



Original Research Article

## Bacteriological Profile of Chronic Suppurative Otitis Media

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### ABSTRACT

**Background:** Chronic Suppurative Otitis Media (CSOM) is major health problem throughout the world in poor socioeconomic conditions as well as in developing countries including India. CSOM is infection of middle ear cleft leading to dangerous complication like brain abscess and meningitis.

**Aim:** This study was conducted to know the bacterial etiology of CSOM and to detect the antimicrobial sensitivity of isolates.

**Material and Methods:** In our study, 48 aural swabs of patients with CSOM from patients attending Department of Otorhinolaryngology, Bharati Hospital, Pune were collected and processed at Department of Microbiology, Bharati Vidyapeeth Medical College, Pune between June 2014 and September 2014. Isolation and identification of isolates was performed using standard microbiological techniques. Antibiotic sensitivity testing was done using Kirby Bauer disc diffusion method as per CLSI guidelines.

**Results:** In our study, 83.33 % samples showed growth. We observed that, number of female patients was more than number of male patients. Maximum patients were seen in age group 31 - 40 years.

Predominant organism isolated was *Pseudomonas aeruginosa* followed by *Staphylococcus aureus*, *Klebsiella pneumoniae* and *Proteus mirabilis*. *Pseudomonas aeruginosa* and other gram negative isolates were highly susceptible to Piperacillin + Tazobactam, Imipenem, Polymyxin-B. *Staphylococcus aureus* was highly sensitive to Vancomycin, Teicoplanin, Linezolid and Chloramphenicol.

**Key words:** Chronic suppurative otitis media, antibiotic sensitivity, *Pseudomonas aeruginosa*.

### INTRODUCTION

Otitis media is an inflammation of the middle ear that affects the tympanic membrane. Clinically otitis media can be classified as acute, subacute and chronic. Chronic Suppurative Otitis Media (CSOM) is the inflammation of the middle ear cleft leading to dangerous complications like meningitis and subdural abscess in the absence of proper treatment within

appropriate time. So introduction of antibiotics may lead to less complications and healing of inflammation of middle ear. [1]

CSOM is a major health problem throughout the world in poor socioeconomic conditions as well as in developing countries including India. CSOM is one of the common illness in Ear Nose Throat patients which requires medical attention in persons

and children of poor socioeconomic status having inadequate treatment and negligent medical care in past. [2, 3]

Early and effective treatment with antibiotics based on the knowledge of causative microorganisms and their sensitivity results in good clinical recovery and prevents from damage and complications. [4] In patients of CSOM symptoms seen are- decreased hearing, swelling in ear, pain in ear, and ear discharge. [5]

CSOM has received considerable attention not only because of its high incidence and chronicity but also because of issues such as bacterial resistance and ototoxicity with both topical and systemic antibiotics. The wide spread use of antibiotics has precipitated the emergence of multiple resistant strains of bacteria which can produce both primary and post-operative ear infections. The in vitro antibiotic sensitivity pattern of bacteria is very important for the clinician to plan a general outline of treatment for patients and can minimize complications that may require surgery for a chronically discharging ear. [6]

This study is conducted to understand bacteriology of CSOM in patients and to know their antibiotic sensitivity.

This study will help clinicians to decide proper treatment on CSOM.

## MATERIALS AND METHODS

In this prospective study, ear discharge by swabs collected from 48 patients were processed for isolation, identification and antimicrobial sensitivity received from Department of Otorhinolaryngology of tertiary care hospital. The bacteria were isolated and identified by morphology, cultural characteristics and biochemical reactions according to standard microbiological techniques. [7]

Antibiotic susceptibility testing was performed on 40 isolates using Kirby Bauer Disc Diffusion method on Muller Hinton agar using CLSI guidelines. [8] Antibiotic discs used for susceptibility testing were manufactured by HiMedia Pvt. Ltd. Mumbai, India.

## OBSERVATION AND RESULTS

In all 48 samples of CSOM were collected. From 48 samples, 40 (83.33%) showed growth while 8 (16.66%) did not.

**Table no.1: No. of isolates**

No. of Samples	48
Growth	40(83.33%)
No Growth	8(16.66%)
Total	48

From 48 samples 20 (41.66%) samples taken from male patients, out of which 17 (85%) showed growth, and 28 (58.33%) were taken from female patients, out of which 23 (82.14%) showed growth.

**Table no.2: Sex wise distribution**

Sex	All	%	Growth	%
Male	20	41.66	17	85
Female	28	58.33	23	82.14
Total	48		40	

Samples were taken from all age groups. In age group of 31-40 years, higher no. of samples taken that are 17, in which 15 grew bacterial isolates.

Total 48 samples were processed, from which bacteria isolated from 40 samples. All samples yielded single pathogen. In those 40 samples, 19 (47.5%) were of *Pseudomonas aeruginosa*, 13 (32.5%) were of *Staphylococcus aureus*, 5 (12.5%) were of *Klebsiella pneumoniae*, and 3(7.5%) were of *Proteus mirabilis*. No growth was seen in 8 samples.

**Table no.3: Isolated Organisms**

Organism isolated	n	%
<i>Pseudomonas aeruginosa</i>	19	47.5
<i>Staphylococcus aureus</i>	13	32.5
<i>Klebsiella pneumoniae</i>	5	12.5
<i>Proteus mirabilis</i>	3	7.5
Total	40	

*Pseudomonas aeruginosa* was sensitive to Piperacillin-89.47%, Piperacillin+Tazobactam-100%, Aztreonam-73.68%, Imipenem-100%, Meropenem-89.47%, Amikacin-78.94%, Gentamycin-73.68%, Nitilmicin-68.42%, Tobramycin-78.94%, Ciprofloxacin-73.68%, Polymyxin-B-100% and colistin-100%. It is least sensitive to Amox+Clav and Cotrimoxazole-21.05%.

*Staphylococcus aureus* isolated in study were 13, out of which 3 were Methicillin Resistant *Staphylococcus aureus* (MRSA). Methicillin Sensitive *Staphylococcus Aureus* were sensitive to Cefuroxime-76.92%, Ceftriaxone-76.92%, Cefotaxime-76.92%, Vancomycin-100%, Teicoplanin-100%, Chloramphenicol-100%, Clindamycin-84.61%, Gentamycin-84.61%, Nitilmicin-92.30%, Tobramycin-92.30%, Rifampicin-92.30%, Linezolid-100%. Penicillin was least effective 7.69%.

*Klebsiella pneumoniae* was 100% sensitive to Piperacillin, Piperacillin+Tazobactam, Imipenem, Meropenem, Amikacin, Gentamicin, Tobramycin, Ciprofloxacin, Polymyxin-B and Colistin. It is 80% sensitive to Netilmicin and Cotrimoxazole. It is least sensitive to Amox+Clav and Cefuroxime. It is resistant to Cephalothin.

*Proteus mirabilis* was 100% sensitive to Piperacillin, Piperacillin+Tazobactam, Cefotaxime, Aztreonam, Imipenem, Meropenem, Amikacin, Gentamicin, Netilmicin, Tobramycin, Ciprofloxacin, Chloramphenicol. It was least sensitive to Cephalothin and Cefepime.

## DISCUSSION

Chronic Suppurative Otitis Media (CSOM) is one of the common ear infections which are more reported from rural population and lower socio economic status group. It is a chronic infection of

middle ear which can even lead to deafness. Poorly treated or untreated CSOM can lead to many complications like mastoiditis, meningitis and brain abscess. Hence, diagnosis of the causative organism is necessary for proper management of CSOM cases.

In our study, 83.33% samples showed bacterial growth. Our study includes more female patients than male patients. In age group wise distribution, highest numbers of samples were between age group of 31-40 years. Predominant isolate was *Pseudomonas aeruginosa* followed by *Staphylococcus aureus*, *Klebsiella pneumoniae*, and *Proteus mirabilis*. Gram negative isolates were highly susceptible to Piperacillin + Tazobactam, Imipenem, Meropenem, Amikacin, Gentamicin, Polymyxin-B and Colistin. *Staphylococcus aureus* was highly susceptible to Vancomycin, Teicoplanin, Linezolid and Chloramphenicol.

Growth was seen in 83.33% cases which are similar to previous study by Agrawal A et al, [9] Kumar Set al [10] and Mohammad SA in 2000. [4]

We observed that female patients outnumbered male patients, which is in accordance with Loy et al, [11] Prakash et al [12] and Shrestha B L et al. [13] But we differ from Ahmed et al [14] and Kumar S et al. [10]

In our study majority of patients were of age group of 31 to 40 years, which is agreement with Loy et al. [11] In contrast Prakash et al [12] and Kumar S et al [10] had majority of patients less than 20 years of age. This may be due to higher number of samples and longer duration of study by Prakash et al [12] and Kumar S et al. [10]

Predominant organisms isolated in our study were *Pseudomonas aeruginosa* followed by *Staphylococcus aureus*, which was also reported by Mohammad S A. [5] Kumar Hand Seth S, [15] Shyamala et al [1] and Deb T [16] had also reported that these

two were predominant organisms isolated from otitis media cases.

The other bacterial isolates reported by us were *Klebsiella pneumoniae* and *Proteus mirabilis*. Prakash et al, [12] Kumar H and Seth S [15] have also reported *Klebsiella* and *Proteus* species.

Antibiotic sensitivity pattern was tested for all isolated organisms. In Gram negative bacteria, *Pseudomonas aeruginosa* was found to be highly sensitive to Colistin, Polymyxin-B and Piperacillin-tazobactam similar with results of Agrawal A et al. [9] It is also sensitive to Imipenem which was also reported by Prakash et al [12] followed by Amikacin as same as the results of Malkappa SK et al, [6] Aslam MA et al, [17] Poorey VK et al [18] and Kumar H and Seth S. [15]

*Staphylococcus aureus* was found to be highly susceptible to Chloramphenicol followed by Cephalosporins and Fluoroquinolones as was also reported by Prakash et al. [12] Reserve drugs like Vancomycin, Teicoplanin, Linezolid showed 100% sensitivity. Good sensitivity towards Clindamycin and Tetracycline was also reported by Singh AH et al. [19]

Another isolate was *Klebsiella pneumoniae* which was sensitive to Piperacillin-Tazobactam, Polymyxin-B and Colistin as was also reported by Agrawal A et al. [9] It is also susceptible to Imipenem also reported by Prakash et al. [12] Amikacin was also effective as was same with Malkappa SK et al. [6] It is also sensitive to Gentamicin as was reported by OO Oguntibeju. [20] It is also sensitive to Ciprofloxacin as was similar to Oni AA et al, [21] Singh AH et al [19] and Tanmoy D. [16]

*Proteus mirabilis* is sensitive to Piperacillin+Tazobactam, Cephalosporins and Fluoroquinolones as was reported by Agrawal A et al. [9] It is also sensitive to Ciprofloxacin as was same as Oni AA et al, [21] Deb T [16] and Singh AH et al. [19] It is

also sensitive to Amikacin as recorded by Poorey VK et al [18] and Malkappa SK et al. [6] it is also sensitive to Gentamycin as was recorded by OO Oguntibeju [20] and Rao B N et al. [22]

It is important to understand that antibiotic susceptibility pattern of CSOM causing bacteria keeps changing. Therefore routine antibiotic susceptibility testing before treatment is recommended.

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