

# ORIGINAL RESEARCH ARTICLE - BACTERIAL PROFILE AND ANTIBIOGRAM OF CHRONIC SUPPURATIVE OTITIS MEDIA AMONG PATIENTS ATTENDING A TERTIARY CARE HOSPITAL

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## ABSTRACT:

**BACKGROUND:** Chronic suppurative otitis media (CSOM) is defined as the inflammation of the mucous membrane of the middle ear cleft which includes the middle ear cavity, mastoid antrum, the mastoid air cells and the Eustachian tube. Complex interactions between the environment, microbes, and host leads to the development of this multifactorial disease. Understanding of the microbiology of chronic otitis media is important for efficient and effective treatment, and prevention of complications and antibiotic resistance. Thus, the present study was conducted at Government Medical College, Akola, Maharashtra for a period of Three years from May 2018 to April 2021 with **AIM AND OBJECTIVES** to study the Bacterial profile and Antibigrams of the isolates from CSOM patients. **MATERIAL AND METHODS:** Total of 400 aural swabs were collected. Swabs were processed with Standard Microbiological techniques and Sensitivity was determined using CLSI guidelines 2018. **RESULT:** Males 215 (53.75%) predominated Females 185 (46.25%). Peak prevalence of otitis media was observed in age group 2-10 years (39.41%). 230 cases were culture positive (57.50%) out of which 80 cases were polymicrobial (21.05%). Gram negative bacteria isolated were *Pseudomonas aeruginosa*, *Proteus mirabilis*, *Klebsiella pneumoniae* and *E.coli* followed by Gram-positive bacteria were *Staphylococcus aureus*. Isolation of Gram negative organisms were higher (77.39%). Gram negative bacteria showed more than 90% sensitivity to Ciprofloxacin, Imipenem, Meropenem.

**CONCLUSION:** Routine use of topical antibiotics for CSOM as empirical therapy must be reviewed and judicious use of antibiotics is recommended to minimize antibiotic resistance.

**KEY WORDS:** Antibiogram, Otitis media, *Pseudomonas aeruginosa*, ear discharge.

## INTRODUCTION:

Chronic Suppurative Otitis Media (CSOM) is a chronic inflammation of middle ear and mastoid cavity that may present with recurrent ear discharges or otorrhoea through a tympanic perforation. It is a disease of multiple etiology and is well known for its persistence and recurrence inspite of treatment. It requires remarkable patient management, especially in children of poorer socio-economic strata, as they do not get adequate access and persistent treatment for this chronic affliction<sup>[1]</sup>. Suppurative otitis media with its unpleasant symptoms and complications may be a catastrophe for the marvellously structured organ, the ear, on which much of our appreciation of life and human activity depends. It is a challenge especially in children to prevent the progress of acute suppurative otitis media to a chronic disease<sup>[2]</sup>. A WHO/CIBA Foundation workshop<sup>[3]</sup> in 1996 defined Chronic suppurative otitis media as

a stage of disease in which there is chronic infection of the middle ear cleft, i.e., eustachean tube, middle ear and mastoid, and in which a non-intact tympanic membrane (e.g., perforation or tympanostomy tube) and discharge (otorrhoea) are present for at least 2 weeks or more.

There are two main varieties of CSOM namely mucosal (or tubotympanic) type of CSOM and squamous (or atticointral) CSOM. Prevalence of CSOM is more in the developing and underdeveloped countries<sup>[4]</sup>. The incidence is highest among low hygiene populations or with overcrowding and malnutrition. In most cases the disease started in childhood when the eustachian tube was incompetent. More bouts of acute otitis media were seen in infants with many siblings in crowded day care facilities. Premature and low birth weight babies in lower socio-economic groups were more vulnerable to CSOM and its attendant handicap and complications in later life<sup>[2]</sup>. A variety of host factors, genetic disorders like Down syndrome, immune deficiencies or paresis, ciliary disorders, cleft palate have been implicated in the causation of CSOM<sup>[2]</sup>. These days, it is rare for an otolaryngologist to encounter bacterial flora of a chronic discharging ear that has not already been modified by previous antibiotic therapy with some of them returning sterile cultures.<sup>[5]</sup> Knowledge of the local microbiological flora in CSOM is essential for initiating empirical therapy, making it mandatory for periodic surveillance of microbiological profile and sensitivity pattern in CSOM. The objective of present study was to understand the bacterial profile and to determine the antibiotic sensitivity pattern of isolates of CSOM patients.

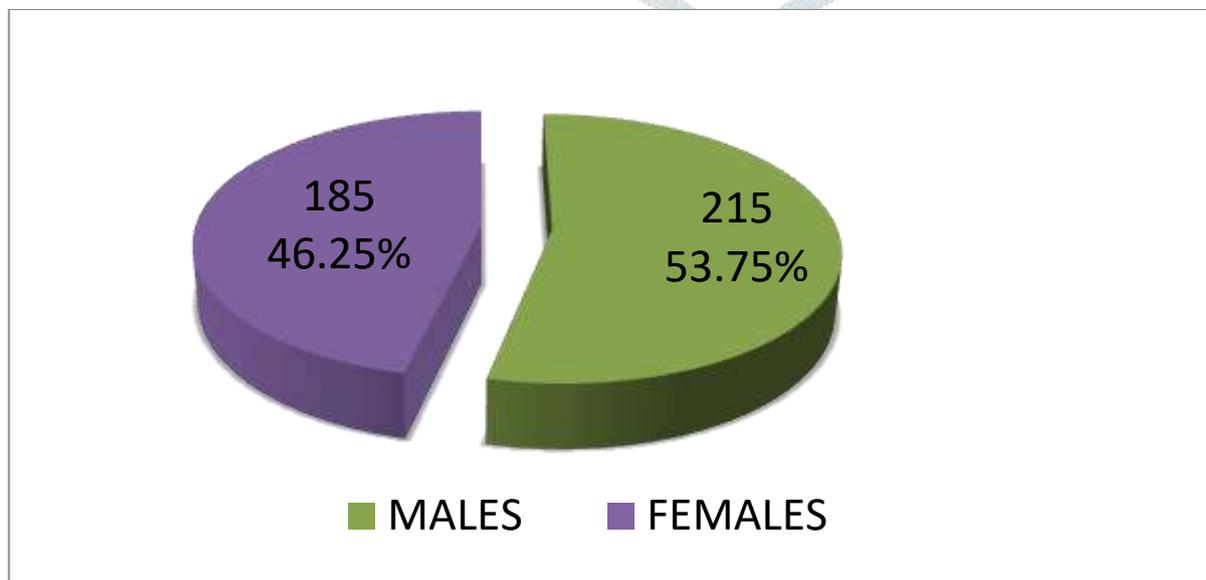
### **MATERIAL AND METHODS:**

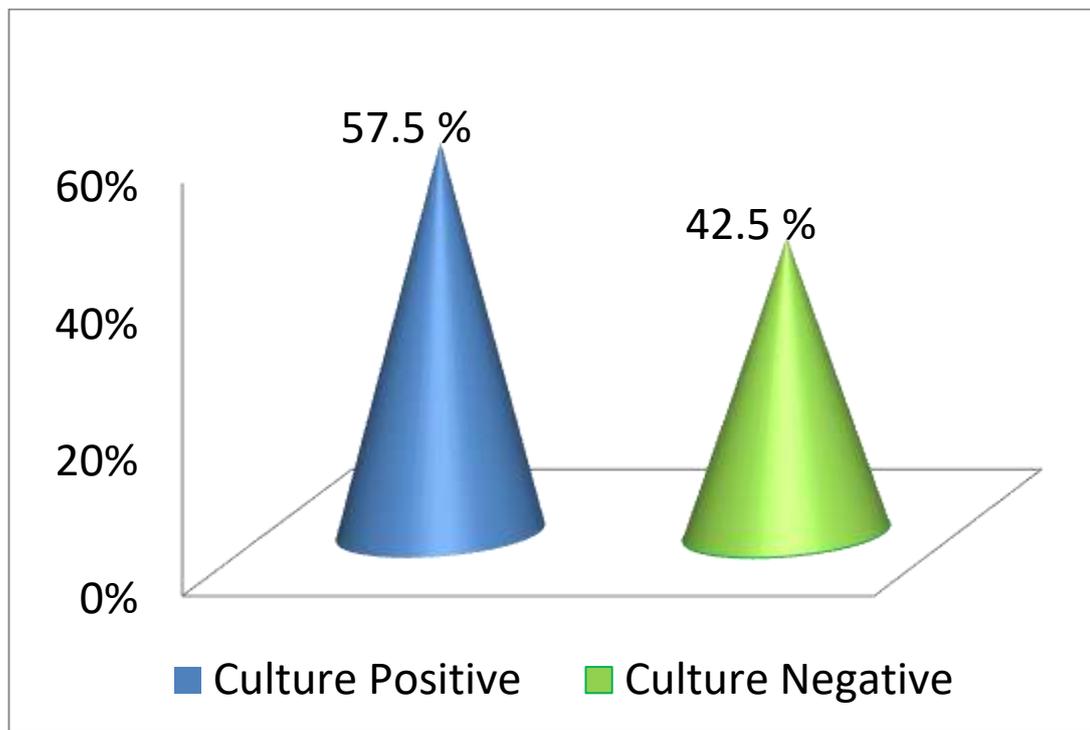
Four hundred patients, who presented to the ENT department from May 2018 to April 2021, with history of chronic discharging ear were studied. Two sterile cotton swabs were used to collect ear discharge from CSOM patients. One swab was used for performing Grams' stain and second one for culture. Culture was done on blood agar and MacConkey agar. The organisms were identified by culture characters, morphology, and pigment production, beta hemolysis on blood agar, motility and conventional biochemical tests. Antimicrobial susceptibility test for all isolates was performed on Mueller Hinton agar plate using Kirby Bauer disc diffusion method. Results were interpreted using Clinical Laboratory Standards Institute (CLSI) guidelines 2018.

### **RESULTS:**

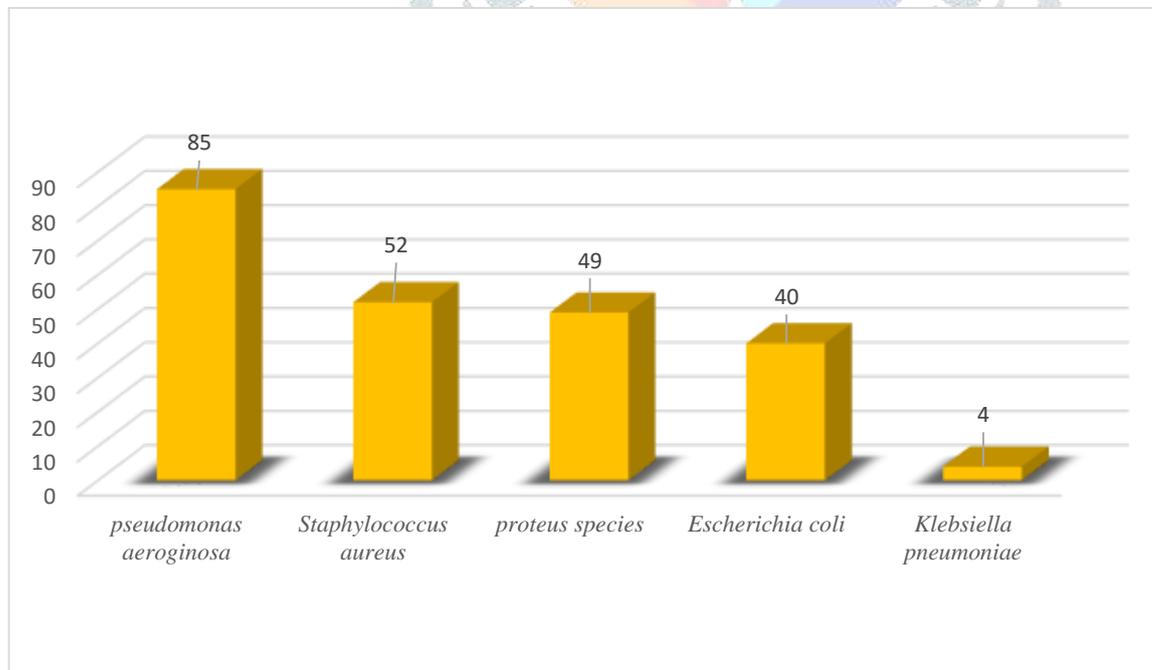
Out of total 400 cases studied, 215 (53.75%) were males and 185(46.25%) were females.

### **FIGURE 1: GENDER DISTRIBUTION AMONG CSOM ISOLATES**



**FIGURE 2: CULTURE GROWTH OF CSOM ISOLATES**

Out of 400, 230 (57.5%) were culture positive and 170 (42.5%) were culture negative.

**FIGURE 3: DISTRIBUTION OF CSOM ISOLATES**

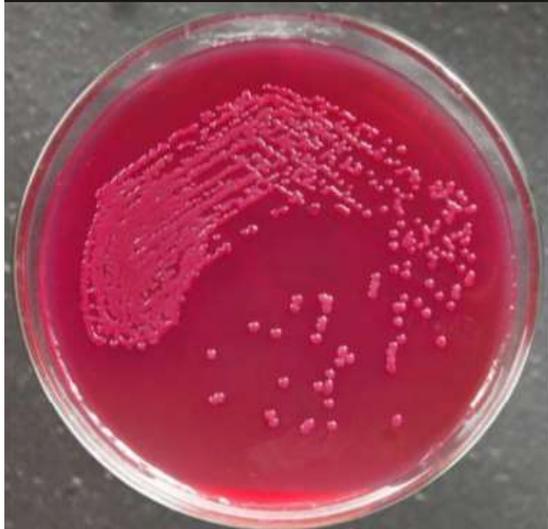
The most common Gram negative bacteria isolated was *Pseudomonas aeruginosa* followed by *Proteus mirabilis*, *E.coli* and *Klebsiella pneumoniae*. *Staphylococcus aureus* was commonly isolated Gram Positive organism.

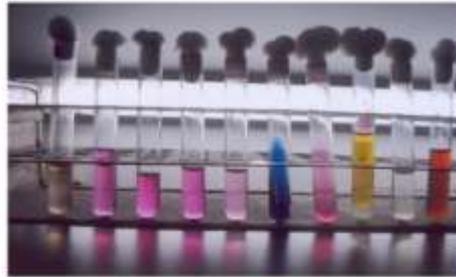
**TABLE 1: SENSITIVITY PATTERN OF GRAM NEGATIVE ISOLATES**

Organism	Ciprofloxacin	Gentamicin	Amikacin	Imipenem	Meropenem	Tobramycin	Piperacillin & tazobactam	Amoxiclav	Ampicillin
<i>P.aeruginosa</i> (n=85)	80 (94.11%)	75(88.23%)	78(91.76%)	80(94.11%)	82(96.47%)	74(87.05%)	70(82.35%)	5(5.88%)	4(4.70%)
<i>Proteus species</i> (49)	45 (91.83%)	45(91.83%)	42(85.71%)	46(93.87%)	47(95.91%)	-	43(87.75%)	8(16.32%)	3(6.12%)
<i>E.coli</i> (40)	36(90%)	37(92.5%)	32(80%)	40(100%)	40(100%)	-	20(50%)	5(12.5%)	2(5%)
<i>K.pneumoniae</i> (4)	3(75%)	3(75%)	2(50%)	4(100%)	4(100%)	-	2(50%)	0	0

**TABLE 2: SENSITIVITY PATTERN OF GRAM POSITIVE ISOLATES**

Organism	Ciprofloxacin	Gentamicin	Amikacin	Erythromycin	Clindamycin	Cefoxitin	Vancomycin	Linezolid
<i>S.aureus</i> N=52	49(94.23%)	42(40.76%)	40(76.92%)	36(69.23%)	36(69.23%)	50(96.15%)	52(100%)	52(100%)

**FIGURE 4: MAC CONKEY AGAR SHOWING GROWTH OF KLEBSIELLA PNEUMONIAE**

**FIGURE 5: BIOCHEMICAL TESTS OF CSOM ISOLATES****BIOCHEMICAL TESTS****ESCHERICHIA coli****KLEBSIELLA pneumoniae****PROTEUS mirabilis****Biochemical reactions of Pseudomonas aeruginosa****DISSCUSSION**

Out of the 400 isolates, 230(57.5%) yielded positive cultures on Blood agar and Mac Conkey medium and 170 (47.5%) were culture negative. There were no fungal isolates on these media. The commonest bacteria isolated was *Pseudomonas aeruginosa* followed by *S. aureus*, *proteus* and *E. coli*. This correlates with Tanmoy Deb et al [6]. The present study revealed that 77.39% isolates were gram negative aerobic bacteria as found in other studies. [7,8]

Quinolones, especially ciprofloxacin was found to be effective in eradicating majority of the gram negative bacteria. In fact in this study it is seen that a cost effective drug like ciprofloxacin is almost 90-96% successful as far as *P. aeruginosa* is concerned. A randomised controlled trial of 0.3% ciprofloxacin drops found a significantly higher rate of elimination of ear discharge [9,10,11]. 47% swabs did not grow any aerobic bacteria and they were culture negative [12]. Otolologists trained in allergic diagnostics tests have realized that allergic otitis media superimposed on CSOM is a definite and not uncommon clinical entity, the permanent central perforation of tympanic membrane allowing dusts, moulds and pollens to easily enter and sensitize the middle ear mucosa. [13,14] Few studies isolated anaerobes and fungus in CSOM patients. [15]

**CONCLUSION**

Gram negative aerobic bacteria especially *Pseudomonas aeruginosa* is significantly associated with CSOM and ciprofloxacin is a preferred in the treatment of CSOM because of its lower cost, lack of ototoxicity and ubiquitous availability as topical and oral preparations. Knowledge of pathogens and their

Antibiotic sensitivity pattern responsible for CSOM and choosing suitable antibiotics according to susceptibility tests guides in effective management of disease and reduces intracranial and extra cranial complications with CSOM. In present era of increasing resistance to antimicrobial agents by bacteria, a periodic surveillance of bacterial profile is essential for effective management of CSOM.

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