



PSEUDOMONAS AERUGINOSA AND IT'S SENSITIVITY SPECTRUM IN CHRONIC SUPPURATIVE OTITIS MEDIA AT TERTIARY CARE HOSPITAL, MAHARASHTRA

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ABSTRACT **Introduction:** Chronic suppurative otitis media (CSOM) is chronic inflammatory condition of the middle ear and mastoid cavity. It can cause serious local damage & severe complications. *Pseudomonas aeruginosa* is most common organism to cause CSOM. The aim of study was to determine antimicrobial Sensitivity pattern in *P. aeruginosa* in ear discharge samples from the patients suffering from CSOM. **Methodology:** It was retrospective study from april 2025 to april 2026. All ear discharge samples from the patients suffering from CSOM were tested by Standard guidelines. **Results:** *P. aeruginosa* isolates (90.2%) were sensitive to Piperacillin-tazobactam followed by imipenem (76%), meropenem (74%) tobramycin (70%). **Conclusion:** Early & effective treatment will be helpful for prevention of complications caused by CSOM. Judicial use of antibiotics minimise antibiotic resistance.

KEYWORDS : CSOM, Antimicrobial Susceptibility, *Pseudomonas Aeruginosa*.

INTRODUCTION

Chronic suppurative otitis media (CSOM) is a chronic inflammation of the middle ear and mastoid cavity. It is characterized by recurrent ear discharge through a perforated tympanic membrane and can occur due to various causes. CSOM is an important cause of hearing loss, particularly conductive hearing loss, accounting for approximately 66.3% of cases.¹ It is also associated with 1.5% of speech disorders.²

CSOM often develops after an upper respiratory tract viral infection, which is followed by infection with pyogenic organisms.³ The disease is known for repeated episodes and persistent infection, even after treatment. If left untreated, CSOM may cause serious complications such as Ossicular damage, Facial nerve damage & Cochlear damage leading to permanent hearing loss. It can also leads to Intracranial complications & Extracranial complications potentially causing life-threatening conditions.⁴

Biofilm formation is considered one of the important factors contributing to the high incidence of chronic suppurative otitis media (CSOM) caused by pathogenic bacteria.^{5,6} Studies have reported that biofilms are present in approximately 60%–75% of CSOM cases associated with cholesteatoma.^{7,8} Among the bacterial pathogens implicated in CSOM, *Pseudomonas aeruginosa* a Gram-negative organism, is frequently isolated and is well recognized for its ability to form biofilms as part of its virulence mechanisms⁹ The presence of biofilm-forming bacteria poses a significant challenge in CSOM management because biofilms can make bacterial infections more difficult to eradicate and control.¹⁰

Determining the antibiotic sensitivity pattern before initiating treatment is essential, as the bacterial pathogens responsible for CSOM and their antimicrobial susceptibility profiles may vary over time. Such information is crucial for ensuring appropriate clinical management and for preventing or reducing the risk of complications. *Pseudomonas aeruginosa* is one of the most frequently isolated pathogens in chronic suppurative otitis media (CSOM). Hence this study is carried out to know antimicrobial Sensitivity pattern in *Pseudomonas aeruginosa* in ear discharge samples from the patients suffering from CSOM.

MATERIAL & METHODS

This retrospective study was carried out in a tertiary care hospital from april 2025 to april 2026. All ear discharge samples collected from patients diagnosed with chronic suppurative otitis media (CSOM) were subjected to microbiological examination. The isolated

organisms were identified based on their cultural characteristics, colony morphology, and biochemical reactions. A total of 62 isolates were identified as *Pseudomonas aeruginosa* and subsequently subjected to antimicrobial susceptibility testing. Antimicrobial susceptibility testing was performed using the Kirby–Bauer disc diffusion method on Mueller–Hinton agar. Following overnight incubation at 37°C, the zones of inhibition surrounding the antibiotic discs were measured and interpreted according to the recent guidelines of the Clinical and Laboratory Standards Institute (CLSI).

RESULTS

A total of 62 *Pseudomonas aeruginosa* isolates were recovered from ear discharge samples of patients with chronic suppurative otitis media (CSOM). Among these isolates, the highest sensitivity was observed to piperacillin–tazobactam (90.2%), followed by imipenem (76%), meropenem (74%), and tobramycin (70%) as shown in fig 1. The isolates showed the highest resistance to ciprofloxacin (44.7%), followed by ceftazidime (42%) and aztreonam (40%).



Fig1. *Pseudomonas Aeruginosa* Isolates Antimicrobial Sensitivity in Percentage (%).

DISCUSSION

Suppurative otitis media is a commonly encountered condition, with an estimated global incidence of approximately 5%¹¹. Chronic suppurative otitis media (CSOM) is among the frequently reported chronic ear infections, particularly affecting individuals from rural areas and lower socioeconomic groups^{12,13}. It is a persistent infection of the middle ear that often begins during childhood and may result in significant morbidity extending into adulthood. The condition is characterized by recurrent ear discharge through a persistent tympanic membrane perforation, which may eventually lead to hearing impairment or deafness. This recurrence result in osteogenesis, osteitis, and erosion of the temporal bone and ossicles¹⁴. Bacteria may reach the middle-ear cleft either through the external auditory canal via a tympanic membrane perforation, through the nasopharynx via the

Eustachian tube, or through both routes. Irrespective of the route of bacterial entry, biofilm formation has been proposed as an important factor contributing to the persistent and difficult-to-treat nature of CSOM¹⁵.

The bacterial etiology of chronic suppurative otitis media (CSOM) includes both aerobic and anaerobic organisms. Common aerobic pathogens include *Pseudomonas aeruginosa*, *Escherichia coli*, *Staphylococcus aureus*, *Streptococcus pyogenes*, *Proteus mirabilis*, and *Klebsiella* species, whereas anaerobic organisms include *Bacteroides*, *Peptostreptococcus* and *Propionibacterium* etc. Although these bacteria may occasionally be present in the external auditory canal, their proliferation can be promoted by factors such as trauma, inflammation, and increased humidity. They may subsequently enter the middle ear through a persistent tympanic membrane perforation. Among the various bacteria, *P.aeruginosa* is particularly associated with progressive and extensive destruction of the middle-ear and mastoid structures, primarily due to the production of various toxins and extracellular enzymes¹⁶.

Several studies have identified *Pseudomonas aeruginosa* as the predominant bacterial isolate among patients with chronic suppurative otitis media (CSOM), with reported isolation rates ranging from 32.1% to 53.9%^{17,18,19}. Other microorganisms documented in CSOM include *Staphylococcus* spp., *Klebsiella aerogenes*, *Proteus* spp., and *Escherichia coli*. The detection of pathogens such as *P. aeruginosa* and fecal coliforms, particularly *E. coli*, may reflect exposure to inadequate sanitary conditions and humid environments, which can increase the risk of infection¹⁹.

In our study *P. aeruginosa* was observed to be sensitive for piperacillin-tazobactam, imipenem & meropenem which is similar to the study done by Garg et al.²⁰ Mofatteh et al²¹, study showed resistance to fluoroquinolone & cephalosporin classes which is similar to present study.

The widespread and prolonged use of antibiotics may contribute to the development of antimicrobial resistance among pathogenic bacteria. Therefore, culture and antimicrobial susceptibility testing of ear discharge samples can help guide the selection of appropriate antibiotic therapy and may reduce the risk of emergence and spread of resistant bacterial strains.

CONCLUSION

Regular and periodic monitoring of the local microbiological profile and antimicrobial susceptibility patterns is essential for developing appropriate antibiotic policies and guiding empirical therapy for otitis media. Such surveillance can contribute to effective treatment, reduce complications, limit the emergence of antimicrobial-resistant strains, and ultimately decrease the long-term disease burden and treatment-related costs for patients.

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