



## Bacterial Flora in Chronic Suppurative Otitis Media

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### ABSTRACT

**INTRODUCTION:** Information regarding the common pathogens and their antibiotic sensitivities is essential for the proper choice of antibiotics in Chronic Suppurative Otitis Media (CSOM). Hence the present study is undertaken to know the microbiological flora of CSOM and their antibiotic sensitivity.

**METHODOLOGY:** 225 clinically diagnosed cases of active CSOM of all age groups and both sexes attending ENT outpatient department of our institute were selected. 2 swabs were taken from the middle ear of each patient, one for gram staining and one for bacterial culture. The bacterial isolates were identified by standard biochemical reactions. Antibiotic susceptibility testing was done using Clinical laboratory standard institute (CLSI) guidelines.

**RESULTS:** A random selection of 225 CSOM cases were studied, of which 55% were males and 45% were females. Majority of patients were below 20 years. Unilateral infection was more common than bilateral. Bacterial isolates showed predominance of *Pseudomonas aeruginosa* (49.12%), followed by *Staphylococcus aureus* (21.92%). The overall antibiotic sensitivity pattern was found to be highest for Imipenem followed by Amikacin, Gentamycin and Ciprofloxacin.

**CONCLUSION:** *Pseudomonas aeruginosa* was the predominant organism followed by *Staphylococcus aureus* in CSOM. The most effective drug was Imipenem.

### KEYWORDS

Chronic Suppurative Otitis Media, bacterial isolates, antibiotic susceptibility.

### INTRODUCTION

Chronic Suppurative otitis Media (CSOM) is a disease of multiple aetiology and is well known for its persistence and recurrence, despite treatment. CSOM is a destructive disease with irreversible sequelae and can proceed to serious intra and extra-cranial complications<sup>1</sup>. It is an infection of the middle ear that lasts for more than three months and is accompanied by tympanic membrane perforation<sup>2</sup>. CSOM was found to be the single main cause of conductive deafness and was responsible for 60.27% cases (Mann. et al 1976)<sup>3</sup>. It was found to be the most common disease in all age groups specially childhood and is more prevalent in developing countries<sup>4</sup>. The indiscriminate and haphazard use of antibiotics and poor follow up of the patients have resulted in persistent low grade infectinal changes in the microbiology of the disease, the advent of new antimicrobials, anti-inflammatory and anti-histamine agents make the evaluation of bacterial flora of CSOM important<sup>5</sup>. The study of the micro-organisms commonly associated with CSOM and their in vitro antibiotic sensitivity pattern is very important for the clinician to plan a general outline of treatment for the patient with CSOM<sup>6</sup>. The present study was undertaken to study the aerobic microbial flora involved in causation of CSOM. The antibiotic susceptibility pattern has also been studied. All this has been done with a purpose to acquire data on the pattern of CSOM infections prevalent in our hospital and to suggest the therapeutic guidelines in the light of present findings.

### MATERIALS AND METHODS

This study was carried out in the E.N.T department of Muzaffarnagar medical college and hospital, Muzaffarnagar. 225 clinically

diagnosed cases of CSOM with active disease of all age groups and both sexes were included in the study. Inclusion criteria- 1) Patients of CSOM with tympanic membrane perforation and ear discharge of 3 months or more. 2) Only those patients have taken who have not received topical or systemic antibiotics for last 2 weeks. The patient's history, general and local examination were done and recorded in case record form. The diseased ear was thoroughly examined and otoscopic examination was carried out. The sterilised swab stick along with sterilised speculum was used for collection of pus from the middle ear. Pus was collected by two swab sticks. Two swabs for bacterial culture and sensitivity, and they were put in a special sterilised test tubes properly sealed. These 2 test tubes were sent in a beaker to microbiology department as soon as possible.

The specific identification of bacteria was done based on microscopic morphology, staining characteristics, culture and biochemical properties, using standard laboratory procedures<sup>7</sup>. Antibiotic susceptibility testing was done by Kirby Bauer disc diffusion method according to CLSI guidelines<sup>8</sup>. The study was restricted to aerobic bacteria because facilities for specific characterisation of the anaerobes was not available at our institute.

### RESULTS

This study to determine the CSOM causing micro-organisms among CSOM patients attending the ENT clinic at Muzaffarnagar medical college and Hospital was carried out among

225 patients with clinical evidence of CSOM. There were 123 (55%) males and 102(45%) females. The mean age was 19.13 years where 143 (63%) were aged below 20 years and 82 (37%) were aged 20 years and above. The range of the age was 1.6 to 80 years while the median age was 15 years.

The commonest mode of onset was Ear discharge and hearing loss. Ear discharge was unilateral in 200 patients, bilateral in 25 patients. So number of ear swabs taken were 250. In 225 patients, right ear discharge was seen in 118 (52.4%) patients, left ear discharge was seen in 82(36.4%) patients and bilateral ear discharge was seen in 25(11.2%) patients. In the 250 ears 225 ears were diagnosed as tubotympanic (TT) and 25 were atticotympanic (AA). In the 225 tubotympanic, right CSOM were 108 (43.2%), left CSOM were 92 (36.8%) and bilateral CSOM were 25 (10%). In the 25 atticotympanic, right CSOM were 10 (4%) and left CSOM were 15 (6%).

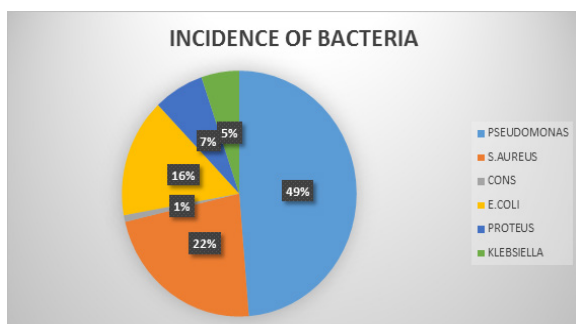
Smear positive and Culture positive were 228(91.2%) and smear negative and culture negative were 22(8.8%). Bacterial findings were categorized into gram positive and gram negative. The most common aerobes identified from the specimens were gram negative bacteria which included Pseudomonas aeruginosa 112(49.12%), E. coli 36(15.78%), Proteus 16(7.01%) and Klebsiella 12(5.26%). The gram positive aerobes identified included Staphylococcus aureus 50(21.9%) and Coagulase negative staphylococcus 2(0.87%).

Pseudomonas was highly sensitive to Imipenem (in 77 strains, 68.75%) followed by Amikacin (73 strains, 65.17%), Gentamycin (in 72 strains, 64.25%), Ciprofloxacin (in 37 strains, 33.03%), Tobramycin (in 18 strains, 16.07%), Polymyxin B (in 18 strains, 16.07%), Piperacillin (in 7 strains, 15.17%), Ceftazidime (in 4 strains, 3.5%) and Norfloxacin (in 3 strains, 2.6%). Staph. aureus was highly sensitive to Vancomycin (in 35 strains, 67.30%) followed by Linezolid (in 34 strains, 65.38%), Clindamycin (in 25 strains, 48.01%), Tetracycline (in 22 strains, 42.30%), Teicoplanin (in 22 strains, 42.30%), Gatifloxacin (in 8 strains, 15.38%), Erythromycin (in 8 strains, 15.38%), Azithromycin (in 7 strains, 13.46%), Imipenem (in 4 strains, 7.6%), Amikacin (in 2 strains, 1.9%) and Ciprofloxacin (in 1 strain, 1.9%).

**TABLE I: OVERALL INCIDENCE OF VARIOUS BACTERIA**

BACTERIA	NO. OF CASES	PERCENTAGE
GRAM POSITIVE		
Staphylococcus aureus	50	21.92%
Coagulase negative Staph	2	0.87%
GRAM NEGATIVE		
Pseudomonas	112	49.12%
E.coli.	36	15.78%
Proteus	16	7.01%
Klebsiella	12	5.26%
TOTAL	228	100%

**Figure: I**



**TABLE II: OVER ALL DRUG SENSITIVITY OF VARIOUS BACTERIA**

Bacteria	Pseu-domonas	Staph. Aureus	E. Coli	Pro-teus	Kleb-siella	Tot-al
No. of strains	112	52	36	16	12	228
Ampicillin	X	X	X	X	1	1
Gentamycin	72	X	19	12	11	114
Amikacin	73	2	18	12	8	113
Amox + clav	X	X	1	X	X	1
Piperacilin	7	X	X	X	X	7
Ceftazidime	4	X	X	X	X	4
Ciprofloxacin	37	1	8	6	4	56
Imipenem	77	4	31	14	8	134
Cotrimaxazole	X	X	11	2	X	13
Chloramphenicol	X	X	X	1	X	1
Netilmicin	X	X	X	X	2	2
Tetracyclin	X	22	X	X	X	22
Tobramycin	18	2	4	6	5	35
Carbenicillin	1	X	1	X	X	2
Gatifloxacin	X	8	X	X	X	8
Norfloxacin	3	X	2	X	3	8
Azithromycin	X	7	X	5	X	12
Erythromycin	X	8	X	X	X	8
Clindamycin	X	25	X	X	X	25
Linezolid	X	34	2	X	X	36
Vancomycin	X	35	2	X	X	37
Polymyxin B	18	X	3	2	X	23
Teicoplanin	X	22	1	X	X	23

Table No. II shows drug sensitivity to different antibiotics as tested by CLSI guidelines. X in the table represents that, that particular antibiotic was not tested for that bacterial strain according to CLSI guidelines & shows that, the overall antibiotic sensitivity pattern is found to be highest of the Imipenem

**DISCUSSION**

CSOM is a condition of the middle ear that is characterized by persistent or recurrent discharge through a chronic perforation of the tympanic membrane. When untreated may pose great risk of irreversible complications. Such complications range from persistent otorrhoea, mastoiditis, labyrinthitis, and facial nerve paralysis to more serious intracranial complications<sup>9</sup>.

In the present study out of 250 samples processed 228(91.2%) specimens were positive and 22(8.8%) were negative for culture which is comparable with the study of Nandy A et al<sup>5</sup>, Gupta V. et al<sup>10</sup>, Asif Alam Gul et al<sup>4</sup>. However the culture results were variable in case of Gulati et al<sup>11</sup> 22(22%) and Aminu A. Bakari et al<sup>12</sup> 22(22.68%) they found high percentage of sterile samples. Negative cultures may be attributed to nonbacterial growth, anaerobic growth, prior antibiotic therapy, presence of antimicrobial enzymes which are lysozymes alone or in combination with Immunoglobulins that suppress the bacterial growth<sup>6, 13, 14</sup>.

Our results show that Pseudomonas spp was the predominant organism 112 (49.12%) followed by Staphylococcus aureus 50 (21.92%), this was in correlation with the study of Loy A.H.C. et al. (2002)<sup>16</sup>, Shazia Parveen. S. et al<sup>17</sup>, Ballal M. et al<sup>18</sup>. However workers like Singh N. et al<sup>13</sup>, Rama rao M.V. et al<sup>19</sup>, Vijaya.D.et al<sup>20</sup>, Patricia N. Ayson.et al<sup>21</sup> have found Staphylococcus aureus as predominant organism causing CSOM.

In our study Pseudomonas was highly sensitive to Imipenem

followed by Amikacin, Gentamycin and Ciprofloxacin. High sensitivity to Imipenem showed by Fliss DM<sup>22</sup> and Loy<sup>16</sup>. High sensitivity to Amikacin showed by Poorey et al<sup>23</sup> and Shyamala et al<sup>24</sup>. Staph. aureus was highly sensitive to Vancomycin followed by Linezolid and Clindamycin. Gulati et al<sup>11</sup> found Ciprofloxacin as most effective drug, however Hiremath S.L. et al<sup>14</sup> and Nandy A. et al<sup>5</sup> have found gentamicin as the most effective drug for Staph aureus.

## CONCLUSION

*Pseudomonas aeruginosa* (41.12%) was the predominant organism, followed by *Staphylococcus aureus* (21.12%), *E. coli* (15.78%), *Proteus* 16(7.1%), *Klebsiella* 12(5.2%) and Coagulase negative staphylococcus (0.8%). The overall antibiotic sensitivity pattern was found to be highest for the Imipenem followed by Amikacin, Gentamycin and Ciprofloxacin.

The knowledge of antibiogram of bacteria not only prevents the administration of unwanted antibiotics but also prevents the development of antibiotic resistance, which is one of the major problems to the clinician. This certainly will help in achieving dry ear and prevention of complications.

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