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A CLINICAL REVIEW- OTOMYCOSIS AND ITS PRESENTATION IN DIABETIC AND IMMUNOCOMPROMISED PATIENT IN NORTHERN INDIA

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ABSTRACT

Introduction: *Otomycosis* is a superficial fungal infection of the external auditory canal, often linked to bacterial infections. It is more common in tropical and subtropical regions due to their hot, humid, and dusty climates.

Symptoms: include ear irritation, otalgia, auditory fullness, hearing loss, and tinnitus. Severe cases, affecting the middle ear, tympanic membrane perforation, and temporal bone, are linked to immunosuppression. *Otomycosis* can be caused by various fungi, with *Aspergillus* and *Candida species* being the most prevalent.

Factors predisposing individuals to otomycosis: include trauma, high humidity in the external ear canal, different stages of chemical breakdown in epithelial detritus, high temperature, common illnesses like diabetic mellitus, immunodeficient individuals, and increased application of topical steroid/antibiotic formulations. Otomycosis is an inflammatory process affecting the skin and subcutaneous tissue of the external auditory canal, which can spread to the eardrum and cartilage. It can be caused by diabetes, impaired immune response, moisture accumulation, or weakened immune systems. In immunocompromised patients, severe ear pain, profuse discharge, fever, swollen lymph nodes, increased risk of complications, and cranial nerve involvement are common.

The Etiology of otomycosis: can be attributed to hyperglycemia, impaired immune response, moisture accumulation, weakened immune system, fungal exposure, and antibiotic use. **Complications** include perforation of the tympanic membrane, hearing loss, otomastoiditis due to fungus, infections with meningitis, and massive infection of the temporal bones.

Diagnosis: involves a combination of clinical examination and laboratory tests, including otoscopy, microscopy and culture, imaging, and PCR tests.

Treatment: involves cleaning the ear canal, topical antifungal therapy, managing underlying conditions, and regular follow-up. Preventive strategies include proper ear hygiene, monitoring, blood glucose control, managing underlying conditions, avoiding antibiotics, using antifungal ear drops, and avoiding smoking.

Keywords: *Otomycosis*; *Aspergillus species*; Diabetes; Immunocompromised

INTRODUCTION

A superficial fungal infection of the external auditory canal is all that is meant to be understood by the word "*otomycosis"* considering that it is an opportunistic infection, it is occasionally linked to bacterial infections though *otomycosis* is more common in the tropics and subtropics due to their hot, humid, and dusty climates, the disease's epidemiology is worldwide.[1] An infection can be acute, subacute, or chronic, and its symptoms typically include ear irritation, otalgia, auditory fullness,

hearing loss, and tinnitus and the related inflammation is linked to the production of masses of debris containing hyphae and superficial epithelial exfoliation, which exacerbate the pain and can occasionally result in open suppuration in the affected ear.[2] The majority of severe *otomycosis* cases, which affect the middle ear, the tympanic membrane perforation, and occasionally the entire temporal bone, are linked to immunosuppression.[3] Many different types of fungi have been linked to mycotic ear infections; *Aspergillus and Candida species* being the most prevalent ones and some less common fungi that are implicated are species of *Penicillium, Mucor,* and *Rhizopus*. [2,4] *Otomycosis* can be caused by a wide variety of fungi, including *Actinomyces, Trichophyton, Aspergillus fumigatus*, and *Candida tropicalis*, even though *Aspergillus niger* and *Candida albicans* are the primary causes.[5] In appearance, *Aspergillus niger* resembles a "wet newspaper"—a moist white plug scattered with black fragments.[6] Airborne fungal spores can either be the main pathogens or they can be added to a bacterial infection, as they are conveyed by water vapours, particularly during the rainy season.[7] In recent years, opportunistic fungal infections have gained greater importance in human medicine, perhaps because of the huge number of immunocompromised patients, however, such fungi may also produce infection in immunocompetent hosts.[8] Of all occurrences of otitis externa, 10% are caused by fungus.[9] Under conditions like diabetes, steroid use,human immunodeficiency virus(HIV) infection, chemotherapy, and cancer (particularly those involving immune system cells), general cellular immunity is diminished, as a result, fungal infections can affect an immunocompromised host, however, one way the host defends against fungal diseases is through the normal flora of bacteria and this process is changed in people who use antibiotic ear drops, which can lead to *otomycosis*.[14]

Immunocompromised hosts are not the only ones who are more vulnerable to otomycosis; those with diabetes, cancer, Acquired immunodeficiency syndrome(AIDS),and those undergoing or receiving radiation therapy or chemotherapy are also more likely to experience complications.[10] A significant portion of people with immunocompromised conditions have diabetic mellitus. Due to altered defense systems, such as the consequences of hyperglycemia, neuropathy, hypoperfusion brought on by microangiopathy, deficiencies in cell-mediated and humoral immunity, and delayed wound healing, they are more likely to become infected.[11]Patients with diabetes have less lysozymes and a higher pH in their cerumen, which reduces local immunity.[12] In cases of uncontrolled diabetes, *Aspergillus* and *Mucor* may induce vasculitis, which can result in an infarction and tissue necrosis."[13] An individual may be predisposed to *otomycosis* by a few factors.[15,16]

Table no.1

	Trauma
	The external ear canal's relatively high percentage of humidity
	Different stages of chemical breakdown in epithelial detritus
	High temperature that is quite similar to the body temperature
	Common illnesses like diabetic mellitus
	Immunodeficient individuals
	Greater application of topical steroid/antibiotic formulations

CLINICAL PRESENTATION

An inflammatory process that affects the skin and subcutaneous tissue of the external auditory canal is the characteristics of inflammation of the external auditory canal, and in extreme situations, it may even spread to the eardrum and cartilage.[17] Inflammation may have an infectious or non-infectious etiology, non-infectious inflammation may be related to systemic conditions like psoriasis or seborrheic dermatitis, or to local conditions like contact or allergy dermatitis.[18,19,20] Infection is typically associated with a range of symptoms in diabetic , including itching, otorrhea, discharge and the sensation of ear canal blockage but pain, which can vary in severity, headache, and tinnitus are also common and EAC edema and redness, desquamation of the epithelium, and impaired hearing

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are often clinical findings present in patients with otomycosis.[21,22] In immunocompromised, severe ear pain, profuse discharge, fever, swollen lymph node, increased risk of complications (meningitis, sepsis),cranial nerve involvement (facial paralysis).[23]

ETIOLOGY OF OTOMYCOSIS

In Diabetic Patients

- **Hyperglycemia:** High blood sugar levels create a favorable environment for fungal growth
- **Impaired immune response:** Diabetes-related immune dysfunction increases susceptibility to infections
- **Moisture accumulation:** Excessive cerumen and moisture in the ear canal provide an ideal environment for fungal growth

In Immunocompromised Patients

- **Weakened immune system**: Conditions like,HIV/AIDS, chemotherapy, and organ transplantation impair immune function, making patients more susceptible to infections
- **Fungal exposure:** Exposure to fungal spores in the environment, especially in humid and warm climates
- **Antibiotic use:** Broad-spectrum antibiotic use can disrupt the natural flora, allowing fungal overgrowth

Complication of otomycosis in diabetic and immunocompromised patients

- Perforation of the tympanic membrane
- hearing loss
- Otomastoiditis due to fungus
- Infections with Meningitis
- massive infection of the temporal bones

DIAGNOSIS

Diagnosing otomycosis in diabetic and immunocompromised patients involves a combination of clinical examination and laboratory tests:

- **Clinical History and Symptoms**: The doctor will ask about your symptoms, including ear itching, discomfort, discharge, and possible hearing loss. They'll also inquire about any recent water exposure, use of hearing aids, or history of ear infections.
- **Otoscopy:** Visualization of the ear canal may reveal fungal elements such as black, white, or yellow spores, and discharge. The canal may appear inflamed and swollen.
- **Microscopy and Culture:** Samples of ear discharge can be examined under a microscope to identify fungal hyphae and spores. Fungal culture can help identify the specific organism, guiding treatment choices
- **Imaging:** In severe cases, CT or MRI may be needed to assess the extent of the infection.
- **Polymerase Chain Reaction:** Polymerase Chain reaction (PCR) tests are molecular individual ways that can descry and identify fungal DNA in the observance discharge. This system is largely sensitive and can give accurate result.

TREATMENT

The management of otomycosis in diabetic and immunocompromised patients is more challenging than in the general population due to the need for a tailored approach:

- **Cleaning of the Ear Canal**: Debridement of the ear canal to remove fungal debris and discharge is critical. This improves the efficacy of topical antifungal treatments and reduces symptoms.

- **Topical Antifungal Therapy**: Common antifungal agents include clotrimazole, miconazole, bifonazole, isoconazole and fluconazole ear drops. For more severe cases, systemic antifungal medications may be required.
- **Management of Underlying Conditions**: For diabetic patients, optimizing blood glucose levels is crucial to improve immune function and reduce the risk of recurrence. In immunocompromised patients, adjusting immunosuppressive therapy, if possible, can enhance the body's ability to fight the infection.
- **Regular Follow-Up**: Due to the high risk of recurrence, particularly in these vulnerable populations, regular follow-up is essential to monitor the patient's response to treatment and to address any complications promptly.

PREVENTIVE

Preventive strategies are critical in managing otomycosis in diabetic and immunocompromised patients:

- **Ear Hygiene**: Patients should be educated about proper ear care, including avoiding trauma and moisture retention in the ears
- **Monitoring**: Regular check-ups with healthcare providers can help detect early signs of infection and prevent recurrence.
- **Blood Glucose Control**: For diabetic patients, maintaining optimal blood glucose levels is essential not only for preventing otomycosis but also for overall health.
- **Manage underlying conditions:** Control diabetes, HIV, or other underlying conditions, Take medications as prescribed.
- **Avoid antibiotics:** Unless absolutely necessary, avoid broad-spectrum antibiotics, which can disrupt the natural flora and increase fungal growth.
- **Use antifungal ear drops:** If prescribed by a healthcare professional, use antifungal ear drops to help prevent fungal growth.
- **Avoid smoking:** Smoking can compromise the immune system and increase the risk of infections.
- **Stay hydrated:** Drink plenty of water to keep the ear canal moist and prevent fungal growth.
- **Consider immunoprophylaxis:** In some cases, immunocompromised patients may benefit from immunoprophylaxis (e.g., antifungal medications) to prevent otomycosis.

CONCLUSION

Otomycosis is a common fungal infection that can be particularly problematic in diabetic and immunocompromised patients. Among patients with impaired immune systems, *Aspergillus species* and *Candida albicans* were the most frequently isolated fungus.The immunocompromised group had a higher incidence of bilateral involvement. For patients with *otomycosis*, clotrimazole is an excellent treatment; fluconazole is a useful backup for those patients. In patients who are immunocompromised, tympanic membrane perforations are an uncommon consequence of *otomycosis*. Early diagnosis and appropriate treatment are crucial to prevent complications and ensure effective management. Regular monitoring and preventive measures can help reduce the incidence and severity of *otomycosis* in these high-risk populations.

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