

# Antibiotic sensitivity pattern in chronic suppurative otitis media at north coastal region of Andhra Pradesh

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## Abstract

**Background:** Chronic suppurative otitis media (CSOM) is a common condition in children with middle ear infection worldwide and untreated cases leads to meningitis, facial nerve paralysis and brain abscess. **Aim:** The aim of the study is to identify bacteria associated with CSOM and its antibiotic sensitivity pattern and to find out the incidence of extended spectrum beta lactamases and metallobeta lactamases in CSOM patients. **Methods:** A total of 250 ear swabs were collected from patients with CSOM and bacteria were identified by using conventional methods. The identified bacteria were subjected to Kirby-Bauers antibiotic test for assessing resistant patterns. Detection of ESBL and MBL is done by double disc diffusion method. **Results:** A total of 184 bacteria were isolated from 250 CSOM patients, among them 52% were *P.aeruginosa*, 73% were *S.aureus*, 20% were *A.baumannii* and rest were others, from antibiotic disc diffusion methods 72% ESBL strains and 8% MBL strains were documented. Multidrug resistant strains of *P.aeruginosa* 52 were more prevalent than those of *S.aureus* and other bacteria in ear discharges. Vancomycin and Imipenem could control gram negative bacteria and gram positive bacteria respectively.

**Key Words:** CSOM, Antibiotic sensitivity, Multidrug resistant

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## INTRODUCTION

Chronic suppurative otitis media is most common childhood disease that causes infection in the ear leading to hearing impairment. It is identified by the chronic drainage in the middle ear which is associated with tympanic membrane perforation. It is generally preceded by an episode of acute otitis media<sup>1</sup>. Individuals with this disease respond frequently to topical therapy than to systemic. The topical therapy basically consists of 3 important things under which selection of correct

antibiotic, control of granulation tissue and aggressive aural toilet are the main components. The common bacteria associated with this infection are *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Klebsiella*<sup>3</sup>. On other hand, the common bacteria found in acute otitis media would be *Streptococcus pneumoniae* and *Haemophilus influenzae*<sup>4</sup>. Certainly, the ability of these microorganisms in biofilm formation is frequent in CSOM (5). Another life threatening situation arises by Methicillin resistant staphylococcus aureus strains with adopted resistance to most common antibiotic groups like beta lactams, piperacillin-tazobactam, carbapenem, ampicillin-sulbactam and imipenem<sup>6</sup>. Hence, the present work describes the surveillance of bacterial strains in patients attending with ear infections in outpatient at Department of Otorhinology of the Pinnacle hospital for a period of 16 months. Antibiotic sensitivity patterns of the identified bacterial strains were performed to assess the varieties of CSOM which will help in therapy with antimicrobial program. The study also focusses on incidence of extended spectrum beta lactamases (ESBL) and MBL strains of CSOM.

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## MATERIALS AND METHODS

### Selection of CSOM patients

Participants with middle ear infection on the basis of otoscopic examinations and clinical presentations were selected for the study and CSOM patients were diagnosed by the otolaryngologist. Patients with infections in the middle ear cleft for less than three months and traumatic perforations were excluded. The patients with CSOM were considered and pus is collected from ear canal with sterile ear swab by consultant otolaryngologist by taking all aseptic measures.

### Study population

The study is been conducted in Pinnacle Hospital, Visakhapatnam during February 2018- May 2019. A total of 250 ear swabs from CSOM patients were collected with sterile swab sticks. The swabs were then transferred to microbiology department for further analysis. Pus swabs were cultured on blood agar plates followed by incubation at 37°C for the growth of pathogenic bacteria, which will be identified by the microbiologist according to standard methods (7), followed by antibiotic susceptibility tests for the isolated bacteria by the guidelines of Clinical Laboratory Standard Institute as mentioned. The antibiotic disks used for bacteria were gentamycin 30, ceftazidime 10, ciprofloxacin, aztreonam 30, imipenem 10, piperacillin 100 and vancomycin 30. The standard MTCC strains along with clinically isolated bacteria were subjected to antibiotic sensitivity tests with antibiotics by disk diffusion method (8).

### Detection of ESBL strains

ESBL producing strains were detected by double disc synergy test (DDST) on a lawn culture grown in Muller Hinton agar plate. The antibiotic disks like augmentin 30 ug dic in combination of amoxicillin and clavulanic acid (20 + 10) in the middle of the plate and was flanked by a disc of ceftazidime 30 ug and cefotaxime 30 at 30 mm apart were placed on lawn culture. The experiments were performed in triplicates and plates were incubated at 37°C and zone of inhibition was measured. The inhibition of ESBL enzyme zone was identified by augmentin disc which was formed from a peripheral disc towards the middle. It is identified by the successor synergetic action of cephalosporin disc as well. To identify, the organism showing resistant to both cephalosprins, due to production of ESBL enzyme, which is deactivated by the augmentin with a consequent reactivation of cephalosporin resulting in enlarged zone of inhibition (9).

### Detection of MBL strain

The metallo beta lactamases (MBL) producing organism were detected by imipenem- EDTA-DDST. Briefly, the organism was considered as MBL producers if there is increase in the zone of inhibition of beta lactam + EDTA disc with more than 5mm. The MBL productions in

bacteria for imipenem –EDTA disk were developed and experiments were repeated in triplicates and results were noted.

## RESULTS

Growth of bacteria from ear swabs of CSOM patients. A total of 250 ear swabs were collected from CSOM patients and subjected to culturing on specific media for the growth of bacteria. In the present study, the prevalence of pathogenic bacteria among CSOM patients was found to be 82%. It was observed that in few cultures two or more organisms were grown on media and in some cultures single organism was identified. The percentage of organisms isolated is documented in Table 1. isolation of one organism as pure culture was significantly more than isotion of two or more bacteria as mixed infection. All the colonies were identified by conventional methods that include both biochemical and microscopic examination by gram staining. and were tabulated. Species identification was done by carbohydrate fermentation tests and results were tabulated.

**Table 1:** Number of organism isolated from samples

	Number of isolates	Number of bacteria	%
Culture sterile	66	0	26
Single organism	75	75	30
Two organisms	60	109	43
No pathogenic organism	49	contaminated	
<b>Total</b>	<b>250</b>	<b>184</b>	<b>73</b>

**Antibiotic sensitivity test of isolated bacteria** From the antibiotic tests data, it was found that *A.baumannii* had highest resistant(78%) to ceftazidime and Amoxyclav showed highest sensitivity- 86% For all the bacteria, the antibiotic sensitivity is measured and calculated In most of cases of CSOM patients ciprofloxacin and amoxyclav were prescribed .but it was seen that *A.baumannii* 20%, 12% *C.freundii*, 52% *K.pneumonia*, 28% *P.aeruginosa* and 43%*S.aureus* were resistant to ciprofloxacin. Similarly percentage of resistance for amoxiclave was found to be for *A.baumannii* 13%, 31% for *C.freundii*, 21% for *K.pneumonia*, 17% for *P.aeruginosa* and 36% for *S.aureus*.

### Incidence of ESBL and MBL strains of CSOM patients

The tested strains were screened for both ESBL and MBL and it was found that 72% were ESBL and 8 % were MBL strains were found. Among the ESBL strains, 88 were *S.aureus* and 78 were *P.aeruginosa*. In the same way, in MBL 3% were *S.aureus* and 5% were *P.aeruginosa*.

## DISCUSSION

In the current study, the prevalence of bacteria among CSOM patients was found to be 73%. This is similar with other study reports from other parts of world (10-12). In our study gram negative bacteria were isolated in 59% of cases and gram positive bacteria in 61%. The CSOM is considered as a major health problem in children and adults in developing countries. It has adverse effects in chronic hearing loss which impact on speech, interaction and language and is significantly responsible for mortality and morbidity by the complications associated with it. WHO reported that CSOM is prevalent in four countries and one among them is India<sup>13</sup>. Antibiotics either topical or systemic are given to acute exacerbations in CSOM. The major risk factors associated with it are poor medical treatment, respiratory tract infections and poor living conditions. Atticoantral is one of the most common diseases associated with it which is characterised by retraction pocket formation followed by cholesteatoma<sup>14</sup>. The remarkable ability to acquire antibiotic resistance limits by *S.aureus* infections which leads to increased mortality and morbidity rates<sup>15</sup>. In a study conducted in Germany, most of the MRSA strains were found in wounds and in pneumonia<sup>16</sup>. In the present study of 250 samples, 184 bacteria were isolated and other studies reported very less number of bacteria. Most of the bacteria were gram negative in our study, which matches with some other study in our country<sup>17</sup>. In the present study, higher resistance is being demonstrated in gram positive bacteria and in gram negative bacteria, the resistance is bit lower i.e.; 8% MBL and 72% ESBL strains were documented.

## CONCLUSION

CSOM is identified as common disease with antibiotic treatment and emergence of resistance strains is leading to treatment failures. The most common drug resistant strains are found to be *P. aeruginosa* and *Staphylococcus aureus* which were more prevalent in ear discharges of CSOM patients. Assessing antibiotic sensitivity of bacteria associated with CSOM is required for monitoring CSOM patients from risk.

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