

## A Cross-Sectional Study of Bacteriological Profiles in Patients with Chronic Suppurative Otitis Media at a Medical College

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### Abstract:

**Background and Aim:** Persistent suppurative otitis media is characterized by persistent inflammation of the middle ear and mastoid cavity, which can manifest as recurrent ear discharges or otorrhoea through a tympanic hole. The purpose of this study is to evaluate the microbiological profile of ear infections in hospitalised patients.

**Material and Methods:** The current cross-sectional study was carried out in the Department of Otorhinolaryngology, Medical College and Hospital, in collaboration with the Department of Microbiology. A total of 200 patients attending the ENT department of Medical College and Hospital, who satisfied the inclusion criteria were included in the study. complete clinical ENT examination carried out, aural swabs were collected, culture was done and antibiotic sensitivity was studied.

**Results:** A total of 75% of the isolates exhibited pure growth, 20% showed mixed growth, and 5% showed no development. As pure growth, *Staphylococcus aureus* (70/150) and *Pseudomonas aeruginosa* (48) were identified as the most prevalent causal microorganisms. The remaining isolates grew various bacteria, including *Klebsiella* spp. (8.0%) and *Escherichia coli* spp. (5.3%). *Proteus* spp. (5.3%), *Enterobacter* spp. (1.3%), and *Citrobacter* sp. (1.3%) were the most common. As mixed growth, *S. aureus* (50.0%) and *P. aeruginosa* (30.0%) were identified as the most prevalent causal microorganisms.

**Conclusion:** Ear infection is a serious public health issue in poor nations such as India. Early detection of etiological agents and knowledge of their antibiotic sensitivity pattern can help reduce the prevalence of ear infections.

**Keywords:** Ear Infection, Otorhinolaryngology, *Staphylococcus Aureus*, Suppurative Otitis Media.

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### Introduction

In the tropics and subtropics, ear discharge is one of the most common clinical presentations at Ear, Nose, and Throat clinics. Ear infections are common in India due to low socioeconomic position, overcrowding, inadequate cleanliness, and malnutrition. These infections, which can be bacterial, fungal, or viral in nature, are frequent in both children and adults. Ear infections have been linked to a variety of bacterial species. Acute Otitis Externa is usually associated with the isolation of *Staphylococcus aureus*, *Streptococcus pyogenes*, and *Pseudomonas aeruginosa*. Chronic Otitis Externa is frequently linked with *Pseudomonas* and Anaerobes.[1,2]

Persistent suppurative otitis media is characterized by persistent inflammation of the middle ear and mastoid cavity, which can manifest as recurrent ear

discharges or otorrhoea through a tympanic hole. Because of starvation, overcrowding, poor hygiene, inadequate health care, and recurring upper respiratory tract infection, the incidence of this disease is higher in developing nations, particularly among low socioeconomic strata. The illness has a 1:2 urban-to-rural ratio, with poorer rural regions having the highest frequency.[3-5]

Even with newer antibiotics being licensed for use almost every year, chronic suppurative otitis media largely remains unconquered and continues to be one of the major causes of otologic morbidity. Its clinical importance stems from its proclivity to cause infectious complications such as acute and chronic mastoiditis, petrositis, intracranial infections, and non-infectious sequels such as chronic perforation of the tympanic membrane,

ossicular erosion, labyrinthine erosion, and tympanosclerosis, which are the leading causes of hearing loss worldwide. The first step in treating CSOM is to accurately record the tympanic membrane defect, ideally with an operating microscope.[6,7]

As a result, current knowledge regarding the common causing bacterium and its antimicrobial susceptibility pattern is critical for the appropriate choice of antibiotics for therapy. In light of this, this study was conducted to identify the etiological agents generating ear discharge in our environment, with a focus on the antibiotic susceptibility patterns of the bacterial isolates, in order to enable effective treatment. The purpose of this study is to evaluate the microbiological profile of ear infections in hospitalised patients.

### Materials and Method

The current cross-sectional study was carried out in the Department of Otorhinolaryngology, Medical College and Hospital, in collaboration with the Department of Microbiology. The length of this study was one year. Before the trial began, the Institutional Ethics Committee at Medical College gave its approval. All patients who took part in this trial provided informed consent.

### Study Population

A total of 200 patients attending the ENT department of Medical College and Hospital, who satisfied the inclusion criteria were included in the study.

### Inclusion Criteria

- Patients having ear discharge.
- Both male and female patients.
- Patients of all age groups.

### Exclusion Criteria

- History of antimicrobial therapy in last 7 days.
- Duplicate isolates of the same patient.
- Patients not willing to participate in the study.

During the trial period, all patients who met the inclusion criteria were included in the study group. Each patient provided informed consent. The patient was informed about the sample collection technique as well as the study's ramifications. The study's history was acquired in terms of name, age, gender, length of complaints, and past antibiotic administration.

### Collection of Ear Discharge

Under aseptic conditions, the ear discharge was collected with sterile swabs. Three samples were collected.

- 1) Use one swab for Direct Gramme Stain and one for KOH mounting.
- 2) A second swab is used for bacterial culture.
- 3) A third swab is used for fungal culture.

### Pathogen detection and sample collection

Ear discharge was taken from the patient's sick ear using two different pre-sterilized swabs. One swab was used for aerobic culture and was plated on 5% sheep blood agar (BA), MacConkey's agar, and chocolate agar (CA) before being incubated at 37°C for 48 hours. The second swab was used for anaerobic culture and was injected in Robertson's cooked meat (RCM) broth before being cultured for 72 hours at 37°C. On the third day, RCM subcultures were grown in 5% BA and Neomycin BA (Neomycin concentration of 70 g/ml). For anaerobic cultivation, a Dynox anaerobic jar based on Marshal's chromous absorption concept was utilised. Standard techniques were used to identify all organisms. All results and outputs were evaluated in accordance with the criteria of the Central Laboratory Standards Institute. The Statistical Package for Social Sciences (SPSS) was used for statistical analysis.

### Results

The bulk of the patients in this research were between the ages of 6 and 10, followed by those between the ages of 11 and 20, and those between the ages of 21 and 30. Males outnumbered females in the study's participant pool. A total of 75% of the isolates exhibited pure growth, 20% showed mixed growth, and 5% showed no development. As pure growth, *Staphylococcus aureus* (70/150) and *Pseudomonas aeruginosa* (48) were identified as the most prevalent causal microorganisms. Methicillin-sensitive *S. aureus* (MSSA) isolates outnumbered methicillin-resistant *S. aureus* (MRSA) isolates (n=16) and coagulase negative *S. aureus* (CONS) isolates (n=12).

The remaining isolates grew various bacteria, including *Klebsiella* spp. (8.0%) and *Escherichia coli* spp. (5.3%). *Proteus* spp. (5.3%), *Enterobacter* spp. (1.3%), and *Citrobacter* sp. (1.3%) were the most common. As mixed growth, *S. aureus* (50.0%) and *P. aeruginosa* (30.0%) were identified as the most prevalent causal microorganisms. MSSA isolates (30.0%) outnumbered MRSA isolates (20.0%).

Table 1: Age distribution of the study subjects (N=100)

Age of the study patients	Number of patients
6 – 10	102
11 – 20	32
21 – 30	28
31 – 40	12

41 – 50	8
51 – 60	8
61 – 70	6
71 – 80	4
Total	200

**Table 2: Pure growth in culture of chronic suppurative otitis media**

Organisms	No. of isolates
Staphylococcus aureus	70
Pseudomonas aeruginosa	48
Klebsiella species	12
Escherichia coli	8
Proteus species	8
Enterobacter species	2
Citrobacter species	2

**Table 3: Mixed growth in culture of chronic suppurative otitis media**

Organisms	No. of isolates
Staphylococcus aureus	20
Pseudomonas aeruginosa	12
Klebsiella species	12
Escherichia coli	2
Proteus species	4

### Discussion

One of the most prevalent presentations to the ENT OPD globally is ear infection. It is a huge public health issue in developing nations such as India. It is linked to avoidable hearing loss. It increases the chance of possibly catastrophic long-term consequences. As a result, understanding their etiological agents as well as their antimicrobial sensitivity pattern will aid in the right treatment and avoidance of consequences.[8,9]

persistentsuppurative otitis media (CSOM) is characterised by persistent inflammation of the middle ear and mastoid cavity, which may manifest as recurrent ear discharges or otorrhoea via a tympanic hole. Because of starvation, overcrowding, poor hygiene, inadequate health care, and recurring upper respiratory tract infection, the incidence of this disease is higher in developing nations, particularly among low socioeconomic strata. The two kinds of CSOM are tubotympanic and attico-antral, depending on whether the disease process affects the pars tensa or pars flaccida of the tympanic membrane (TM).10]

In this study, we found a significant frequency of CSOM in children aged 6 to 10, followed by those aged 11 to 20. Similar findings were found in investigations conducted in various regions of the world. The greater frequency of otitis media in children may be attributed to the fact that children are more prone to developing upper respiratory tract infections (URTIs) and that cold weather predisposes children to URTI. Poor hygiene and non-scientific approaches to therapy, such as the administration of unorthodox ear drops and local folk medicines such as oil and honey into the

middle ear, have also been seen to worsen infections and lead to eustachian tube obstruction.

In this study, the gender distribution indicated that CSOM was more prevalent in males (57%) than females (43%). This is congruent with the findings of Patigaroo et al. and Moshi et al., who found a greater incidence in the male population. In our study, 5% of patients had no culture growth, 75% had pure growth, and 20% had mixed growth. Similar findings were found in other investigations.

This research revealed that the incidence of sterile growth was lowest, whereas the incidence of pure growth was greatest. It is worth noting that, in contrast to Fliss et al.'s studies, where *P. aeruginosa* was the most common causative agent, *S. aureus* was the most common causative agent (46.7% in pure growth and 50.0% in mixed growth), with *P. aeruginosa* coming in second (32.1% in pure growth and 30.0% in mixed growth).

### Conclusion

Ear infection is a serious public health issue in poor nations such as India. Early detection of etiological agents and knowledge of their antibiotic sensitivity pattern can help reduce the prevalence of ear infections. As a result, early detection and treatment of these infections is critical, not only because they are treatable in the early stages, but also to avoid disease progression into more serious and deadly invasive forms.

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