

Original Research Article

## Study of Bacteriological Profile and Its Antibiotic Susceptibility in Patients of Chronic Suppurative Otitis Media in Nanded, Maharashtra

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### ABSTRACT

**Introduction:** Chronic suppurative otitis media (CSOM) is the most common infection of the ear characterized by recurrent, purulent discharge from the middle ear through a nonintact tympanic membrane. Its incidence has remained relatively higher in developing countries

**Aim/Objectives:** This study was carried out in department of Microbiology, Dr.S.C.G.M.C, Nanded to determine bacteriological profile and its antibiotic susceptibility in patients with CSOM

**Materials & Methods:** A total of 470 patients aged 2-60 years admitted to ENT ward from July 2014 to April 2015 were studied. Ear swabs were taken and cultured aerobically on blood agar and MacConkey agar. The organisms isolated were identified by standard microbiological methods and antibiotic sensitivity pattern was determined

**Results:** Out of 470 patients, 245(52.12%) were female and 225(47.87%) were male. Peak prevalence of otitis media was documented in age group 2-10 years (39.41%). Amongst 470 ear swabs, 460(97.87%) were culture positive and 30(6.52%) were having 2 isolates. *Pseudomonas aeruginosa* (37.95%) was the commonest isolate followed by *Staphylococcus aureus* (21.83%), Coagulase Negative *Staphylococcus* (18.16%), *Klebsiella pneumoniae* (15.51%) and *Escherichia coli* (8.36%). Antibiotics sensitive to *P. aeruginosa* were Imipenem (100%), Gentamicin (65.2%) and Tobramycin (61.7%) and those resistant were Ceftazidime (71.6%) and Piperacillin (59%). Both *K. pneumoniae* and *E. Coli* species showed highest sensitivity to Amikacin (96.8%) and Ciprofloxacin (65.3%) and resistance to Amoxycylav (62.2%), Cefotaxime (61.8%) and Ceftriaxone (61.3%). Amongst Gram positive isolates, Vancomycin (100%), Clindamycin (64.3%) and Cefoxitin (53.9%) were highly sensitive and Penicillin (11.2%) was most resistant drug

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

**Key words:** Chronic suppurative otitis media (CSOM), *Pseudomonas aeruginosa*, Imipenem.

### INTRODUCTION

Chronic Suppurative Otitis Media (CSOM) is chronic inflammation of middle ear, which affects the tympanic membrane, middle ear mucosa and other middle ear structures. [1] It is characterized by recurrent, purulent discharge from the middle ear

through a nonintact tympanic membrane. Untreated cases of CSOM can result in a broad range of complications. These may be related to the spread of bacteria to structures adjacent to the ear or to local damage in the middle ear itself. Such complications range from persistent otorrhea, mastoiditis,

labyrinthitis, and facial nerve paralysis to more serious intracranial abscesses or thromboses. [2]

Although CSOM is a global disease, its incidence has remained relatively higher in developing countries. [3]

The indiscriminate uses of antibiotics and poor follow up of the patients have resulted in persistent changes in the bacteriological pattern of the disease. The advent of new antimicrobials, anti-inflammatory and anti-histamine agents make an evaluation of bacterial flora of CSOM important. [4]

The changing flora of CSOM and emergence of strains resistant to the commonly employed antibiotics stimulated the study. The present study deals with the bacteriological profile of CSOM and to evaluate the antibiotic sensitivity pattern in our area.

#### **Aim and Objectives:**

1. To isolate and identify the bacteria causing Chronic Suppurative Otitis Media in patients admitted in the ENT ward of tertiary health care centre.
2. To determine the antibiotic sensitivity pattern of the bacterial isolates.

## **MATERIALS & METHODS**

The present study was conducted in Department of Microbiology at Dr. Shankarrao Chavan Government Medical College, Nanded, Maharashtra. A total of 470 patients aged 2-60 years admitted to ENT ward from July 2014 to April 2015 were studied.

#### **Inclusion criteria:**

1. Patients with CSOM safe (tubotympanic type) of age group 2-60 years
2. Only those patients of CSOM who have not received any treatment either systemic or local in the form of eardrops for the last seven days

#### **Exclusion Criteria:**

1. Those patients of CSOM who have received treatment either systemic or local in the form of eardrops for the last seven days

2. Patients with unsafe ear that is cholesteatomatous CSOM
3. Children with Downs' syndrome and cleft palate or craniofacial abnormalities

Discharge was collected from the affected ear using two sterile cotton swabs with all aseptic precautions. Swabs were transported immediately to the Microbiology laboratory. [5]

In the laboratory, the first swab was used for Gram staining. Second swab was inoculated on MacConkey agar, Blood agar and Chocolate agar for bacterial isolation. The culture plates were incubated at 37°C for 24 hours. [6] The isolates were identified as per standard methods. [3] Antibiotic susceptibility was carried out using Kirby Bauer Disk Diffusion method as per CLSI guidelines. [7] Antibiotic discs used for Gram positive organisms were Erythromycin (15 µg), Penicillin (10units), Vancomycin (30µg), Cotrimoxazole (1.25/23.75µg), Cefoxitin (30 µg).

Antibiotic discs used against Gram negative organisms were Amikacin (30 µg), Amoxicillin / Clavulanic Acid (20 µg), Ampicillin (10 µg), Cefotaxime (30 µg), Ceftazidime (30µg), Gentamicin (10µg), Imipenem (10µg), Piperacillin (100µg), Ticarcillin (75 µg), Tobramycin (10 µg), Ceftriaxone (30 µg).

## **RESULTS**

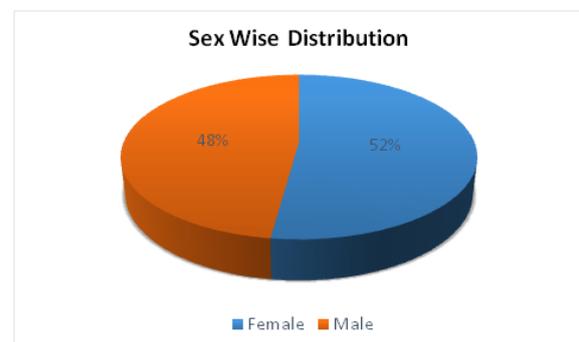


Figure I: Sex wise distribution

Out of 470 patients, 245(52.12%) were female and 225(47.87%) were male

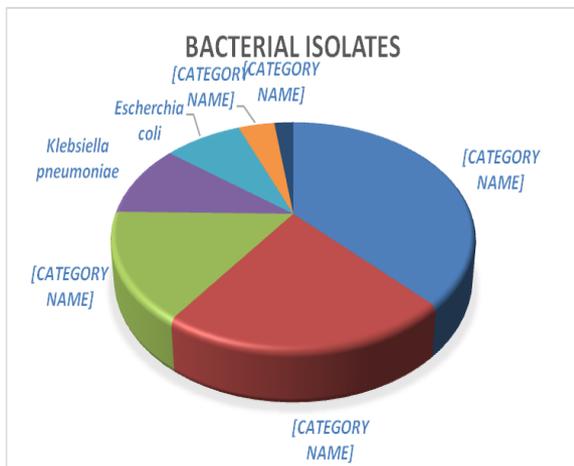
The Age Wise distribution of patients is shown in Table1. Peak prevalence of otitis media was documented

in children with age group 2-10 years (39.78%).

**Table I: Age wise distribution of cases**

Age group (in years)	Male	Female	Total	%
2-10	89	98	187	39.78
11-20	65	67	132	28.08
21-30	43	48	91	19.36
31-40	22	25	47	10
41-60	6	7	13	2.76
Total	225	245	470	100

Amongst 470 ear swabs, 460(97.87%) were culture positive and 10(2.12%) were negative for culture. 30 culture (6.52%) showed 2 isolates. A total of 490 isolates were identified. Gram-negative organisms (297/490 i.e.60.61%) predominated over Gram positive organisms (193/490 i.e. 39.38%). *Pseudomonas aeruginosa* (37.95%) was the commonest isolate followed by *Staphylococcus aureus* (21.83%), *Coagulase Negative Staphylococcus* (18.16%), *Klebsiella pneumoniae* (15.51%), *Escherichia coli* (8.36%), *Citrobacter koseri* (2.04%) and *Proteus mirabilis* (1.83%) as shown in Figure 2.



**Figure II: Bacterial Isolates**

Gram positive isolates were 100% sensitive to Vancomycin and thereafter sensitive to Clindamycin and Cefoxitin respectively. Penicillin was the most resistant drug. Out of *Staphylococcus aureus* isolates, 39/107(36.44%) were *Methicillin resistant Staphylococcus aureus* (MRSA) as determined using Cefoxitin discs. [7]

**Table II: Sensitivity patterns of Gram positive isolates**

Antibiotics	S.aureus (107)	CONS (86)
Vancomycin	100 (107)	100 (86)
Clindamycin	64.48 (69)	63.95 (55)
Cefoxitin	63.55 (68)	44.18 (38)
Erythromycin	61.68 (66)	43.02 (37)
Cotrimoxazole	49.53 (53)	33.72 (29)
Penicillin	14.01 (15)	9.3 (8)

Gram negative isolates showed highest sensitivity to Imipenem, Amikacin and Ciprofloxacin, Gentamicin and Tobramycin and resistance to Amoxycylav, Cefotaxime, Ceftriaxone and Ceftazidime

**Table III: Sensitivity patterns of Gram negative isolates**

Antibiotics	P.aeruginosa (186)	K.pneumoniae (51)
Imipenem	100 (186)	00
Amikacin	97.3 (181)	96.07 (49)
Ciprofloxacin	65.02 (119)	66.66 (34)
Gentamicin	65.02 (119)	64.71 (33)
Tobramycin	61.8 (115)	60.78 (31)
Ampicillin	00	58.8 (30)
Ticarcillin	44.1 (82)	00
Piperacillin	38.7 (72)	00
Cefotaxime	00	35.3 (18)
Amoxicillin / Clavulanic Acid	00	33.33 (17)
Ceftriaxone	00	31.4 (16)
Ceftazidime	26.8 (50)	00

## DISCUSSION

In this study female predominance was higher (52.12%) than male. It is in accordance to other studies done by Loy et al and Mansoor et al. [8,9]

Age group 2-10 years had higher prevalence of CSOM (39.41%). Study done by Shrestha et. Al, Jhaet. Al and Shymala et al. also found the similar result. [10-12] This is due to the fact that younger children are more prone to otitis media related to the immaturity of their immune status. Due to the shorter and horizontal nature of Eustachian tubes, infected material from the nose, adenoids and sinuses passes more readily along the Eustachian tube to the tympanic cavity.

Culture results of the present study were-460(97.87%) culture positive and 10(2.12%) negative for culture, which is correlated with Gupta et al.(95.5%, 4.5%) and Gopichand et al (90%, 10%). Negative cultures can be attributed to-Non-bacterial growth, anaerobic growth, prior-antibiotic therapy, presence of antimicrobial enzymes i.e. lysozyme alone or in combination with

immunoglobulins that suppress the bacterial growth.

In the present study, 30 cultures (6.52%) showed 2 isolates, which is similar to study results of Gopichand et al. [4] Availability and use of topical and systemic broad spectrum antibiotics in the period before consultation was probably responsible for the lower incidence of mixed infection.

*Pseudomonas aeruginosa* was the most common aerobic isolate in CSOM followed by *Staphylococcus aureus* which is in agreement with the reports of other investigators Laxmi et al, Maji et al, Deb et al. [13-15]

Coagulase negative *Staphylococcus* was the second most common organism isolated after *Staphylococcus aureus*. Among the gram negative pathogens, next to *Pseudomonas aeruginosa*, *Klebsiella pneumoniae* (10.41%) was the other common pathogen followed by *Escherichia coli* (8.36%). This is similar to study by Loy et al. [8]

*Klebsiella pneumoniae* showed highest sensitivity to Amikacin (96.07%), thereafter Ciprofloxacin and Gentamicin. The isolate was highly resistant to Amoxyclav, Cefotaxime and Ceftriaxone.

Laxmi et al [13] showed that *Pseudomonas aeruginosa* was 100% sensitive to imipenem, 91% susceptibility to Amikacin, 88% to Gentamicin, like our study. *Klebsiella pneumoniae* was 72 - 80% susceptible to Amikacin, Gentamicin and less sensitive to Cephalosporins. Among the *Staphylococcus aureus*, 18% were Methicillin resistant *Staphylococcus aureus* (MRSA), compared to 36.44% in our study.

Raakhee T et al. [16] showed that *Pseudomonas aeruginosa* had high sensitivity to Ciprofloxacin (92.3%) Gentamicin (84.61%), Imipenem (84.61%), Piperacillin (88.46%). *Staphylococcus aureus* was sensitive to Gentamicin (90.47%), Ciprofloxacin (90.47%), Clindamycin (85.7%).

Humera Rashid et al [17] shows sensitivity pattern of Gram negative

organisms as- Amikacin (78.3%), Gentamicin (81%), Cefepime (91.89%), Aztreonam (94.5%) and Ciprofloxacin (78.3%) sensitive.

These results support our study with slight difference in sensitivity pattern. However, different workers showed different sensitivity patterns.

## CONCLUSION

*Pseudomonas aeruginosa* and *Staphylococcus aureus* were found to be the most common cause of CSOM in our study.

The drugs found to be most effective were are- Imipenem, Amikacin, Ciprofloxacin and Gentamicin for Gram negative organisms where as Vancomycin and Clindamycin for Gram positive organisms. Gram negative isolates were found to be less susceptible to the commonly used Cephalosporin. Emergence of MRSA strains is also a concerning issue.

Hence, routine use of topical antibiotics for any case of CSOM as empirical therapy must be reviewed and judicious use of antibiotics is recommended. Appropriate antimicrobial drugs should be prescribed after proper diagnosis of the causative organism and its antimicrobial susceptibility pattern.

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