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Research Article

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Literature Review on Patient Demographics, Risk Factors and Causative Agents of Otomycosis

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ABSTRACT

Background: Otomycosis can be defined as a fungal infection of the external auditory canal, frequently encountered in the general otolaryngology department. Otomycosis is more commonly reported in hot and humid climates and various individual as well as environmental factors predispose to this infection. Otomycosis is not only a prevalent condition but also follows a set patterns in patient demographics, predisposing factors and, causative pathogens, which we aim to explore in this review. **Objectives:** In this review, we intend to shed light on the prevalence of otomycosis, along with the characteristics of patients that are most commonly presented with this condition including age, gender, occupation, socioeconomic class, as well as complains. We also aim to elucidate the various predisposing risk factors that increase the likelihood of contracting otomycosis and explore the usually encountered pathogenic causes. **Materials and Methods:** A review of relevant articles published between the years of 1975 to 2019 in English language was done using the databases of PubMed Pico, Google Scholar and Google, using the predetermined keywords. **Conclusion:** Otomycosis is a prevalent fungal ear infection mostly seen in young patients between the ages of 21-30 years. Otomycosis mostly involves one ear, and bilateral involvement is mostly observed in immunodeficient patients. The most frequently reported risk factors include self-cleaning of ears with objects such as Q-tips, wooden sticks, metal pickers, instillation of mustard oil in ears, undue use of antibiotic ear drops, and swimming. Otomycosis causative organism is especially Aspergillus and Candida while concomitant bacterial infection can be seen in several cases of otomycosis, the most common implicated bacteria being staphylococcus aureus. This literature review highlights the need for education to eradicate the aforementioned predisposing risk factors to reduce the incidence of otomycosis.

Key words: *Otomycosis, fungal otitis externa, fungal ear infections, risk factors, microbiological causes, Aspergillus, Candida, Staphylococcus Aureus.*

INTRODUCTION

Otitis externa makes up about 5 to 20% of the total visits to Ear, Nose and Throat (ENT) departments, among which, approximately 10 to 25% can be attributed to fungal infections broadly referred to as fungal otitis externa or otomycosis. [1, 2] Although otomycosis is prevalent all around the globe, it occurs more frequently in tropical and subtropical regions. [3] Several host and environment related factors increase the likelihood of acquiring otomycosis. Fungi are ubiquitous and can be found everywhere, although higher numbers are expected in locations with inappropriate waste disposal that serve as habitat for fungal growth but also provide means for dispersal in the form of airborne dust particles. Otomycosis is a common clinical entity. Although not life threatening, it can be a frustrating condition for both patient and physician due to the need for a long-term therapy, regular follow-up and tendency for recurrence. Common associated symptoms include itching, pain, aural fullness, aural discharge, hearing impairment and tinnitus. [2, 4-7] In this literature review, we will discuss the patient population, risk factors and pathogenic causes of otomycosis, in order to shed light on the distribution and pathogenesis of this prevalent fungal infection.

MATERIAL AND METHODS

Sample

This literature review was conducted using the available biomedical databases i.e. PubMed Pico, Google scholar, and Google. We included studies published between the years of 1975-2019 in English language. Keywords used to search through the databases were otomycosis, fungal otitis externa, fungal ear infections, risk factors, microbiological causes Aspergillus, Candida, and Staphylococcus Aureus.

Analysis

We employed no software for analyzing the results obtained from the review of published articles. However, to ensure that the data compiled is free of error and valid, multiple revisions were done by each of the authors.

DISCUSSION:

Otomycosis is a fungal infection of the external ear prevalent in several regions of the world. [8] Otomycosis involves the overlying squamous epithelium of the external ear canal where the causative fungi mostly occupy the medial aspect of the ear canal. The tendency to reside in the medial aspect is due to the fact that this part is warm and dark as compared to other structures and supports fungal growth. Additionally, the location of the inferior tympanic recess also permits the accumulation of debris, further encouraging fungi growth. [9]

Otomycosis is mostly observed in the younger patient population. This can be backed by a study conducted on 338 otomycosis patients by [10] that reported majority of the patient population to be between the ages of 21-30 years constituting 33.8 % of the total study group. Similar findings were observed in a study by [11] where the highest incidence of otomycosis was reported in the age group of 21–30 years with the lowest incidence observed in ages less than 10 years and above 60 years of age. This explicit age preference can be explained by the fact that young people are more likely to spend time outdoors than children or the elderly, hence accounting for the increased exposure to causative fungi.

Gender distribution of otomycosis is, however, not as marked as age distribution. Some studies report a higher prevalence of otomycosis in males. For example, 56% of the total population presenting with otomycosis was reported to be males by [12] and 60% of the study group was reported to be males by [13]. This is possibly due to the fact that young men generally spend more time outdoors and fungi are airborne pathogens. In contrast, some studies reveal females to have a higher prevalence of otomycosis possibly due to higher prevalence of practices of self-cleaning of ear with objects such as hairpins or due to increased use of mustard oil to relieve pruritus. For example, as a dominant group, 65% was reported to be women by [14].

Otomycosis is seen majorly in the lower socioeconomic class. It also has a tendency to occur in farmers and construction workers. This is evidenced in a study conducted on 150 patients of otomycosis that revealed agriculture to be the main occupation in 105 of the patients which amount up to 70% of the study group while 94 (63%) of the patients reported lower than average income. [11] This has also been reported by [15], who observed that the most common group affected by otomycosis belonged to the lower socioeconomic class, including farmers and the peak reported season was the rainy season [15].

Otomycosis is mostly presented with unilateral ear involvement with the right ear being involved more commonly. This is based on studies that report a major presence of unilateral ear involvement with the right side being more common possibly because it is on side of the dominant hand and in practices such as self-cleaning

since the right hand is mostly used to clean the right ear. [16] Nevertheless, some studies report bilateral involvement but the affected patients are mostly immunocompromised and have diseases such as cancer and Acquired Immunodeficiency Syndrome (AIDS). [17]

Patients with otomycosis commonly present a wide variety of complains the most eminent of which is ear pruritus as reported in a study by [15]. Other reported symptoms include ear discomfort, pain, discharge, and feeling of ear blockage. [18] In some cases, tinnitus, hypoacusis, and hearing impairment may also be reported. [19] Hearing loss was observed as the most commonly occurring symptom in 77.7% of the study population in an analysis by Khurshid Anwar et al. [20] Although ear pruritus and otalgia are the hallmarks of otomycosis, deep-seated itching is often reported to be a more troublesome symptom. On the other hand, pain associated with otomycosis is reported to be less intense when compared to bacterial external otitis.

The factors that predispose an individual to otomycosis include both local and systemic host-related factors as well as a few environmental factors. Local ear related factors increase the likelihood of contracting otomycosis by inducing changes in pH, in the ear's epithelium, and in the quantity of ear wax, also called cerumen. [21] Additionally, bacterial and fungal infection, instrumentation of the ear with unsterile objects, self-inflicted trauma, hearing aids, and swimming all predispose to otomycosis. [22] Systemic factors that enhance the risk of otomycosis include the long term use of steroids, and broad-spectrum antibiotic agents, as well as cancer and other immune disorders, all of which depreciate the immune system and render the host susceptible to otomycosis. [22]

The association between self-cleaning and otomycosis is apparent in a study conducted by [23], that reported 224 patients diagnosed with otomycosis to practice self-cleaning out of the total 350 cases. [23] Self-cleaning predisposes to otomycosis by removal of cerumen, changing both its quantity and quality. Cerumen is a secretion of sebaceous and apocrine glands and serves to protect the ear from invading organisms. Mustard oil is another risk factor reported in a study by [9] where a significant association between otomycosis and mustard oil instillation are often used to relieve itching in the ear. Antibiotic ear drops can eliminate the natural flora of the ear and predispose to local ear infections especially if used for longer periods of time. [24] Habitual as well as occasional swimming can serve as a predisposing factor for otomycosis as proved by a study conducted in Iran that reported the practice of swimming in otomycosis cases ranging from 5.7 to 81 %, with higher prevalence recorded in the summer season. [25]

To establish the causative agents of otomycosis, an examination of the ear canal is essential through otoscopy and biomicroscopy, while confirmation can be obtained through mycological exams. Fungi have been isolated as the causative pathogens in as many as 74.7% by [11] and even 100% in a study by [26]. Among the isolated fungi, the most commonly implicated are Aspergillus and Candida. [27] Aspergillus and Candida are both opportunistic fungi found as a constituent of the normal microbiota of various body parts. [28] Aspergillus has been reported as the most common causative agent in several studies such as in a study conducted in Saudi Arabia that reported Aspergillus isolation in 51.5% of the total otomycosis cases. [29] Aspergillus isolation rate was reported as 44.8% in another study conducted in Turkey. [30] The most common species of Aspergillus observed is Aspergillus Niger in several studies. [11] Few studies report candida to be the most common organism instead of Aspergillus as seen in a study in Ibadan where Candida was isolated in 15 out of the total 53 cases. [31]

Sometimes, fungal otomycosis can be superimposed by bacteria. Mixed bacterial and fungal growths have been observed by several researchers in as many as 6% of the total cases. [32] The principal misfortune in these cases is the tendency of recurrence. Recurrence is observed due to the formation of biofilms demonstrated by both Aspergillus and Candida. [33, 34] The most commonly isolated bacteria is Staphylococcus aureus. This has been observed in other studies and the association between Aspergillus and Staphylococcus aureus is due to the antibiotic activity of A. fumigatus against S. aureus. [1] In cases where mixed bacterial and fungal infections are observed, it is mandatory to prescribe both antifungal and antibiotic agents, further stressing the significance of being aware of the causative organism of otomycosis, to narrow the instituted treatment.

The available treatment options for otomycosis range from control of underlying predisposing conditions to causative fungi and bacteria eradication, to local debridement, also called micro-aspiration or the use of topical or systemic antimicrobial agents. [35]

CONCLUSION

Otomycosis is seen across the world with a high incidence especially in tropical countries. Otomycosis is not a life-threatening condition; however, it is challenging for both patients and health care professionals as it

frequently requires long-term treatment and follow-up. Otomycosis is more prevalent between the ages of 21-30 years and is seen in both males and females, without marked gender distribution. Individuals belonging to the lower socioeconomic class and farmers are at higher risk. Variable presenting complains may be seen such as pruritus, pain or hearing impairment. Fungi are the most commonly implicated organisms particularly Aspergillus and Candida and bacterial contamination is observed in at least a portion of these cases especially by Staphylococcus aureus. Consequently, there is a need of raising awareness regarding practices that predispose the general population to otomycosis such as the use of unhygienic objects for self-cleaning of ears, long term use of antibiotic ear drops and to curb the practice of instilling mustard oil into the ears. With the required attention, these risk factors can be considerably depreciated, leading to decreased incidence and prevalence of otomycosis. Finally, Otolaryngologists and even primary care physicians should be aware of this clinical features, diagnosis and management of otomycosis.

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