

Review Article

Epidemiology, risk factors and monitoring of acute otitis externa

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ABSTRACT

Estimates show that otitis externa is a common presentation in different settings and can be acute, chronic, or necrotizing. Eczema of the ear canal is usually associated with the condition. It has also been demonstrated that humid environments, swimming, and mechanical trauma, using hearing aid supplements, and absence or reduce air wax are all significant risk factors that can increase the risk of having otitis externa. The pathology of otitis externa is simply an inflammation of the external auditory canal, which can either be attributed to an infection or other non-infectious etiologies. In the present literature review, we have discussed the epidemiology, risk factors, and monitoring of patients with acute otitis externa. Our findings indicate the high prevalence of the condition, especially among developing countries and areas with high temperature and humidity levels. Swimmers are more commonly affected together with adults. However, children might also be affected in some cases. Male individuals also have a higher risk. Nevertheless, data is limited and further studies are needed. The condition can be easily treated and symptoms usually resolve within 1 day from initiating the treatment. However, some cases might persist, and in these events, consultation with an otolaryngologist is required together with culture for adequate identification of the etiology and management of the case.

Keywords: Otitis externa, Epidemiology, Prevalence, Swimmer's disease, Risk factors

INTRODUCTION

Estimates show that otitis externa is a common presentation in different settings and can be acute, chronic, or necrotizing. Eczema of the ear canal is usually associated with the condition. It has also been

demonstrated that humid environments, swimming, and mechanical trauma, using hearing aid supplements, and absence or reduce air wax are all significant risk factors that can increase the risk of having otitis externa.¹ The pathology of otitis externa is simply an inflammation of the external auditory canal, which can either be attributed to

an infection or other non-infectious etiologies. Inflammation can furtherly spread to the outer ear, involving the pinna and tragus, or to the middle ear, leading to the development of serious complications that might even lead to hearing loss.²

Acute inflammation of the external auditory canal for <6 weeks is called acute otitis externa, while in cases when the inflammation lasts beyond three months, the condition is called chronic otitis externa. Bacterial infection is the commonest cause of acute otitis externa, and reports show that it might be associated with psoriasis, eczema, and allergy.^{3,4} In the present study, we aim to conduct a literature review to discuss the epidemiology, risk factors, and monitoring of acute otitis externa based on information from the current studies in the literature.

METHODS

To retrieve relevant studies, we conducted an extensive literature search of the Medline, Cochrane, and EMBASE databases which was performed on 27th October 2021 using the medical subject headings (MeSH) or a combination of all possible related terms, according to the database. To avoid missing potential studies, a further manual search for papers was done through Google Scholar, while the reference lists of the initially included papers. Studies discussing approach to contraception in the primary health care were screened for useful information, with no limitations posed on date, language, age of participants, or publication type. Only Saudi-based studies were included.

DISCUSSION

Epidemiology and risk factors

Otitis externa can be defined as an infection to the external auditory canal that can be found at the cutis and subcutis regions, in addition to potentially affecting the tympanic membrane and the pinna. Many forms were reported for otitis externa, including necrotizing or malignant otitis externa, acute otitis externa, chronic otitis externa, and circumscribed otitis externa. The condition should be differentiated from other disorders that might have similar clinical characteristics, including cholesteatoma, otitis media with perforation, eczema, otitis externa bullosa sive hemorrhagica, herpes zoster oticus, otomycosis, erysipelas, perichondritis, and carcinoma affecting the external auditory canal.⁵ Estimates show that the prevalence of the condition is high as the condition is relatively commonly observed among the settings of otolaryngology. Tropical areas have the highest prevalence rates than other temperate regions, which is attributed to the high humidity and elevated temperatures in these regions. The estimated overall prevalence of the condition has been around 10%.⁶ Nevertheless, the rate is significantly variable across the different investigations based on the recruited populations and the region where the study took place. Epidemiological investigations also

show that the condition is more common among adults. However, children can also be affected, although the prevalence is not very high among them, and the age group 7-12 years old are the most commonly affected.⁷ The estimated annual incidence of circa 1% has been estimated among the different studies, including investigations that were conducted in the United Kingdom and the Netherlands.^{8,9} Other investigations reported that the prevalence of otitis externa in developing countries was 17.5%.¹⁰⁻¹² A similar rate was also reported in another similar investigation that indicated the high prevalence of the condition in otological settings in developing countries.¹² The high prevalence rates in these countries might be secondary to the presence of certain risk factors, which might be specific to the recruited populations (including increased ear wax formation, narrow ear canal, and increased recurrence of the condition) or to the country where the study took place, including the humidity and high temperature in these countries. Personal bad practices and reduced hygiene might also contribute to the high prevalence of otitis externa in these countries. In this context, trauma to the external auditory canal might predispose to the infection due to self-induction of sharp objects through the canal, leading to superimposed infections.^{10,13}

The affected age groups were also found different across the different investigations. Some studies reported that the age group 21-30 years old is the most commonly affected.^{10,14-17} This has been attributed to the potential increase in the outdoor activities of these individuals, which significantly exposes them to dust, humidity, high temperature, and other risk factors. Gender also has an impact on the prevalence of the condition. For instance, it was reported that the prevalence was higher among males than females.¹⁰ It should be noted that this point is an area of conflict among the different investigations as some reported that gender does not have an impact, while others reported that the prevalence rate can be significantly affected by either gender. A higher prevalence of otitis externa was also reported among Christians. Nevertheless, it has been indicated that this is because most of the study participants were Christians.¹⁰ The prevalence of otitis externa was also reported among young age groups, which has been attributed to the reduced hygiene practices and frequent swimming in non-clean areas, especially within the poor socio-economic communities.¹⁰⁻¹² The impact of marital status was also previously emphasized in a previous investigation that showed that most of the study participants with otitis externa were single.^{10,18} However, this association is not validated by adequate investigations, and such differences might be attributed to potential differences in the baseline demographics of the recruited populations.

The risk of catching otitis externa has been reported to be higher among swimmers, and reports show that the risk is five times higher among them, and some authors even call it swimmer's ear based on the estimated high prevalence rate of the condition for this population.¹⁹ This is because

swimming in non-clean areas significantly increases the risk of catching a pseudomonal otitis externa infection. It has been furtherly demonstrated that some cases with acute otitis externa might progress to necrotizing otitis externa. However, these cases are rare. It should also be noted that among the cases that progress to necrotizing otitis externa, most of them (90%) usually suffer from glucose intolerance. Multiple factors were reported to take part in the pathogenesis of the condition, and different risk factors were reported across the different investigations, varying between skin diseases, environmental factors, endogenous factors, systemic diseases, trauma, anatomical factors, and other factors.

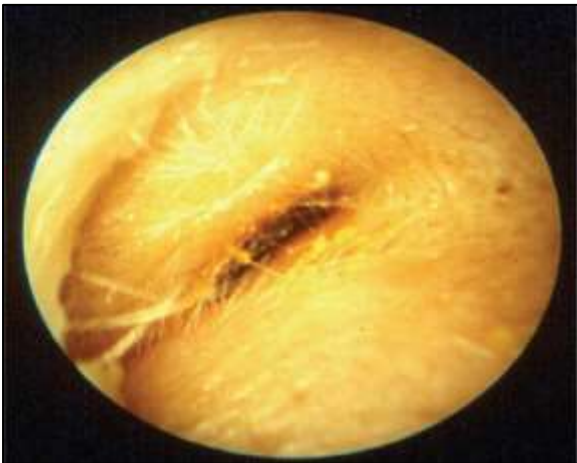


Figure 1: Otoscopic examination of acute otitis externa, showing canal edema.²⁰

Bacterial infection is responsible for around 90% of the etiology of otitis externa.¹⁹ A previous investigation even reported that 98% of cases with otitis externa are owing to bacterial infections.²⁰ It has been shown that *Pseudomonas aeruginosa* and *Staphylococcus aureus*, with estimated prevalence rates of 22-62%, and 11-34%, respectively. It has been reported that isolation of multiple microbes was also performed among previous different settings, indicating that the infection can also be multi-microbial.²¹⁻²³ Evidence also shows that fungal infection is not common to cause otitis externa. Nonetheless, a previous report showed that acute otitis externa was attributed to a fungal infection in 10% of the cases.²⁴ On the other hand, other reports show that chronic otitis externa is commonly caused by a fungal infection, most probably *Aspergillus* and *Candida* species, with an estimated rate of 60-90% and 10-40%, respectively.^{4,25,26} Reduced immune response might be the main predisposing factor to catching a fungal infection within the external ear. Some of the reported factors include diabetes mellitus, immunosuppression, and the frequent administration of antibiotics. Different changes can be noticed through the external ear canal secondary to the infection, including fibrosis of the dermis, edema (Figure 1), chronic granulation tissue, and hyperkeratosis of the epidermis. These significant changes can significantly narrow the ear canal. Getting rid of microorganisms, cellular debris, and cerumen out of the

canal has been reported to be significantly done by epithelial cell migration. The presence of stenosis and inflammation over these processes can significantly lead to the initiation and progression of acute otitis externa.

Evaluation and monitoring

The diagnosis of acute otitis externa is usually done clinically and can be approached by the primary healthcare physician with no need for consultation with an otolaryngologist. Obtaining a complete history from the patient can give adequate clues about the pathology of the condition, and physical examination can easily establish the diagnosis. Pneumatic otoscope examination should be performed, in addition to examination of the surrounding skin and lymph nodes, and evaluation of the auricle. The findings by otoscope usually include the presence of an edematous, erythematous ear canal together with an abundant presence of debris that might be grey, white or yellow. The underlying edema of the external auditory canal can also lead to visualization of the tympanic membrane, which is erythematous in most cases.^{27,28} The presence of an air-fluid level across the tympanic membrane is suggestive of the associated presence of otitis media, which indicates that physical examination should be seriously approached in these cases. The clinical presentation of the affected patients is variable, depending on the severity and staging of the condition. Ear pain and pruritis are the main presenting manifestations, which usually deteriorate by manipulation of the pinna and/or tragus. The development of pain in these situations is attributed to the manipulation of the nerve fibers within the periosteum that lies within the thin dermis of the canal. However, it should be noted that the severity of pain is usually disproportionate with the physical examination. Hearing loss, fullness sensation, and otorrhea are other local manifestations that were documented in these cases.^{29,30}

Accordingly, no specific tests, as laboratory investigations or imaging studies, are usually needed, especially for uncomplicated cases. However, in recurrent and resistant cases, it has been demonstrated that performing cultures should be conducted by the attending physician to identify the causative organism and adequately eradicate it, particularly for patients with an immunocompromised state. Severe cases of acute otitis externa might indicate the assessment for human immunodeficiency virus and evaluation of blood glucose levels.²⁹ Monitoring of patients with acute otitis externa is part of the management plan and is essential to ensure that the recovery process is complete and to prevent any risk of recurrence in these situations. A previous study reported that after the application of recommended management modalities, most patients will experience significant improvement in the clinical manifestations after one day only.^{20,29} It should be noted that some cases do not experience such improvements, and if the clinical manifestations persist up to 2-3 days after treatment, reevaluation is recommended in such cases. Misdiagnosis, canal obstruction, inadequate

drug delivery, and nonadherence to treatment are the most apparent reasons for not experiencing clinical improvement. It is well known that in different settings, the diagnosis and management of acute otitis externa are usually done by the primary healthcare physician. However, some cases might require a referral for adequate consultation by an expert. Some of the reasons for such referral include the inability to remove the foreign body or obstructive debris from the ear canal, lack of improvement, and in cases of suspected malignant otitis externa. Performing cultures should also be considered in recurrent and resistant cases to identify the underlying organisms and prescribe the most appropriate antibiotics and antifungal treatment modalities. This is usually indicated in cases when the clinician suspects that the inflammation extended beyond the levels of the external auditory canal, there are multiple risk factors, and in cases when no clinical improvement was noticed after applying all the available treatment modalities.²⁰ It should be noted that there are no clear guidelines about the duration of treatment administration in cases of acute otitis externa. However, some reports show that the administration of treatment should be continued for 7-10 days. Still, it has been furtherly demonstrated that the resolution of the clinical manifestations in some cases might persist for up to one month.^{21,31,32}

CONCLUSION

Swimmers are more commonly affected together with adults, Nevertheless, children might also be affected in some cases. Male individuals also have a higher risk. However, data is limited, and further studies are needed. The condition can be easily treated and symptoms usually resolve within one day from initiating the treatment. Still, some cases might persist, and in these events, consultation with an otolaryngologist is required together with culture for adequate identification of the etiology and management of the case.

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