



ISSN Print: 2394-7500  
 ISSN Online: 2394-5869  
 Impact Factor: 5.2  
 IJAR 2019; 5(5): 86-90  
 www.allresearchjournal.com  
 Received: 24-03-2019  
 Accepted: 28-04-2019

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## A study on bacteriological and fungal profile in cases of CSOM

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**Abstract**

Chronic Suppurative Otitis Media (CSOM) is defined as chronic inflammation of middle ear and mastoid cavity, which presents with recurrent ear discharge or otorrhoea through tympanic perforation. The indiscriminate and haphazard use of antibiotic along with poor compliance and follow-up of these patients has resulted in the emergence of multiple resistant strains of bacteria and the persistence of low grade infections. Present study was conducted to know the bacteriological and fungal profile in CSOM cases and to categorize the various organisms isolated and evaluate their antibiotic sensitivity pattern. A total of 149 isolates were obtained from 132 samples, out of which 133 (89.26%) were aerobic bacteria while 16 (10.73%) were fungal isolates. Out of the 133 bacterial isolates, the most common organism isolated was *Pseudomonas aeruginosa* 46 (34.58%), followed by *Staphylococcus aureus* 27 (20.30%). Other organisms isolated were *Proteus mirabilis*, *Klebsiella pneumoniae*, *Escherichia coli*, *Acinetobacter spp.*, coagulase negative *Staphylococci*, *Enterobacter spp.*, *Citrobacter freundii* and *Serratia marcescens*. Overall sensitivity of gram negative bacteria was more towards Amikacin, Ceftriaxone, Ciprofloxacin and Imipenem. Most of the Gram positive isolates were sensitive to Clindamycin, Erythromycin and Tetracycline and Linezolid. Fungal isolates were *Aspergillus niger*, *Aspergillus flavus*, *Candida albicans* and non-albicans *Candida*.

**Keywords:** CSOM, antibiotic sensitivity pattern, *Ps. aeruginosa*

**1. Introduction**

Infections of the middle ear space and their sequelae have been known to mankind since the beginning of time. It was first described by Hippocrates in 450 BC, who stated, "Acute pain in the ear, with continued strong fever, is to be dreaded, for the patient may become delirious and die" [1, 2].

Chronic Suppurative Otitis Media (CSOM) is defined as chronic inflammation of middle ear and mastoid cavity, which presents with recurrent ear discharge or otorrhoea through tympanic perforation [3]. The disease may be followed by serious intra and extra-cranial complications like septicaemia, meningitis, brain abscess, facial paralysis and mental retardation [4, 5].

Occurrence of CSOM is also closely related to the country's development level, a higher prevalence being observed in less developed countries [6].

The basic principles of medical management of CSOM are aural hygiene and the use of topical antimicrobial agents [7]. The indiscriminate and haphazard use of antibiotic along with poor compliance and follow-up of these patients has resulted in the emergence of multiple resistant strains of bacteria and the persistence of low grade infections [7, 8].

Present study was conducted to know the bacteriological and fungal profile in CSOM cases and to categorize the various organisms isolated and evaluate their sensitivity pattern.

**2. Material and Methods**

The present study is a prospective study carried out for a period of two years in the Department of Microbiology attached to a tertiary care hospital. The patients attending the out-patient department of ENT were included in this study. After taking verbal consent, samples were collected from 130 patients and subjected to routine microscopy and culture.

Patients not included in this study were those on antibiotic treatment for a week or more those with inflammatory external ear conditions, aural polyp or granulation, malignancy of ear etc, and those who have undergone ear surgery.

Pus/discharge was collected from the ear of the patient with the help of three sterile swab sticks in sterile test tubes and transported immediately to laboratory. First swab was used for Gram staining and KOH mount, second swab was used for bacterial culture and the third swab was used for fungal culture.

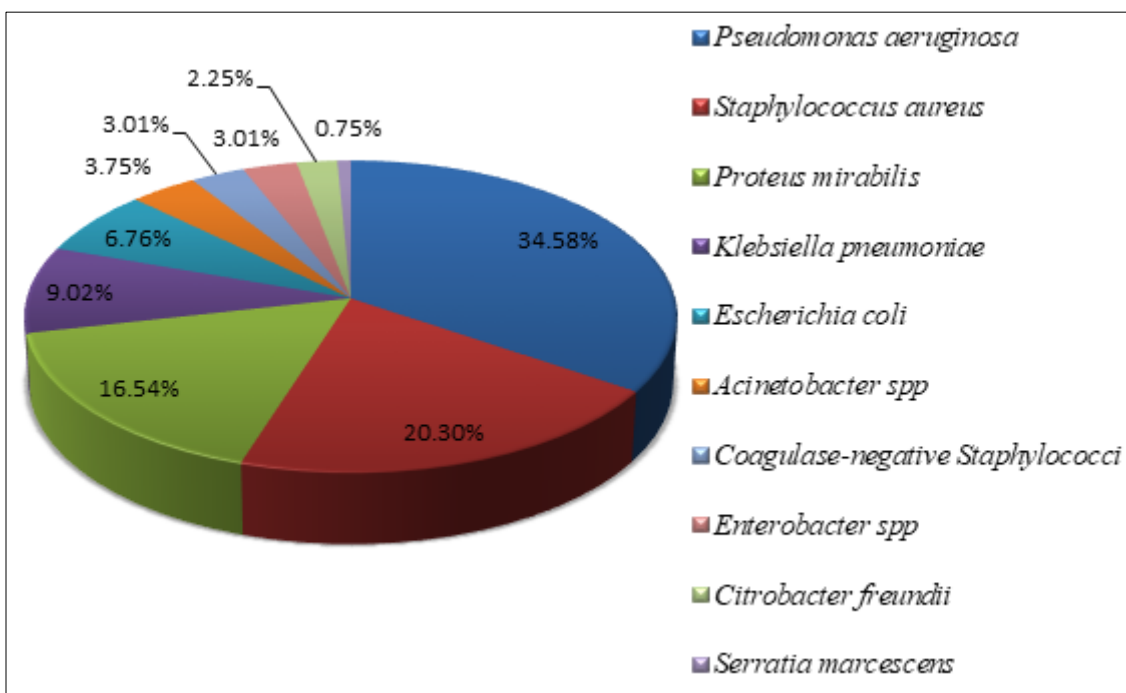
**3. Results**

The subjects included in the study were within the range of 1 and 65 years. Out of 130 patients, 57% were males and 43% were females and maximum incidence was observed in 11-20 years age group. Cases complaining of CSOM related symptoms were comparatively more during rainy season. Out of 130 patients, 27 (20.76%) had bilateral ear discharge while 103 (79.23%) had unilateral ear discharge. Of those with unilateral ear discharge, 61 (46.92%) had discharge

from right ear while 42 (32.30%) had discharge from left ear. Hundred and ten patients (84.61%) out of 130 had tubotympanic type of disease while 20 (15.38%) patients had atticofurcal or dangerous type of CSOM. From 130 patients examined, 157 samples were obtained, out of which 132 (84.02%) revealed growth while the remaining 25 (15.92%) samples were sterile. A total of 149 isolates were obtained from 157 samples, out of which 133 (89.26%) were aerobic bacteria while 16 (10.73%) were fungal isolates.

**Table 1:** Showing distribution of organisms based on Gram stain

Organisms	No. of isolates (n=133)	Percentage (%)
Gram negative	102	76.69
Gram positive	31	23.30



**Chart 1:** Distribution of bacteria isolated on culture

Out of the 133 bacterial isolates, the most common isolate was *Pseudomonas aeruginosa*, 46 in number, amounting for 34.58%. This was followed by 27 (20.30%) isolates of

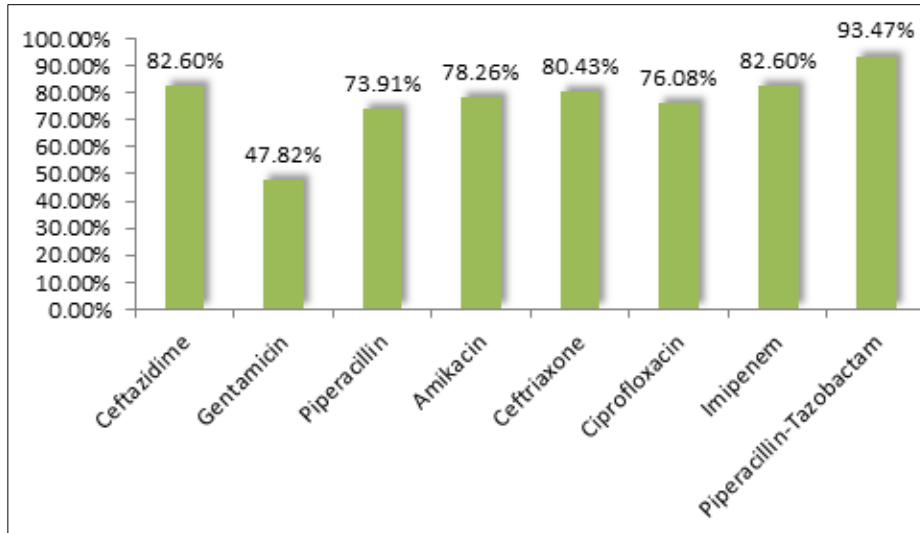
*Staphylococcus aureus* and 22 (16.54%) isolates of *Proteus mirabilis*.

**Table 2:** Shows antibiotic sensitivity pattern of *Ps.aeruginosa*

Antibiotic	No. of sensitive isolates (n=46)	Percentage of sensitivity (%)
Ceftazidime	38	82.60
Gentamicin	22	47.82
Piperacillin	34	73.91
Amikacin	36	78.26
Ceftriaxone	37	80.43
Ciprofloxacin	35	76.08
Imipenem	38	82.60
Piperacillin-Tazobactam	43	93.47

Out of the 46 isolates of *Pseudomonas aeruginosa*, maximum i.e. 43 (93.47%) showed sensitivity to Piperacillin-Tazobactam followed by Imipenem and

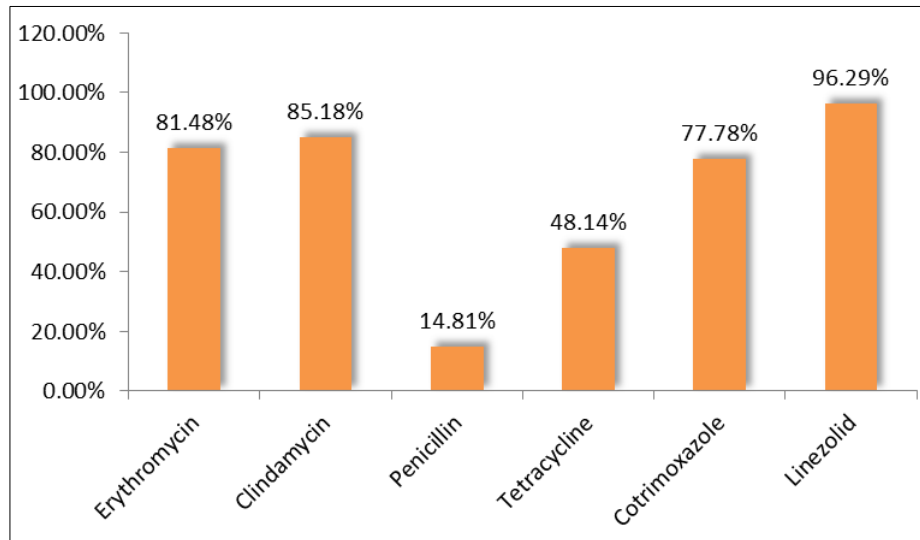
Ceftazidime, amounting for 38 (82.60%) each. Resistance to Gentamicin was more in *Ps. aeruginosa* isolates, as compared to other drugs.



**Chart 2:** Percentage of antibiotic sensitivity in *Ps. aeruginosa*

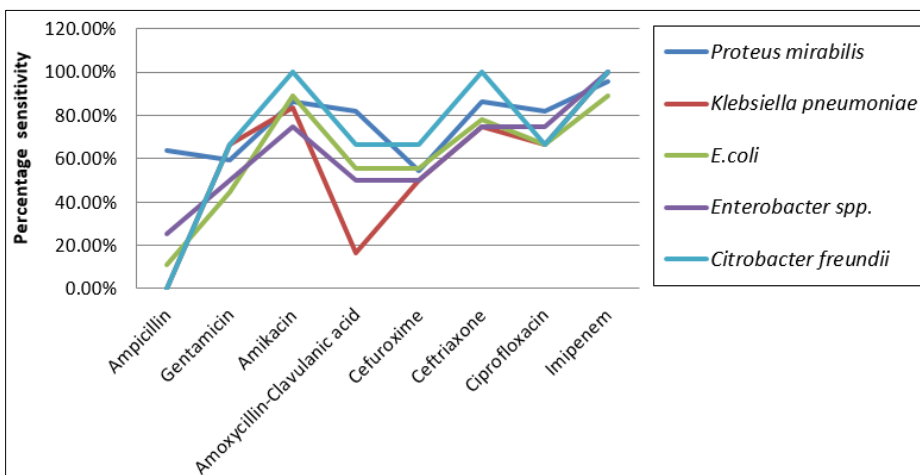
Of the 27 isolates of *Staphylococcus aureus*, 26 (96.29%) were sensitive to Linezolid followed by Clindamycin 23 (85.18%), Erythromycin 22 (81.48%), Cotrimoxazole 21 (77.78%), Tetracycline 13 (48.14%), with least sensitivity to

Penicillin 4(14.81%). Twenty five isolates (92.59%) were sensitive to Cefoxitin while 2 (7.40%) were resistant, i.e. MRSA (Methicillin resistant *Staphylococcus aureus*).



**Chart 3:** Percentage of antibiotic sensitivity in *S. aureus*

Antibiotic sensitivity pattern of other Gram negative bacteria isolated, were as shown in the chart 4.



**Chart 4:** Antibiotic sensitivity pattern of other Gram negative bacteria

Out of four isolates of coagulase-negative *Staphylococci*, all (100%) were sensitive to Linezolid, 3(75%) were sensitive to Cotrimoxazole, 2(50%) to Erythromycin, Clindamycin and Tetracycline, while only 1(25%) was sensitive to Penicillin.

In this study, a total of 16 fungal isolates were obtained. Out of these, 6(37.5%) were *Aspergillus niger*, 4(25%) were *Aspergillus flavus*, 4(25.0%) were *Candida albicans* and 2 (12.5%) were non-albicans *Candida*.

#### 4. Discussion

Chronic suppurative otitis media (CSOM) is defined as a disease condition of the middle ear cleft characterized by the presence of persistent perforation of the tympanic membrane with recurrent or persistent mucoid or mucopurulent discharge for more than six to eight weeks or for more than three months<sup>[9, 10]</sup>. Due to its recurrent nature and the development of resistant pathogenic organisms, control of infection poses a greatest therapeutic challenge<sup>[11]</sup>.

In the present study, males were affected more as compared to females. The male: female ratio obtained was 1.32:1. Similar results were seen in studies conducted by Shyamala and Reddy and Patel and Sharma<sup>[12, 13]</sup>.

The most common age group affected was in between 11-20 years, followed by 21-30 years age group. Similar results were seen in studies conducted by Ashish J *et al.* and Prakash R *et al.*<sup>[14, 15]</sup>.

In the present study, about 61 (46.92%) patients showed right ear involvement while 42 (32.30%) patients had left ear involvement. Twenty seven cases (20.76%) had bilateral ear involvement. Similar study results were obtained by Kumar R *et al.*<sup>[16]</sup>.

Tubotympanic type of CSOM was more frequently seen as compared to atticointral or dangerous type of CSOM in present study. Similar results were obtained in studies by Moorthy PNS *et al.* and Wakode PT *et al.*<sup>[17, 18]</sup>.

In the present study, the most common organism isolated among the aerobic bacteria was *Pseudomonas aeruginosa* (34.58%) followed by *Staphylococcus aureus* (20.30%). Similar observations were noted in other studies conducted in Maharashtra by Hirapure and Pote and Magdum S *et al.*<sup>[19, 20]</sup>.

Sensitivity pattern of *Ps.aeruginosa* in present study was similar to studies conducted by Kumar and Seth<sup>[21]</sup>, Sudhindra KS *et al.*<sup>[22]</sup>, Ashish J *et al.*<sup>[14]</sup>. Sensitivity pattern of *Staphylococcus aureus* was similar to studies conducted by Singh AH *et al.*<sup>[23]</sup>, Hirapure and Pote<sup>[24]</sup>.

In the present study, the MRSA strains were 7.41% which was comparable with studies conducted by Dayasena RP *et al.* Sudhindra KS *et al.*<sup>[4, 22]</sup>.

Antibiotic sensitivity pattern of other gram negative bacteria was comparable to various studies conducted in India like Prakash R *et al.*<sup>[15]</sup>, Malkappa S *et al.*<sup>[25]</sup>, Singh AH *et al.*<sup>[23]</sup>, Kumar and Seth<sup>[21]</sup>.

Similar sensitivity results for CONS were noted in studies by Sudhindra KS *et al.* Arif D *et al.* and Singh AH *et al.*<sup>[22, 23, 26]</sup>.

Fungal results could be related with studies conducted by Shreshtha BL *et al.* and Sharma and Kaur<sup>[27, 28]</sup>.

#### 5. Conclusion

Chronic use of antibiotics for treatment in patients with CSOM has led to development of multidrug resistant strains. The study signifies the importance of correct identification

and knowledge of pathogens and their antibiotic sensitivity testing which helps in selecting appropriate treatment strategy for the patients with chronic suppurative otitis media. This, in turn, can help in reducing emergence of antibiotic resistance. The magnitude of the existing problem of antimicrobial resistance should be taken into utmost consideration and rational prescription of antibiotics needs to be strictly followed.

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