

**Original article:**

## **Assessment of bacteriology and drug susceptibility in chronic suppurative otitis media in ENT outpatients**

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**Abstract:**

**Aim:** To assess bacteriology and drug susceptibility in chronic suppurative otitis media in ENT outpatients.

**Methodology:** One hundred five adult patients of CSOM in age ranged 20-40 years of either sex was enrolled. The ear discharge is collected using sterile cotton wool swabs under aseptic precautions. Swabs are then transported to the laboratory. The first swab was used to make a smear on a glass slide for direct smear examination by Gram's stain. The second swab was processed for the isolation of aerobic bacteria. The swab on reaching laboratory was inoculated on the following culture media: MacConkey agar and Blood agar. Antibiotic sensitivity testing is performed by Kirby-Bauer disc diffusion method according to CLSI guidelines.

**Results:** Out of 105 patients, males were 65 and females were 40. Organisms isolated were *Stap. Aureus* in 38, *Pseudomonas* in 30, *E. coli* in 22, *Klebsiela* in 8 and *Proteus mirabilis* in 5 cases. Antibiotic susceptibility pattern in *Staphylococcus aureus* and *Pseudomonas* against cotrimoxazole was 100% and 30%, Teicoplanin was 95% and 90%, Cefotaxime was 94% and 42%, Oxacillin was 100% and 25%, ciprofloxacin was 91% and 45%, erythromycin was 65% and 82%, levofloxacin was 26% and 80%, linezolid was 92% and 74% and azithromycin was 56% and 45%. A significant difference was observed ( $P < 0.05$ ).

**Conclusion:** *S. aureus*, *Pseudomonas* and *E. coli* were the most frequently isolated organisms in patients with ear infection.

**Key words:** Chronic suppurative otitis media, ear infection, *Pseudomonas*, *Staphylococcus Aureus*

### **Introduction**

The diagnosis of chronic suppurative otitis media (CSOM) implies a permanent abnormality of the pars tensa or flaccida, most likely a result of earlier acute otitis media, negative middle ear pressure, or otitis media with effusion.<sup>1</sup> Chronic otitis media (COM) equates with the classic term chronic "suppurative" otitis media that is no longer advocated as COM is not necessarily a result of "the gathering of pus." The prevalence of disease is approximately 7.2%.<sup>2</sup>

The disease usually occurs after upper respiratory viral infections followed by invasion of pyogenic organisms. Many studies have showed that the common organisms isolated from cases of CSOM are found to be *Pseudomonas* spp, *Staphylococcus aureus*, *Klebsiella pneumoniae*, and *Proteus* spp.<sup>3</sup> It is calculated that about 13.8%–36.2% of the people have hearing impairment due to CSOM. The classic type of hearing loss described for this condition is conductive. However, several investigators have reported sensorineural hearing loss do occur concomitantly or as sequelae of CSOM.<sup>4</sup>

Frequent upper respiratory tract infections and poor socioeconomic conditions (overcrowded housing and poor hygiene and nutrition) are often associated with the development of CSOM.<sup>5</sup> The deafness caused by CSOM of safe type was usually considered to be purely of conductive type. In unsafe type of CSOM, the sensorineural deafness is known usually due to labyrinthitis and cholesteatoma.<sup>6</sup> Occasionally, in fatal condition, CSOM can lead to fatal intracranial infections and acute mastoiditis. Because of misuse and overuse of antibiotics, antibiotic drug resistance (ADR) is increasing among the pathogens causing CSOM which makes this mandatory for periodic surveillance of microbiological and sensitivity profile of CSOM.<sup>7</sup> Considering this, we attempted present study to assess bacteriology and drug susceptibility in chronic suppurative otitis media in ENT outpatients.

### Methodology

After considering the utility of the study and obtaining approval from ethical review committee of the institute, we selected one hundred five adult patients of CSOM in age ranged 20-40 years of either sex. Cases having symptoms of active ear discharge for more than 6 weeks were considered as CSOM. Patients suffering from SOM who are on systemic antibiotics and on topical medications to the ear were excluded.

The ear discharge is collected using sterile cotton wool swabs under aseptic precautions. Swabs are then transported to the laboratory. The first swab was used to make a smear on a glass slide for direct smear examination by Gram's stain. The second swab was processed for the isolation of aerobic bacteria. The swab on reaching laboratory was inoculated on the following culture media: MacConkey agar and Blood agar. Antibiotic sensitivity testing is performed by Kirby-Bauer disc diffusion method according to CLSI guidelines. The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

### Results

**Table I Patients distribution**

Total- 105		
Gender	Male	Female
Number	65	40

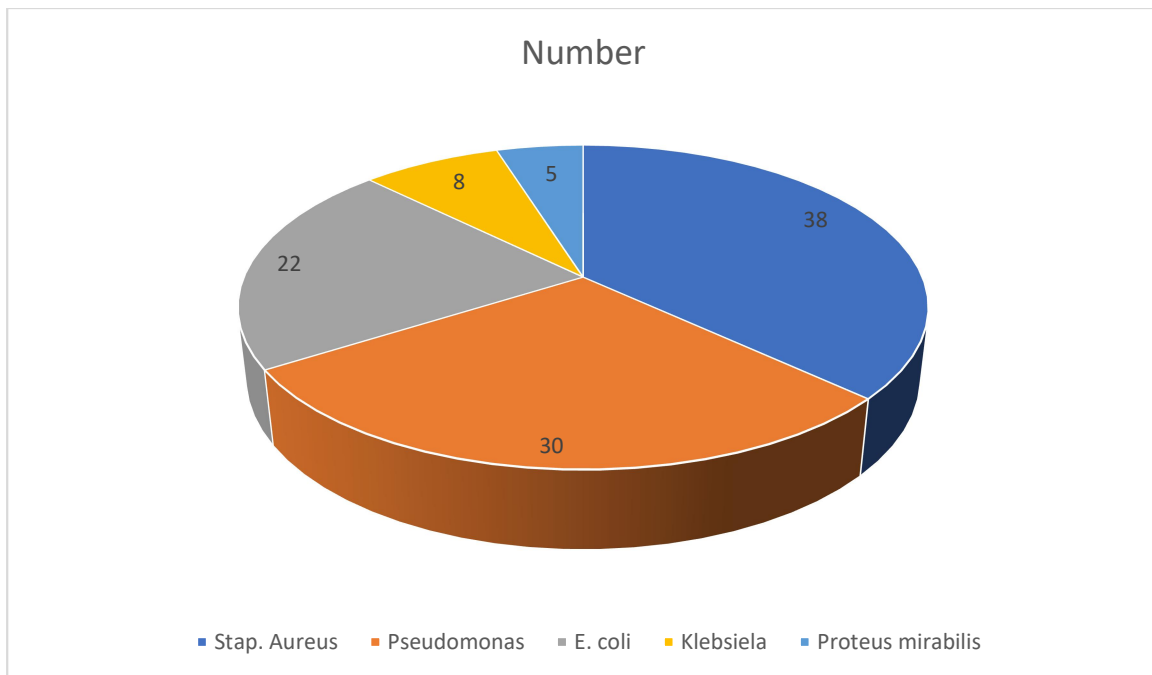
Out of 105 patients, males were 65 and females were 40 (Table I).

**Table II Organisms isolated from patients**

Organisms	Number	P value
Stap. Aureus	38	<0.05
Pseudomonas	30	
E. coli	22	
Klebsiela	8	
Proteus mirabilis	5	

Organisms isolated were Stap. Aureus in 38, Pseudomonas in 30, E. coli in 22, Klebsiela in 8 and Proteus mirabilis in 5 cases. A significant difference was observed (P< 0.05) (Table II, graph I).

**Graph I Organisms isolated from patients**

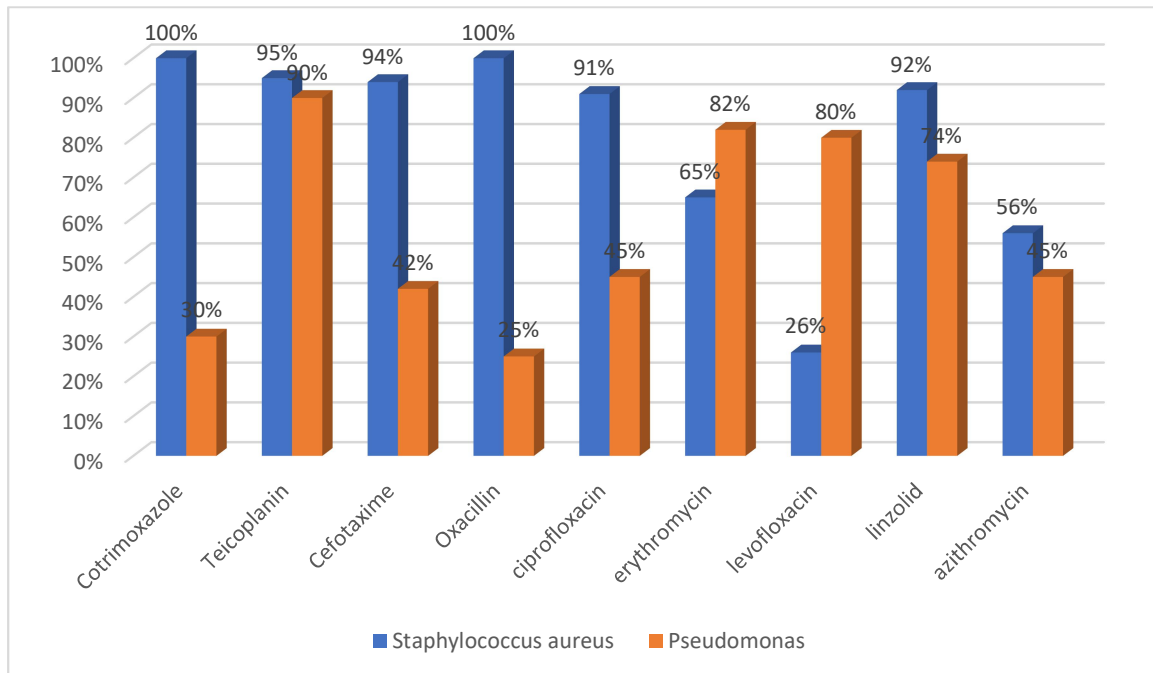


**Table III Antibiotic susceptibility pattern**

Drug	Staphylococcus aureus	Pseudomonas	P value
Cotrimoxazole	100%	30%	<0.05
Teicoplanin	95%	90%	
Cefotaxime	94%	42%	
Oxacillin	100%	25%	
ciprofloxacin	91%	45%	
erythromycin	65%	82%	
levofloxacin	26%	80%	
linzolid	92%	74%	
azithromycin	56%	45%	

Antibiotic susceptibility pattern in Staphylococcus aureus and Pseudomonas against cotrimoxazole was 100% and 30%, Teicoplanin was 95% and 90%, Cefotaxime was 94% and 42%, Oxacillin was 100% and 25%, ciprofloxacin was 91% and 45%, erythromycin was 65% and 82%, levofloxacin was 26% and 80%, linezolid was 92% and 74% and azithromycin was 56% and 45%. A significant difference was observed (P< 0.05) (Table III, graph II).

**Graph II Antibiotic susceptibility pattern**



### Discussion

Chronic suppurative otitis media (CSOM) is characterized by repeated otorrhea via tympanic membrane perforation.<sup>8,9</sup> Chronic suppurative otitis media often leads to conductive hearing loss and constitutes a risk factor for permanent sensorineural hearing loss because of inner ear injury as well as intracranial complications.<sup>10,11</sup> Chronic suppurative otitis media is a major public health problem in poor and developing countries like India. According to a report by WHO, India belongs to the highest (>4%) CSOM-prevalent countries.<sup>12,13</sup> Thus, early diagnosis, knowledge of regional etiological agents and an effective antibiotic policy can curtail the development of CSOM in fatal cases.<sup>14,15</sup> We attempted present study to assess bacteriology and drug susceptibility in chronic suppurative otitis media in ENT outpatients.

Our results showed that out of 105 patients, males were 65 and females were 40. Organisms isolated were Stap. Aureus in 38, Pseudomonas in 30, E. coli in 22, Klebsiela in 8 and Proteus mirabilis in 5 cases. Mirza et al<sup>16</sup> in their study a total of 178 patients with unilateral or bilateral active chronic suppurative otitis media attending the outpatient clinic were included in the study. All the patients were evaluated through detailed clinical history and clinical examination. Pus samples were collected from the discharging ear(s) and sent to microbiology section of hospital laboratory where aerobic cultures were done. Antibiotic sensitivity testing was done with standard antibiotic discs using Kirby-Bauer disk diffusion method as per National Committee for Clinical Laboratory Standards recommendations. From the clinical specimens of 178 patients enrolled in the study, microbiological culture was yielded from 130 (73%) specimens. There were 116, (89%) bacterial isolates and 14, (11%) fungi. Pseudomonas aeruginosa 58 (45%) was the most common isolate, followed by Staphylococcus aureus 52 (40%) including two isolates of Methicillin resistant Staphylococcus Aureus (MRSA). Antibiotic sensitivities of Pseudomonas aeruginosa showed that 100% isolates were sensitive to Piperacillin/Tazobactam, where as 86% isolates were sensitive to ceftazidime and 83% to ciprofloxacin. Only 45% of Pseudomonas aeruginosa isolates

were sensitive to gentamicin and 48% to amikacin. For *Staphylococcus aureus* (other than MRSA), 100% isolates were sensitive to cloxacillin, 80% to ciprofloxacin and 68% to gentamicin. Only 60% isolates were sensitive to chloramphenicol and 32% to cotrimoxazole.

Our results showed that organisms isolated were *Stap. Aureus* in 38, *Pseudomonas* in 30, *E. coli* in 22, *Klebsiella* in 8 and *Proteus mirabilis* in 5 cases. Loy et al<sup>17</sup> assessed the microflora and the antibiograms of patients with chronic suppurative otitis media (CSOM) in Singapore. Ninety patients with CSOM were prospectively studied. They had chronic ear discharge and had not received antibiotics for the previous five days. Swabs were taken, and cultured for bacteria. Antibiotic testing was done using modified Kirby Bauer disk diffusion method. In addition to the usual antibiotics, the three most common topically available antibiotics (chloramphenicol, gentamicin and neomycin) were tested. There were 135 positive cultures for organisms from the 90 patients. The most common causal organisms isolated were *Pseudomonas aeruginosa* (33.3%) and *Staphylococcus aureus* (33.3%) followed by coagulase negative *Staphylococcus* (21.1%). Fungi accounted for 8.8% of isolates while 6.6% were anaerobes. Of the three antibiotics commonly available as topical eardrops, gentamicin has the highest susceptibility rate (82.6%), followed by neomycin (67.8%) and chloramphenicol (62.8%).

We observed that antibiotic susceptibility pattern in *Staphylococcus aureus* and *Pseudomonas* against cotrimoxazole was 100% and 30%, Teicoplanin was 95% and 90%, Cefotaxime was 94% and 42%, Oxacillin was 100% and 25%, ciprofloxacin was 91% and 45%, erythromycin was 65% and 82%, levofloxacin was 26% and 80%, linezolid was 92% and 74% and azithromycin was 56% and 45%. Attallah<sup>18</sup> reported the result of causative organisms in chronic suppurative otitis media with cholesteatoma. Eighty- eight patients clinically diagnosed with chronic suppurative otitis media with cholesteatoma, and confirmed intra-operatively and by histological examination were pre-operatively studied for the causative bacteria and fungi. A single isolate was obtained in 42 (48%) cases, no growth was isolated in 11 (12.5%) cases. Most common bacteria isolated were, *Pseudomonas aeruginosa* in 51%, *Staphylococcus aureus* in 31%, and *Proteus* species in 17%. Among the 15 fungal isolates, 9 (10%) were *Aspergillus* species and the remaining 6 (7%) were *Candida albicans*. Conventional ear swabs taken under direct vision using an operating microscope are reliable in establishing the microbiological profile of chronic suppurative otitis media.

### Conclusion

*S. aureus*, *Pseudomonas* and *E. coli* were the most frequently isolated organisms in patients with ear infection.

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