

A Study on CSOM – Microbiologist ProspectiveK Navya¹, K Divya²¹Post Graduate, Department of ENT, Saveetha Medical College, Chennai²Assistant Professor, Department of Microbiology, GSL Medical College, Rajahmundry

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Corresponding Author: Dr. K Divya

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Abstract

Introduction: Otitis media (OM), especially Chronic Suppurative Otitis Media (CSOM), is a prevalent childhood infection, notably high in India. Major factors include poor hygiene and improper antibiotic use, leading to social stigma and potential drug resistance. This study identifies aerobic bacterial and fungal profiles in CSOM, guiding targeted therapies and improving management.

Methods: This prospective study, conducted at GSL Medical College from January to May 2024, included adults with ear discharge or pain. Aural swabs were processed for aerobic culture, sensitivity testing, and pathogen identification via Gram staining and biochemical assays. Antibiotic sensitivity was assessed using the Kirby-Bauer method, with *E. coli* ATCC 25922 as control.

Results: In this research, 116 members were included. Culture positivity was 82%. The mean age was 46.4 years and male female ratio was 1.12. GNB (47.4%) were isolated maximum, followed by GPC (42%) and fungi (10.5%). *Pseudomonas aeruginosa* (25; 56%) was the leading cause of CSOM. No significant drug resistance was identified.

Conclusion: The study identifies *Pseudomonas aeruginosa* as a primary pathogen in CSOM, with minimal antibiotic resistance, supporting current treatment effectiveness. Regular monitoring of resistance and culture testing are advised to sustain efficacy. Targeted antimicrobial therapy, based on pathogen profiles, can improve outcomes.

Keywords: Chronic Suppurative Otitis Media (CSOM), *Pseudomonas aeruginosa*, Antibiotic resistance, Pathogen profiling, Targeted therapy.

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Introduction

Otitis media (OM), an inflammation of the middle ear and mastoid bone, ranks among the most common infections in childhood. [1] Chronic Suppurative Otitis Media (CSOM), in particular, has been identified as a significant cause of childhood morbidity, characterized primarily by recurrent ear discharge. According to the World Health Organization, India carries one of the highest global burdens of CSOM. Key contributing factors include poor personal hygiene and the habit of introducing foreign objects into the ear, which heighten the risk of infection. [2, 3]

CSOM often leads to continuous pus discharge, which can result in social stigma, especially for school-going children who may face teasing and isolation from peers. This chronic condition not only impacts social interactions but also creates practical challenges in daily activities. [4] Additionally, the improper use of antibiotics to manage CSOM has been linked to the development

of drug-resistant bacterial strains, compounding the difficulty of effective treatment. [5]

In light of these issues, we conducted a study aimed at identifying the aerobic bacterial and fungal profiles those presenting with symptoms of CSOM. The findings are expected to guide more targeted antimicrobial therapies, address antibiotic misuse, and contribute to better disease management and quality of life.

Methods

It was a prospective research conducted in the department of Microbiology, GSL Medical College. Study was conducted between January to May 2024. Study protocol was approved by the institutional ethics committee. Informed consent was taken from all the study members.

Individuals of both gender, > 18 years with ear discharge or pain were included in the research. Those on antibiotics, recently underwent some ear related invasive procedures, non cooperative

individuals were not considered in this research. Aural swabs were collected and sent to the Microbiology laboratory for aerobic culture and sensitivity test.

Swabs were inoculated on Blood agar, MacConkey agar. The inoculated plates were incubated at 37^o C for 24 hours. After incubation, initially growth was classified by Gram staining (GS). Battery of biochemical tests were used to identify the pathogens. [6] Coagulase test, Catalase test, Microdase test, Bile esculin agar were used for identification of gram positive cocci (GPC). To confirm gram negative bacilli (GNB), tests such as Indole, Methyl Red, Voges Proskauer, Citrate utilization, Urease production and growth on Triple Sugar Iron agar were used. Antibiotic sensitivity test (AST) was done on Muller-Hinton agar (MHA) by Kirby-Bauer disc diffusion method. [6] *Escherichia coli* ATCC 25922 was used as the control. Fungal growth was identified by GS, lactophenol cotton blue mount.

Results

In this research, 116 members were included. Culture positivity was 82% (95). The mean age was 46.4 years and male female ratio was 1.12. GNB (47.4%; 45) were isolated maximum, followed by GPC (42%; 40) and fungi (10.5%; 10). *Pseudomonas aeruginosa* (25; 56%) was the leading cause of CSOM. No significant drug resistance was identified.

Discussion

CSOM is a major public health concern, particularly among school-aged children, due to anatomical factors such as a shorter and more horizontal Eustachian tube. This structure facilitates middle ear infections, making CSOM common in children. A high number of CSOM cases being observed in this institution, highlighting the need for targeted intervention in this age group. Improved understanding and management strategies are essential to address this prevalent condition and reduce its long-term impact on child health and development. [7, 8, 9]

In this study involving 116 participants, culture positivity was notably high at 82% (95 cases). This result underscores the significant role of bacterial and fungal pathogens in CSOM, highlighting the necessity of microbiological evaluation for effective treatment. High culture positivity suggests that prompt culture-based diagnosis could guide targeted antibiotic or antifungal therapy, potentially improving patient outcomes and reducing resistance issues. [10] Studies show that early culture-based diagnosis in CSOM cases enables more accurate identification of pathogens, allowing for tailored treatments that can mitigate

complications associated with the condition. [11, 12]

The mean age of participants was 46.4 years, with a male-to-female ratio of 1.12, indicating a nearly balanced gender distribution. The prevalence of CSOM across this age group aligns with findings that middle-aged adults are increasingly susceptible to ear infections due to age-related changes in immune function and Eustachian tube function. Studies indicate that although CSOM affects both genders, males may exhibit a slightly higher prevalence, potentially due to occupational or environmental exposures that increase risk. [13, 14] This balanced demographic also suggests the importance of tailoring interventions for a middle-aged population, focusing on early detection and personalized treatment strategies to address gender-specific risk factors and outcomes effectively.

GNB were the most frequently isolated pathogens in CSOM cases, constituting 47.4% (45), followed closely by GPC at 42% (40) and fungi at 10.5% (10). Among the GNB, *Pseudomonas aeruginosa* was identified as the primary causative agent, accounting for 56% (25) of CSOM infections. *P. aeruginosa* is well-known for its virulence and adaptability in moist environments like the middle ear, where it can form biofilms, which complicates treatment and often contributes to recurrent infections. [15]

The presence of both GNB and GPC in high numbers highlights the diverse microbial spectrum involved in CSOM, which aligns with other studies showing that polymicrobial infections frequently characterize chronic otitis cases. Notably, the study observed no significant antibiotic resistance, suggesting that current treatment protocols remain effective against these pathogens. However, continual monitoring of resistance patterns is essential, as resistance can develop rapidly, particularly with overuse of antibiotics in chronic infections like CSOM. [16, 17] The data underline the importance of comprehensive microbiological evaluations in guiding therapy for CSOM, emphasizing a need for periodic culture and sensitivity testing to prevent resistance. Proper antibiotic stewardship and close patient follow-up are key in managing these infections effectively and ensuring that the antimicrobial regimen aligns with the current sensitivity patterns.

Conclusion

The study reveals that GNB, especially *Pseudomonas aeruginosa*, are predominant pathogens in CSOM, followed by GPC and fungi. The absence of significant antibiotic resistance among isolates is promising, indicating that current treatment approaches remain effective. However, continuous monitoring of resistance patterns and regular culture and sensitivity testing are

recommended to maintain treatment efficacy. This study highlights the importance of targeted antimicrobial therapy based on pathogen profiles, which could improve outcomes and reduce recurrence rates in CSOM cases.

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