrimazole treatment in the second visit period.



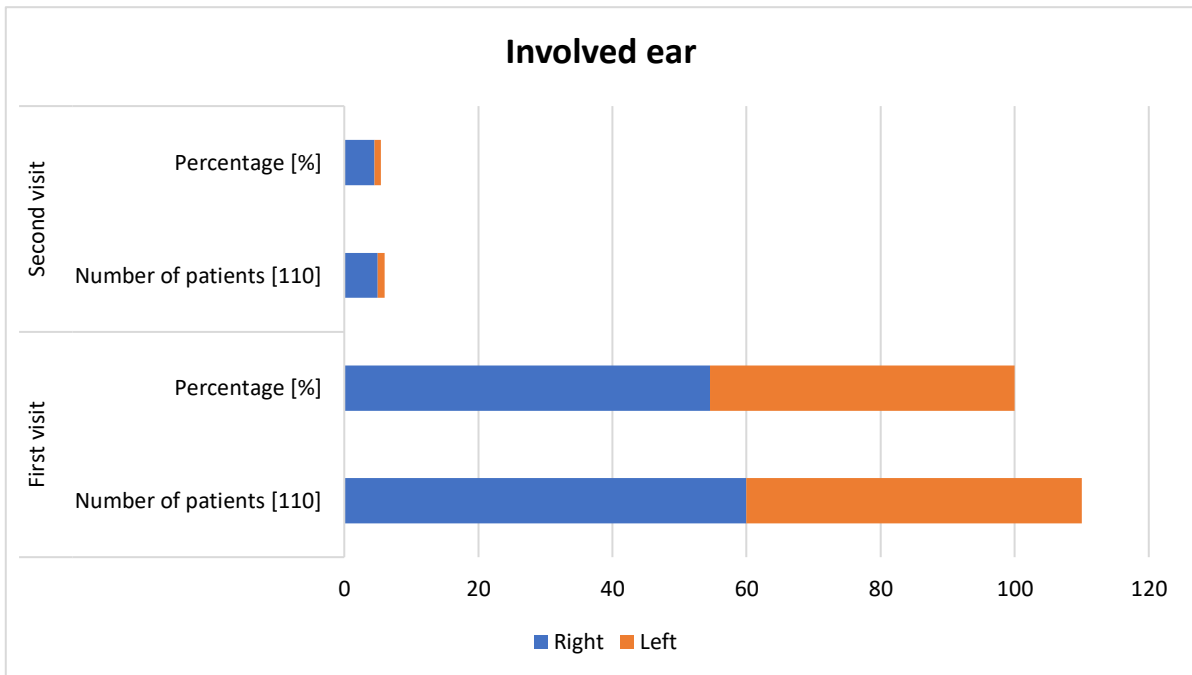
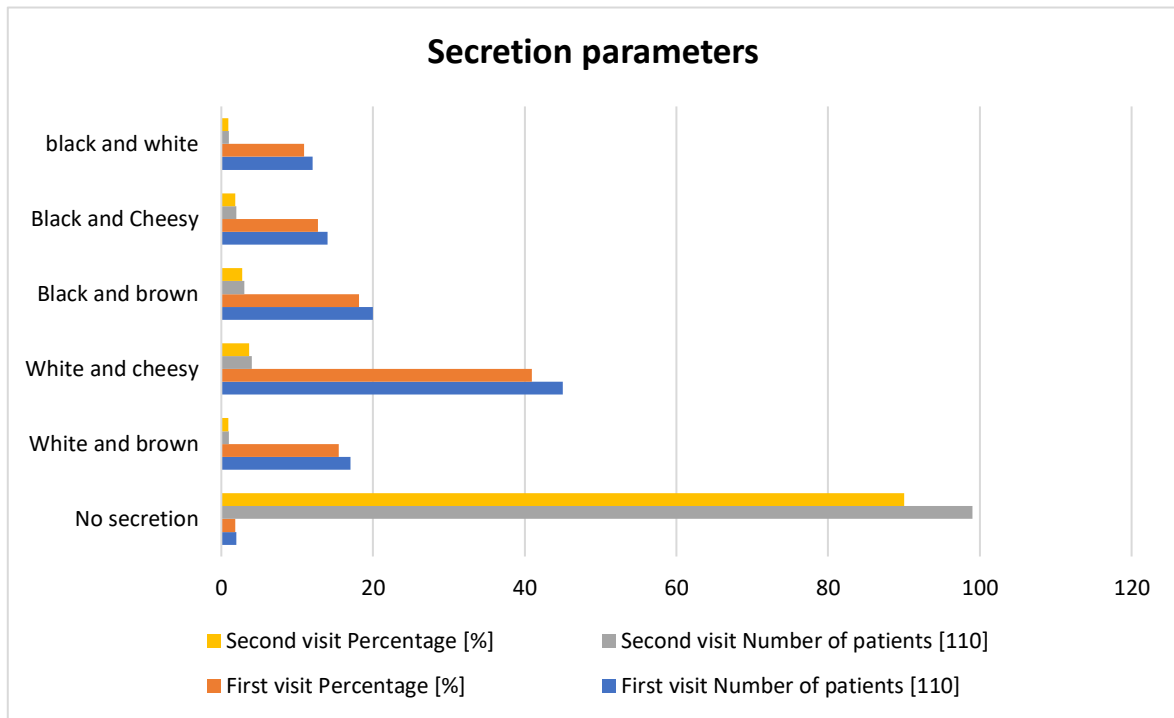


Figure 1. Secondary outcomes of patients with otomycosis who underwent treatment during visiting the ENT Clinic

Table 6. Determine the severity of symptoms for patients with otomycosis during the first and second visits within 30 days by SNOT 22 scores

Time (Days)	Mean	SD	P -value
First visit (10 days)	89.10	4.25	< 0.0001
Second visit (30 days)	11.79	2.58	< 0.0001

This study evaluated the results related to the severity of symptoms for patients with otomycosis, as the symptom score was 89.10 ± 4.25 at the first visit and 11.79 ± 2.58 at the second visit.

Table 7. Determine the pain scores of patients with otomycosis during the first visit and second visit

Time (Days)	Mean	SD	P -value
First visit (10 days)	8.89	0.77	< 0.0001
Second visit (30 days)	1.04	0.004	< 0.0001

This study evaluated the degree of pain in patients with otomycosis, where the pain score was 8.89 ± 0.77 in the first visit and 1.04 ± 0.004 in the second visit.

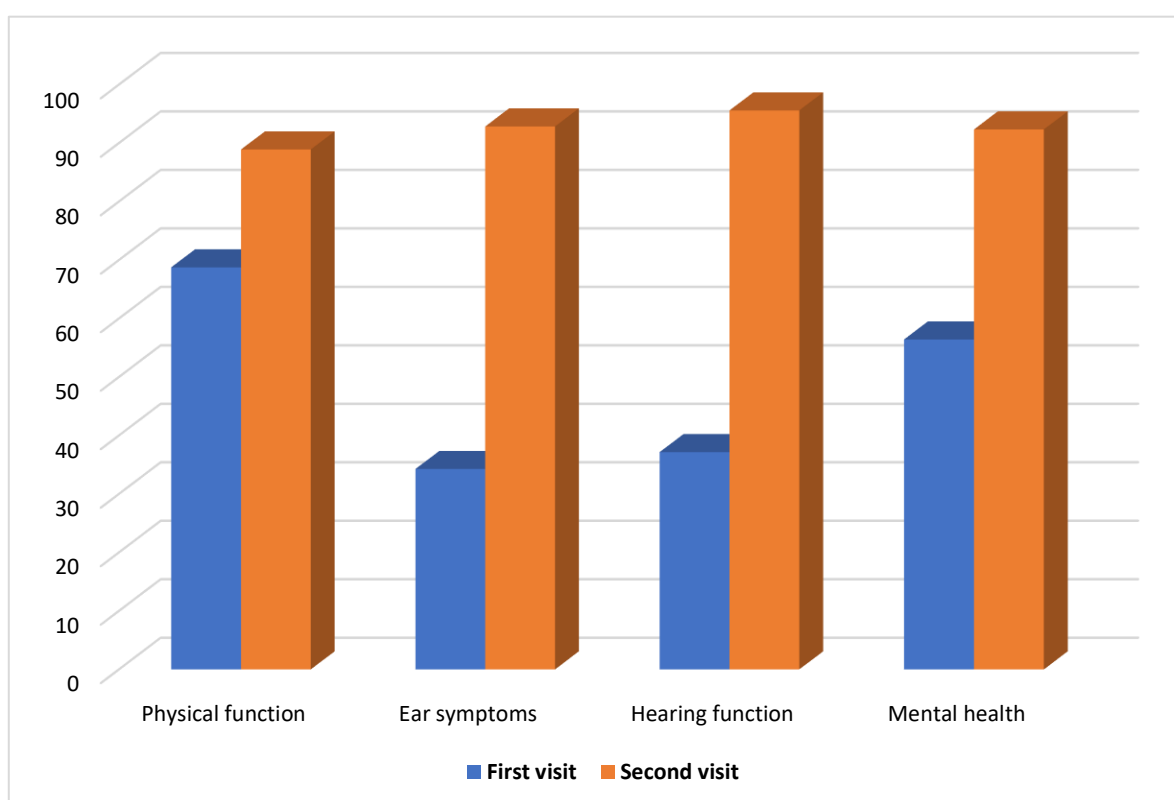


Figure 2. Assessment of health quality of life for patients with otomycosis in the first and second visits to the ENT clinic

This study evaluated the quality of life for patients with otomycosis, where the most prominent results were physical function was 68.75, ear symptoms were 34.27, hearing function was 37.16, and psychological aspect was 56.42 in the first visit, while on the other hand, the results recorded in terms of physical function were 88.9. The ear symptoms were 92.84, the hearing function was 95.58, and the psychological aspect was 92.33 in the second visit.

4. Discussion

Otomycosis is often seen in patients visiting ENT clinics who suffer from a history in recurrent ear infections, wear hearing aids, swim in polluted water, or are regularly exposed to damp circumstances. Otomycosis is a significant portion of ear infections diagnosed in the ear, nose, as well as throat clinics, and infection rates varying from 9% to 30% globally. Otomycosis instances generally include fungal species like *Aspergillus* and *Candida*, while *Aspergillus Niger* becoming the most prevalent culprit. Otomycosis risk factors include inadequate hygiene habits, use of topical antibiotics, immunodeficiency, and certain health disorders, including diabetes [21]. Patients often exhibit symptoms such as ear discomfort, itching, discharge, as well as hearing loss. The diagnosis is often determined via clinical assessment and microscopic analysis of ear canal swabs. Early identification and proper care are crucial for ensuring favorable treatment results for those afflicted [22].

Betadine (povidone-iodine), along with clotrimazole, are often used in the management of otomycosis, a fungal infection that impacts the outer ear canal, as shown by a study conducted in the United States. Betadine's antiseptic characteristics may decrease fungus load and inhibit infection spread, making it a common choice for ear washes or drops to manage ear infections. Fungal proliferation. Clotrimazole was an antifungal medication that inhibits the development of fungus [23].

Other studies agree that both the treatments Betadine and Clotrimazole have a complete therapeutic effect against otomycosis, which betadine contributes to reducing the fungal burden and preventing the spread of infection. On the other hand, clotrimazole contributes to eliminating all fungi that cause the disease, which is why Betadine and clotrimazole are used for the purpose of treating otomycosis, which represents a fungal infection that has severely affected the external ear canal. Moreover, Betadine has powerful antiseptic properties that allow reducing the fungal burden as well as preventing the spread of the disease to patients. It can be used as a natural ear wash or as drops to control the growth of fungi which. Clotrimazole also represents an antifungal drug that is implemented by inhibiting the proliferation of fungi and is given to patients regularly where ear drops and cream for topical use [24], [25].

5. Conclusion

The assessment and therapy of otomycosis in patients seeking care at the ENT clinic are essential for the efficient management of this prevalent fungal infection in the ear. By utilizing accurate diagnostic techniques such as clinical examination and microscopic analysis of ear discharge, healthcare professionals can effectively detect cases of otomycosis and commence suitable antifungal treatment. Achieving successful outcomes and preventing recurrence can be accomplished by employing a mix of specific antifungal medications and customized ear-cleaning techniques based on the individual needs of the patient. It is crucial to educate patients about how to keep their ears clean and avoid variables that increase the risk of otomycosis, such as exposing the ears to water and using earbuds improperly. This education is necessary to prevent future occurrences of otomycosis. Engaging in additional research and ongoing education regarding the most effective methods for evaluating and treating otomycosis would enhance the quality of patient care and management in the ENT clinic.

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