

**Original Research Article****Bacterial flora of CSOM and their Antibiogram in RIMS, Ranchi – a Tertiary Care Hospital**

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Email: [manoj\\_drmicro@rediffmail.com](mailto:manoj_drmicro@rediffmail.com)**ABSTRACT**

*Chronic Suppurative Otitis Media (CSOM) is a long standing infection of middle ear characterized by ear discharge and permanent perforation. Ranchi is amongst those geographical areas in India which have environmental factors favouring frequent upper respiratory infections resulting in a higher incidence of persistent and recurrent Otitis Media, which in turn leads to complications. Hence the present study was done to observe the aerobic bacterial flora in causation of CSOM and their antimicrobial susceptibility pattern. 336 samples of ear discharge from 310 patients of CSOM were studied, out of which 297 were culture positive. The most predominant bacteria was Staphylococcus aureus followed by Pseudomonas aeruginosa. Sensitivity of Staphylococcus was good to Vancomycin, Cloxacillin, Linezolid, Cefalexin, Cotrimoxazole, Clindamycin, Ciprofloxacin and Amoxyclave while 25.9% were MRSA. Pseudomonas showed high susceptibility to Meropenem, Sulbactam-Cefoperazone, Chloramphenicol, Ceftazidime, Ciprofloxacin, Piperacillin-Tazobactam and Amikacin. Therefore the present study proved useful for clinicians in knowing the predominant pathogen and their susceptibility pattern for the appropriate management of CSOM patients.*

**KEYWORDS:** *Chronic Suppurative otitis media, Aerobic Bacterial, Staphylococcus aureus , Antibiotic sensitivity pattern.*

**INTRODUCTION**

CSOM has been defined by WHO, as a chronic inflammation of the middle ear cavity with recurrent discharge through tympanic membrane perforation for a period of 3 months or more. Chronic suppurative otitis media is a sequelae of acute otitis media often due to poor therapeutic management.

CSOM is one of the most common diseases of childhood. Children are more affected than adults because the Eustachian tube in children are short and more horizontal in position which makes the ascent of microorganisms from nasopharynx to middle ear cavity far more easier. The less developed immune system in children have also been attributed to the causation.

CSOM is an important cause of preventable hearing loss. It can cause both conductive and sensorineural hearing loss which can thereby affect the development of speech, language, learning skills, outdoor activities and hence the overall development of a growing child.

The Global burden of disease study 2010 assigned 4.68 million disability adjusted life years (DALYs) to otitis media. A large part of it, is from the developing countries. The important factors associated with CSOM are low socio-economic status, overcrowding, poor hospital hygiene, lack of resources for infection control and lack of infection control team in hospitals.

In developing nations, the hospitals in the periphery lack laboratories with facilities for culture and sensitivities. Hence the Medical officers are left with no other options than prescribing the available antibiotics of their preference. This injudicious use of antibiotics leads to the development of resistance in bacteria and with time the microbiological profile keeps on changing.

Ranchi has a weather very favourable for Upper Respiratory tract infections throughout the year indirectly increasing the CSOM case load in the ENT department of RIMS hospital. Hence this study was undertaken to elicit the present aerobic bacterial profile of CSOM and their antibiotic sensitivity pattern so as to help in rationale use of antibiotics, successful treatment, prevention of development of complications and resistance in microorganisms.

## **MATERIALS AND METHODS**

An analytical study was carried out at the Department of Microbiology in RIMS Hospital, Ranchi from November 2015 to October 2016. The patients coming with complaints of ear discharge for more than 3 months were examined by the ENT Surgeon in the ENT OPD, with the help of aural speculum, so as to confirm the diagnosis of CSOM. Once the diagnosis was established, an informed consent was taken from the patient and a detailed clinical history was elucidated.

**INCLUSION CRITERIA** – The study included 310 patients who had been suffering from unilateral or bilateral ear discharge for a period of 3 months or more and where clinically diagnosed as cases of CSOM by the Otorhinolaryngologists in the ENT Department of RIMS Hospital.

**EXCLUSION CRITERIA** – Patients who had ear discharge for duration less than 3 months, those who had any history of antibiotic intake in the past 2 weeks, those who presented with Cholesteatoma and those who had ear discharge without any tympanic membrane perforation (Otitis Externa) were excluded from the study.

**SAMPLE COLLECTION**– Pulling the pinna outwards, laterally and backwards, the purulent discharge was collected from the middle ear using single use mini tip moistened cotton swab, with adequate precautions to prevent contamination with normal commensals of external canal. Then the swabs were immediately transported to the Department of Microbiology.

**ISOLATION OF PATHOGENIC BACTERIA**  
The swabs were inoculated onto Blood agar, Mac Conkey agar, Chocolate agar and Nutrient broths for the isolation of aerobic bacteria. The inoculated cultures were incubated at 37°C for 24-48 hrs.

**IDENTIFICATION OF THE ISOLATED PATHOGEN**– The bacterial isolates were identified based on colony morphology, cultural characteristics and biochemical tests according to the Standard techniques.

**ANTIBIOTIC SENSITIVITY TESTING FOR THE ISOLATED PATHOGEN** – The bacterial isolates were tested for their antibiogram on Muller – Hinton Agar by Kirby Baur Disc Diffusion Method according to Clinical Laboratory and Standard Institute guidelines (CLSI, 2016).

## **RESULTS**

The study included 310 diagnosed cases of CSOM comprising of 171(55.16%) males and 139 (44.83%) females. Among the 310 patients, 284 (91.6%) had unilateral while 26 (8.3%) had bilateral CSOM. Hence a total of 336 samples were obtained.

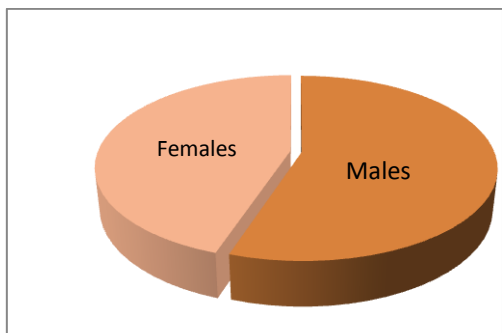


Figure 1: Gender predisposition

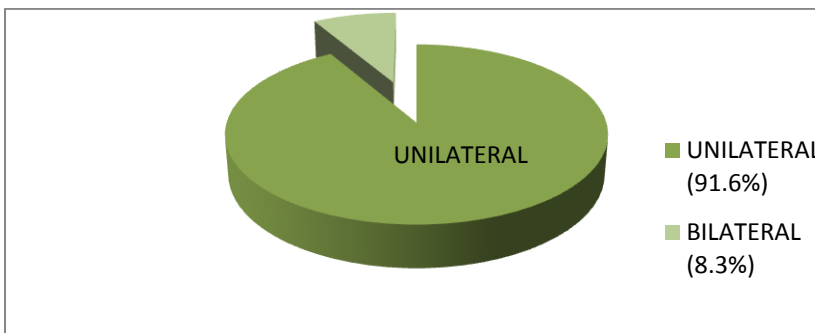


Figure 2: Prevalence of Unilateral and Bilateral disease.

Out of the 336 samples, 297 (88.3%) were culture positive and 39 (11.6%) showed no growth. 255

(75.89%) samples showed monomicrobial growth while 42 (12.5%) showed polymicrobial growth.

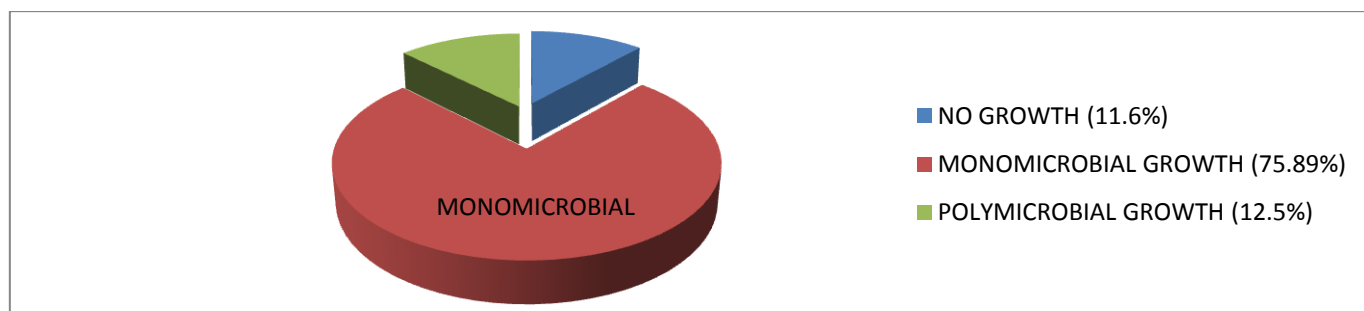


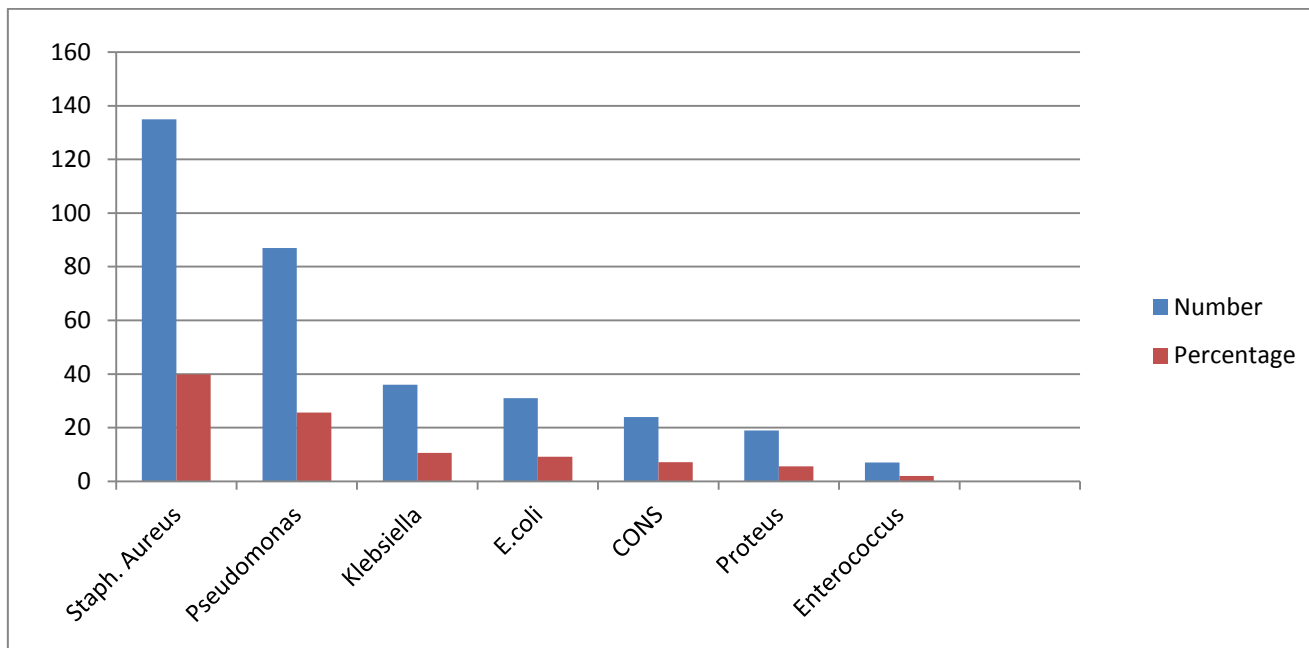
Figure 3: pie chart depicting proportion of different growth types.

The most common organisms isolated in this study was *Staphylococcus aureus* (39.82%) followed by *Pseudomonas sp.* (25.66%).

*Klebsiella pneumoniae*, *E.coli*, Coagulase negative *Staphylococci*, *Proteus* and *Enterococcus* were the other organisms isolated.

Table no. 1: Number and Percentage of pathogenic bacteria isolated.

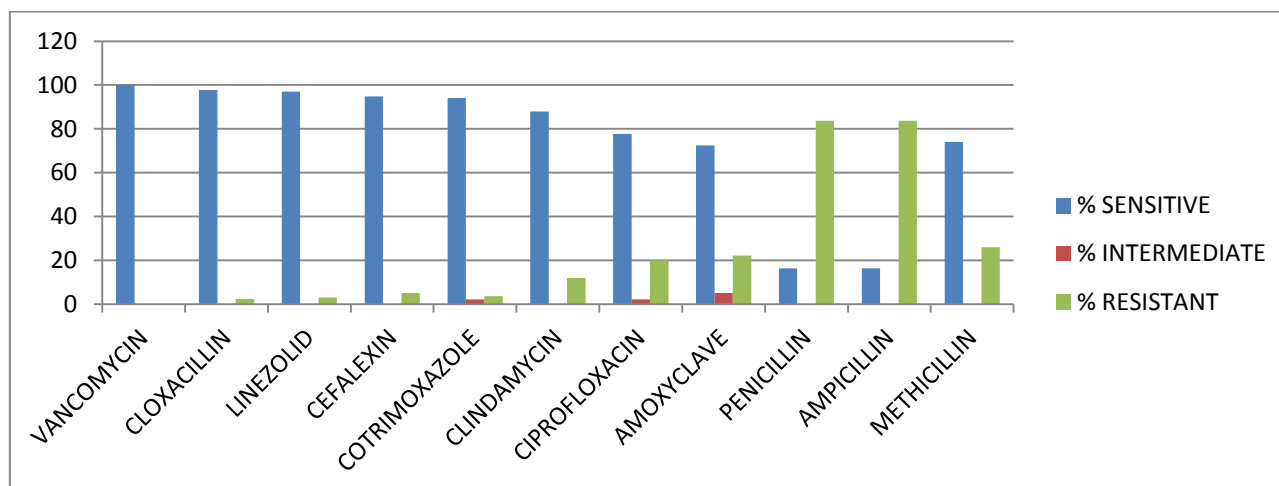
S. No.	Bacterial Isolates	Number	Percentage
1	<i>Staphylococcus aureus</i>	135	39.82%
2	<i>Pseudomonas aeruginosa</i>	87	25.66%
3	<i>Klebsiella pneumoniae</i>	36	10.61%
4	<i>E.coli</i>	31	9.14%
5	Coagulase Negative <i>Staphylococcus</i>	24	7.07%
6	<i>Proteus sp.</i>	19	5.6%
7	<i>Enterococcus sp.</i>	7	2.0%
	Total	339	100%



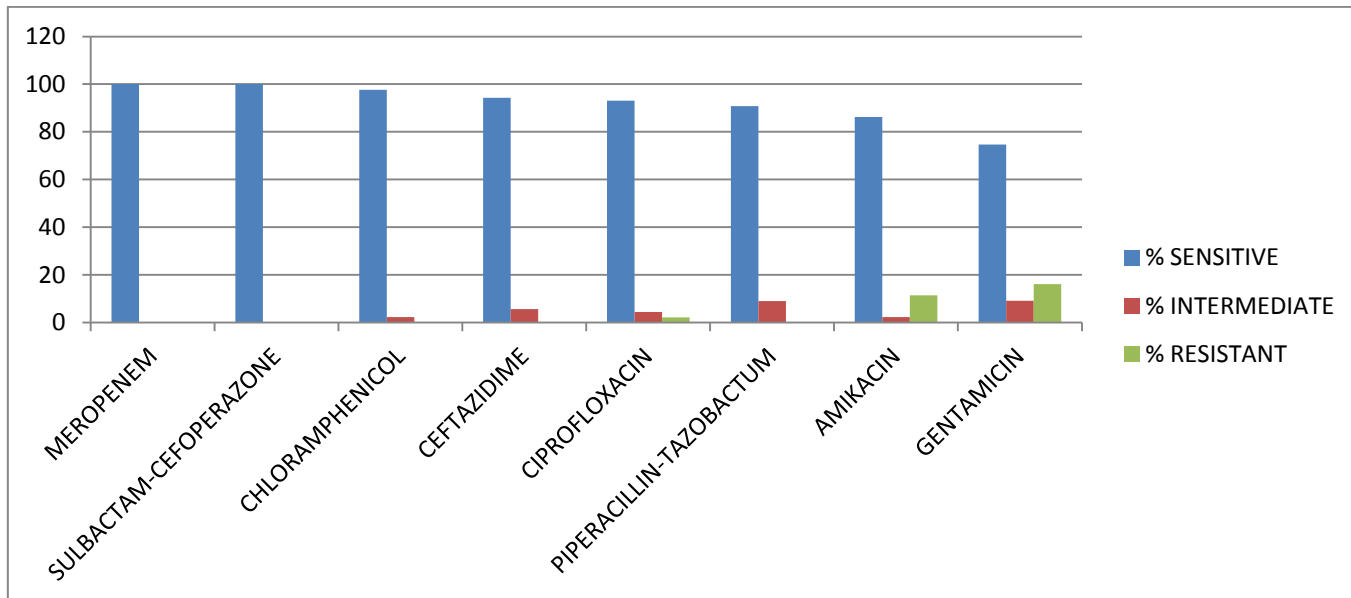
**Graph 1:** Number and Percentage of Isolated bacteria from the purulent discharges of the CSOM patients.

The Staphylococcus aureus isolated showed high susceptibility to Vancomycin (100%) , Cloxacillin (97.7%) , Linezolid (97%) , Cefalexin (94.8%) , Cotrimoxazole (94%). They were also sensitive to Clindamycin (88%), Ciprofloxacin (77.7%) and Amoxyclave (72.5%). Only 22 (16.2%) Staph. aureus isolated were sensitive against Penicillin and Ampicillin while 100 (74.1%) were sensitive to Methicillin. 25.9% (35) of them were Methicillin resistant Staphylococcus aureus. The Pseudomonas aeruginosa isolates showed high sensitivity against Meropenem (100%), Sulbactam- Cefoperazone (100%) , Chloramphenicol (97.7%), Ceftazidime (94.3%), Ciprofloxacin (93.1%), Piperacillin- Tazobactam (90.8%). They

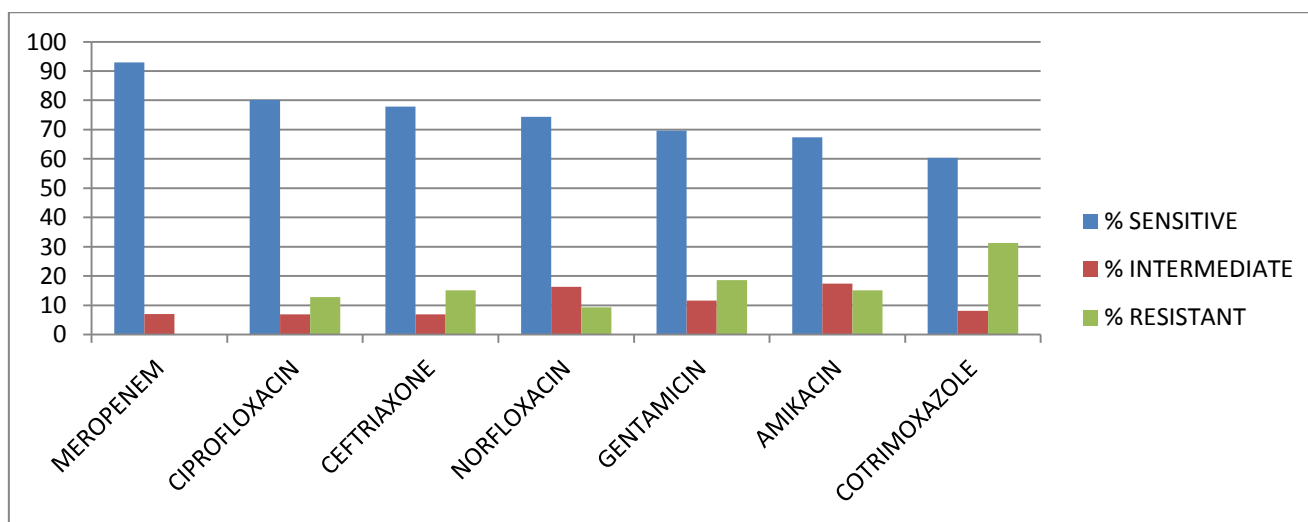
were also susceptible to Amikacin (86.2%) and Gentamicin (74.7%). Klebsiella sp. , Escherichia coli and Proteus sp. Isolated were susceptible Meropenem (93%), Ciprofloxacin (80.2%), Ceftriaxone (77.9%), Norfloxacin (74.4%), Gentamicin (69.7%), Amikacin (67.4%) and Cotrimoxazole (60.4%). Coagulase Negative Staphylococcus isolates were found sensitive to Cloxacillin (79.1%), Erythromycin (75%), Chloramphenicol (62.5%) , Cephalexin (58.3%), Cotrimoxazole (58.3%) and Gentamicin (50%). Enterococcus species were susceptible to Cloxacillin (85.7%), Amikacin (71.4%), Cefotaxime (57.1%), Ciprofloxacin(57.1%).



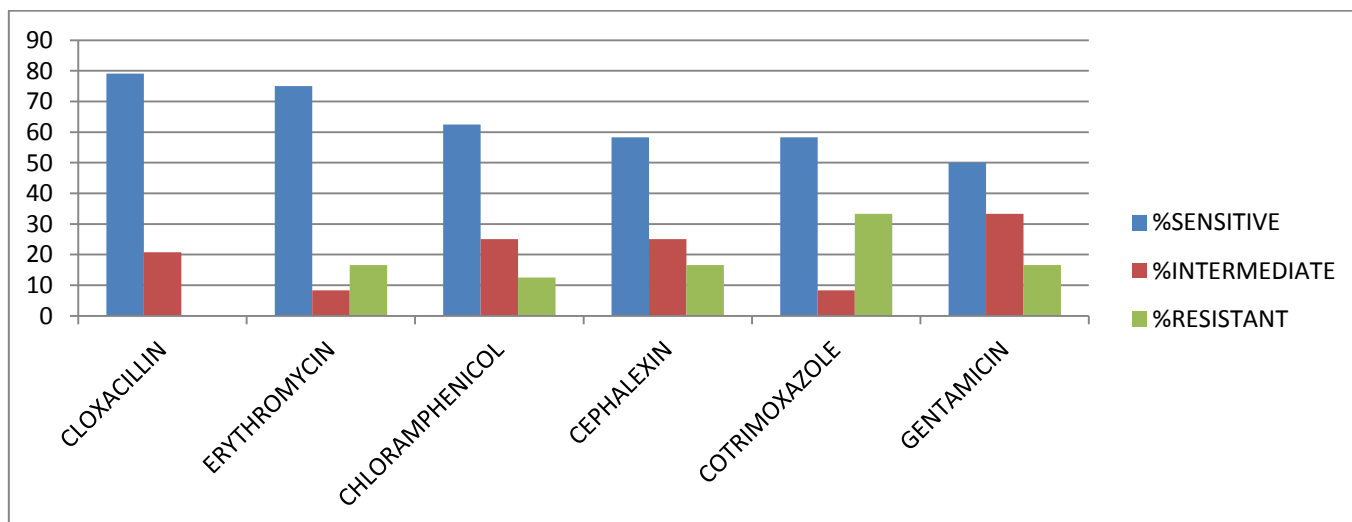
**Graph 2:** Antibiotic Sensitivity Pattern of Staphylococcus aureus.



**Graph 3:** Antibiotic Sensitivity Pattern of *Pseudomonas aeruginosa*.



**Graph 4:** Antibiotic Sensitivity Pattern of Gram Negative Bacilli except *Pseudomonas*.



**Graph 5:** Antibiotic Sensitivity Pattern of Coagulase Negative *Staphylococcus*.

**DISCUSSION**

CSOM is one of the most common ear infections which has been notoriously associated with serious complications like Deafness, Mastoiditis, Brain abscess, Meningitis, Petrositis, Labyrinthine fistula, Facial nerve paralysis, Sigmoid sinus thrombosis etc.

Majority of the patients belonged to age group within 20 years similar to the study performed by Mansoor et al, Wariso et al, Poorey et al. This kind of predisposition to children and young adults could be due to multiple reasons like the anatomically short and wider Eustachian tube present in children and infants which makes access of infections from throat to middle ear easy. Secondly, due to illiteracy and decreased awareness about the correct techniques of breast feeding habits where mothers are habituated to incorrectly breast feed their babies in supine position or instill oil into their ears. In contrast to this, Loy et al in his study showed that the disease burden was highest between 30-40 years of age.

In our study males (55.16%) were more commonly affected than females which was in accordance to Ahmed et al but was in contrast to study done by Loy et al and Mansoor et al.

11.6% of the samples showed no growth which is in accordance with Chakraborty et al (12.6%) and varies from the results of Fatma et al (16.9%), Vijaya et al (5.28%) and Lakshmi et al (6.25%). Monomicrobial growth occurred in 75.89% which was found to be 85% by Lakshmi et al.

In this study, the most predominant organism isolated was *Staphylococcus aureus* (39.82%) followed by *Pseudomonas aeruginosa* (25.66%) which was similar to results obtained by Loy et al, Taj et al, Ahmed et al, Shreshtha et al, Lakshmi et al and Kumar et al. But studies done by Saraswati Jayanthi et al, V.K.Poorey et al, Mohammed S. et al, Kamran Iqbal et al showed *Pseudomonas* species as the most common isolate.

**CONCLUSION**

In the present study, Gram negative bacilli (51.01%) accounted for the largest proportion of isolated pathogens and the rest (48.89%)

constituted of Gram positive cocci. Individually, *Staphylococcus aureus* (39.82%) was the most common isolate. The antibiotic sensitivity profile of each bacteria were found to be variable. Hence it should be inculcated in the routine practices to get the culture and sensitivity reports for each CSOM case before starting the definitive treatment. This will help in successfully treating the disease, preventing development of resistance in organisms and will save the patients from landing into serious complications.

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