



MICROBIOLOGICAL PROFILE AND THEIR ANTIMICROBIAL SENSITIVITY PATTERN IN PATIENTS OF CHRONIC SUPPURATIVE OTITIS MEDIA (CSOM)

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**ABSTRACT** Chronic Suppurative Otitis Media (CSOM) is a chronic inflammation of the middle ear, which presents with recurrent ear discharge or otorrhea through a tympanic membrane perforation. The study included 156 clinically diagnosed cases of CSOM. Samples collected from the patients were processed using standard microbiological techniques. In this study the most common organism causing CSOM was *Pseudomonas aeruginosa*, followed by *Staphylococcus aureus*. Meropenem and Piperacillin-Tazobactam were effective against most of the gram negative bacilli followed by aminoglycosides and fluoroquinolones. Linezolid, vancomycin, minocycline and tetracyclines were effective against gram positive cocci. The knowledge of sensitivity pattern helps in rational use of antibiotics and thus prevents the emergence of resistant strains and prevent long term complications of CSOM.

**KEYWORDS :** Chronic suppurative otitis media, *Pseudomonas aeruginosa*, Antibiotic profile.

**INTRODUCTION:**

Chronic suppurative otitis media is characterized by persistent or recurrent purulent otorrhea in the setting of tympanic membrane (TM) perforation. Usually, there is also some degree of conductive hearing loss. This condition can be categorized as active or inactive. Inactive disease is characterized by a central perforation of the TM, which allows drainage of purulent fluid from the middle ear.<sup>[1-2]</sup> CSOM is one of the most important causes of preventable hearing loss in India and other developing countries.<sup>[3-5]</sup> The infection may occur during the first 5 years of age, with peak around 2 years.<sup>[6]</sup> The aerobic microorganisms most frequently found in CSOM are *Pseudomonas aeruginosa*, *Staphylococcus aureus* and other Gram negative bacteria such as *Proteus spp.*, *Klebsiellae spp.*, *Escherichia coli*, *Haemophilus influenzae* and *Moraxella catarrhalis*. The most commonly isolated fungal agents are *Aspergillus spp.* and *Candida spp.*<sup>[2]</sup> In untreated patients of CSOM, when the perforation is more peripheral, squamous epithelium from the auditory canal may invade the middle ear through the perforation forming mass of keratinaceous debris (chlesteatoma) at the site of invasion. This mass can enlarge and has the potential to erode bone and promote further infection, which can lead to meningitis, brain abscess, or paralysis of cranial nerve VII.<sup>[1]</sup> Hence, timely management of CSOM cases is important to prevent further complications.

**MATERIAL & METHODS:**

The present prospective study conducted over a period of July, 2018 to January, 2019. A total of 156 patients attending the outpatient and patients admitted in-patient department of ENT, Pacific Institute of Medical Sciences hospital, Udaipur, with complaints of ear discharge for more than 3 months were included in the study.

**Sample Collection & Processing:**

The ear discharge was collected using sterile cotton swabs under aseptic precautions. The samples collected were transported & processed immediately in the department of microbiology, central laboratory. The isolates grown were identified based on morphology, cultural characteristics and biochemical reactions as per standard microbiological procedures.<sup>[7]</sup> Antimicrobial testing for bacterial isolates was carried out on Muller Hinton Agar by Kirby Bauer disc diffusion method and results were noted according Clinical Laboratory Standard Institute (CLSI, 2018) guidelines.<sup>[8]</sup>

**RESULTS:**

In this study, as shown in Table 1, majority of the patients were of 21-40 years of age (53%), followed by 30% in 1-20 years age group and 13% patents in 41-60 years range. Female patients (52%) were a little more affected than male patients (48%).

**Table 1: Age And Gender Wise Distribution Of CSOM Patients**

Age Group	Male (n=32)	Female (n=34)
1-20 years	9	11
21-40 years	15	20
40-60 years	6	3

A total of 74 isolates were identified in CSOM patients. Eighty nine percent of the isolates showed pure growth, whereas 11% were mixed growth.

*Pseudomonas aeruginosa* (53.4%), followed by *Staphylococcus aureus* (27.4%) were identified to be the most common causative bacteria. Among the *Staphylococcus aureus*; Methicillin Sensitive *Staphylococcus aureus* (MSSA) were 65% and Methicillin Resistant *Staphylococcus aureus* (MRSA) were 35%. The remaining 14 isolates (19.2%) were Gram negative bacteria other than *Pseudomonas aeruginosa* (*Klebsiella pneumoniae*, *Proteus mirabilis*, *Acinetobacter spp.*, *Escherichia coli* and *Citrobacter spp.*) [Table 2].

Of the 74 culture positive, 8 cases showed polymicrobial growth. Mixed infection involving *Pseudomonas aeruginosa* with *Staphylococcus aureus* were more commonly seen. The next common mixed isolates were *Proteus mirabilis* with *Pseudomonas*, *Klebsiella* and *Escherichia coli*.

*Pseudomonas aeruginosa* showed 25% resistant to Amikacin, Gentamicin, Ciprofloxacin, Levofloxacin and Gentamicin, whereas Tobramycin and Imipenem were resistant to 20% of the isolates. Piperacillin-Tazobactam showed resistant to 12% and Meropenem showed resistant to 7%. None of the *Pseudomonas aeruginosa* showed resistant to Colistin and Polymyxin B.

Among *Staphylococcus aureus*, MSSA showed 85% resistant to Penicillin, 61% resistant to Trimethoprim/Sulfamethoxazole, 46% resistant to Ciprofloxacin, 38% resistant to Erythromycin and Azithromycin, 23% resistant to Chloramphenicol and Gentamicin. All the MSSA isolates were sensitive to tetracycline, cefoxitin, minocycline, doxycycline, clindamycin, Linezolid and Vancomycin. In this study all MRSA showed sensitive to tetracyclin, minocycline, linezolid and Vancomycin. All MRSA showed resistant to Trimethoprim/Sulfamethoxazole, Cefoxitin, Penicillin Erythromycin and Azithromycin. Eighty five percent MRSA showed resistant to Gentamicin, 42% showed resistant to ciprofloxacin, 14% showed resistant to chloramphenicol, doxycycline and clindamycin.

In other gram-negative bacteria other than *Pseudomonas aeruginosa* showed different resistant patterns mentioned in Table 2.

**Table 2: Isolated Organisms From CSOM Patients And Their Resistant Pattern Against The Following Antibiotics**

Isolated Organisms	Antibiotic Resistant pattern of Organisms Isolated from CSOM patients																											
	Total No. of Isolates (n=73)	Amikacin	Gentamicin	Tobramycin	Ciprofloxacin	Levofloxacin	Tetracyclin	Trimethoprim/Sulfamethoxazole	Ampicillin/Sulbactam	Ceftriaxone	Cefepime	Cefazolin	Gentamicin	Chloramphenicol	Piperacillin/Tazobactam	Meropenem	Polymyxin B	Colistin	Penicillin	Minocycline	Doxycycline	Clindamycin	Erythromycin	Azithromycin	Vancomycin			
<i>Pseudomonas aeruginosa</i>	39	10	10	8	9	10									9	5	3	8	0	0								
<i>Staphylococcus aureus</i>	13	3	3	6	0	8								0	3						11	0	0	0	4	5	0	0
<i>MRSA</i>	7	0	0	3	0	7								7	1						7	0	0	1	7	7	0	0
<i>Proteus mirabilis</i>	4	1	1	2	2	4			2	2	2	2			0	0	0											
<i>Klebsiella pneumoniae</i>	5	1	1	1	0	0			1	1	1	1	1	1	1	1	1	1	0									
<i>Escherichia coli</i>	1	1	1	1	0	0			1	1	1	1	1	1	1	1	1	1	0									
<i>Citrobacter spp</i>	1	0	0	0	0	0			0	0	0	0	0	0	0	0	0	0										
<i>Acinetobacter</i>	1	1	1	1	0	0			2	2	2	2			1	1	1	1										

**DISCUSSION:**

Chronic Suppurative Otitis Media (CSOM) is the most common conditions seen by the Otologist, Paediatrician and the General Practitioner. It is a persistent disease with great risk of irreversible complications. Early bacteriological diagnoses of all cases will assume accurate and appropriate effective therapy.<sup>[9,10]</sup>

In the present study, the age of the patients ranged from 1-60 years. Maximum number of cases was found in the age group of 21-40 years, followed by 1-20 years. This is similar comparison with studies of H Kumar & S Seth, 2011<sup>[11]</sup>; Bansal sulabh et al., 2013<sup>[12]</sup>; Rejitha IM et al., 2014.<sup>[13]</sup> However, studies of Harshika et al., 2015<sup>[2]</sup>; Poorey and A Iyer, 2002<sup>[9]</sup>; A agarwal et al., 2014<sup>[14]</sup>; Choudary BL et al., 2014<sup>[15]</sup>., have reported maximum number of cases in 1-10 years of age.

Females were more commonly affected than males and it is also supported by a study in Pakistan and Singapore. [Mansoor T et al., 2009<sup>[6]</sup> & Loy AHC et al., 2002<sup>[17]</sup>] In contrast to this some studies showed opposite trend reported male 57.3% and Female 42.7% [Ahmed A et al., 1999<sup>[18]</sup>] and this can be due to geographical variation.

Our results show that CSOM in Southern Rajasthan is mainly due to *Pseudomonas aeruginosa* followed by *Staphylococcus aureus*, *Klebsiella pneumonia*, *Proteus mirabilis*, *Acinetobacter spp.*, *Citrobacter spp.*, *Escherichia coli* and *Acinetobacter spp.* Our findings correlate with other studies<sup>[16,11,19,2]</sup>. But our findings are in contrast to studies of Singh AH et al., 2012<sup>[20]</sup> & Prakash M et al., 2013<sup>[21]</sup>, who have found *Staphylococcus spp.* as the predominant organism causing CSOM.

Antibiotic susceptibility patterns serve as useful guidelines for choosing the appropriate antibiotic. In the present study, majority of *Pseudomonas aeruginosa* were highly sensitive to Meropenem followed by Piperacillin-Tazobactam, Imipenem, Aminoglycosides (Amikacin, Gentamicin & Tobramycin) and fluoroquinolones (Ciprofloxacin & Levofloxacin).

In study conducted by Mansoor et al., 2009<sup>[16]</sup>, reported 76% of isolates were sensitive against Imipenem. Imipenem is very effective against *Pseudomonas aeruginosa* infected patients with this antibiotic has often allowed the emergence of imipenem resistant mutants. We found that *Pseudomonas aeruginosa* were 80% sensitive to aminoglycosides and it is also supported by previous studies showed that *Pseudomonas* acquiring resistant against Gentamicin.<sup>[22]</sup> In contrast, some studies showed highly sensitive (96%) to amikacin, gentamicin and tobramycin.<sup>[2,11,16]</sup>

All the Gram negative pathogenic strains other than *Pseudomonas* which were isolated in the present study were tested against various antibiotics. Ciprofloxacin and Levofloxacin were found to be the most effective drugs, followed by Meropenem, Amikacin, Gentamicin, Piperacillin tazobactam, cephalosporins. The findings of our present study are in accordance with other studies.<sup>[9,11,12]</sup>

In the present study Gram positive isolates were showing good sensitivity for the older drugs tetracycline and chloramphenicol, this might be because of these drugs are not commonly being used recently after the advent of newer drugs fluoroquinolones like ciprofloxacin, levofloxacin which are less ototoxic and good topical antibiotics for CSOM.

**CONCLUSION:**

In the era of antibiotics the emergence of antibiotic resistance is becoming more common. Human negligence is a factor responsible for the development of drug resistance. As soon as symptoms subside, many patients stop taking antibiotics before completion of therapy and another reason of drug resistance might be due to injudicious use of broad spectrum antibiotics.

Therefore, periodic evaluation of microbiological pattern and their antibiotic sensitivity pattern in local area becomes important & helpful in prescribing empirical antibiotics for successful treatment of CSOM and thus minimizing its complications and emergence of resistance organisms.

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