



## International Journal of Research and Development in Pharmacy & Life Science

An International open access peer reviewed journal

ISSN (P): 2393-932X, ISSN (E): 2278-0238

Journal homepage: <http://ijrdpl.com>



### Original Article

# Clinico-microbiological profile of Chronic Suppurative Otitis media in a Tertiary Care Hospital

Diljot Sandhu\*<sup>1</sup>, Veenu Gupta<sup>1</sup>, Deepinder K. Chhina<sup>1</sup> and Manish Munjal<sup>2</sup>

<sup>1</sup> Department of Microbiology and <sup>2</sup> Department of ENT, Dayanand Medical College & Hospital, Ludhiana, India

**Keywords:** Chronic suppurative otitis media, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, Ciprofloxacin

#### Article Information:

**Received:** March 04, 2018;

**Revised:** April 17, 2018;

**Accepted:** May 01, 2018

#### Available online on:

15.06.2018@<http://ijrdpl.com>



[http://dx.doi.org/10.21276/IJRDPL.2278-0238.2018.7\(3\).2995-2998](http://dx.doi.org/10.21276/IJRDPL.2278-0238.2018.7(3).2995-2998)

#### ABSTRACT:

**Background:** Chronic suppurative otitis media (CSOM) is a notorious ear infection and a major health problem in developing countries causing serious local damage and threatening complications. Early and effective treatment based on the knowledge of causative microorganisms and their antimicrobial sensitivity can ensure prompt clinical recovery and possible complications can thus be avoided. **Objectives:** To study the clinico-microbiological profile of CSOM. **Materials and Methods:** Clinically diagnosed cases of CSOM were enrolled in the study and the ear discharge was obtained using two separate pre-sterilized swabs. They were processed for aerobic & anaerobic culture and sensitivity. Drug susceptibility testing was done using Kirby Bauer disc diffusion method. **Results:** Total of 72 patients clinically diagnosed with CSOM were enrolled in our study. Majority of the patients who had ear discharge were in the age group of 41-60 years. 29 cases were of Safe/ tubotympanic type & 43 cases of Unsafe/ atticofacial type of CSOM. Out of 60 positive samples, 54 (90%) had monomicrobial, while 6 (10%) had polymicrobial growth. Amongst the 66 aerobic isolates, most common causative organisms isolated were *Pseudomonas aeruginosa* (59%) and *Staphylococcus aureus* (24.2%). Antimicrobial profile of Gram negative isolates revealed maximum sensitivity to piperacillin, piperacillin-tazobactam, imipenem and ciprofloxacin. All Gram-positive isolates were sensitive to vancomycin, teicoplanin & linezolid. **Conclusion:** Continuous and periodic evaluation of microbiological pattern and antibiotic sensitivity of isolates is necessary to decrease the potential risk of complications by early institution of appropriate treatment.

† Corresponding author at:

**Dr. Veenu Gupta**, Professor, Department of Microbiology, DMC&H, Ludhiana, India

E-mail: [vsunilgupta@reddiffmail.com](mailto:vsunilgupta@reddiffmail.com)

## INTRODUCTION

Chronic suppurative otitis media (CSOM) is defined as chronic inflammation of middle ear and mastoid cavity that may present with recurrent ear discharge or otorrhoea through a tympanic perforation [1]. It is a common problem in the tropics. About 65-330 million people suffer from ear infection worldwide and 60% of them had significant hearing impairment [2]. India was reported to be associated with the highest prevalence of otitis media with more than 6% experiencing the disorder. The World Health Organization had reported and categorized otitis media as one of the neglected tropical diseases. It is common in infants and children especially of lower socio-economic group. 10% to

20% of the school children in India have been reported to associate with at least one episode of otitis media. High rates of chronic otitis media are attributed to overcrowding and poor hygiene, poor nutrition, passive smoking, high level of nasopharyngeal colonization with pathogenic bacteria and inadequate or unavailable healthcare. Among these, there is more impact of the disease in slums rather than in well sanitized urban cities [3].

The disease is mainly classified into two types: tubotympanic and atticofacial depending upon whether the disease process affects the pars tensa or the pars flaccida of the tympanic membrane [4].

Tubotympanic is called as a safe type or benign type as there is no serious complication whereas, atticofacial is called as the unsafe or dangerous type because of associated complication and may be life threatening at times [5].

Both Gram positive (*Staphylococcus aureus*, *Streptococcus pneumoniae*) and Gram-negative bacteria (*Pseudomonas aeruginosa*, *Escherichia coli*, *Proteus* & *Klebsiella* etc.) are involved in the pathogenesis of CSOM. Infection can spread from middle ear to vital structures such as mastoid, facial nerve, labyrinth, lateral sinus, meninges and brain leading to mastoid abscess, facial nerve paralysis, deafness, lateral sinus thrombosis, meningitis and intracranial abscess [6, 7]. Chronic suppurative otitis media (CSOM) is one of the leading causes of preventable disabling hearing impairment (DHI) in developing countries [8].

Complications associated with CSOM were frequent in pre-antibiotic era, however, the introduction of antibiotics gave clinicians a tool to be used even without the precise etiological diagnosis, but the irrational use of antibiotics has led to the emergence of multidrug resistant bacterial strains and disease complications in return [9]. So, this study was done to analyze the clinico-microbiological profile of patients suffering from CSOM.

## MATERIALS & METHOD

This prospective study was conducted for a period of 1 year (January 2016 to December 2016) in Dayanand Medical College & Hospital, Ludhiana. Patients clinically diagnosed of CSOM, who did not receive any antimicrobial therapy (topical or systemic) for the last 7 days were included in the study. Ear discharge was obtained from the diseased ear of the patient, using two separate pre-sterilized swabs. One of the swabs was used for aerobic culture and was plated on blood agar (BA) and MacConkey's agar. The plates were incubated at 37°C for 48 hrs. Gram stain smear of the sample was also examined.

Second swab used for anaerobic culture was inoculated in Robertson's cooked meat (RCM) broth and incubated at 37°C for 24-48 hrs. Subculture was done on blood agar and plates were incubated at 37°C for 48-72 hrs. Organisms were identified using standard procedures. Antimicrobial susceptibility testing of isolates was carried out by Kirby Bauer disc diffusion method on Muller Hinton agar [10]. Results were interpreted in accordance with central laboratory standards institute (CLSI) guidelines [11]. The study was approved by Institutional Ethical Committee.

## RESULTS

During 1-year study period, 72 patients clinically diagnosed with CSOM were enrolled in our study. Out of these 40 (55.5%) were males and 32(44.4%) females. 43 (59.7%) patients belonged to the urban and 29 (40.3%) belonged to the rural population. Majority of the patients who had ear discharge were in the age group of 41-60 years. Male preponderance was observed in the age group of >60 years, whereas female preponderance was in 51-60 years. (Table I) 58 (80.6%) patients had unilateral disease (31 with right ear and 27 with left ear involvement), while 14 (19.4%) patients had bilateral disease.

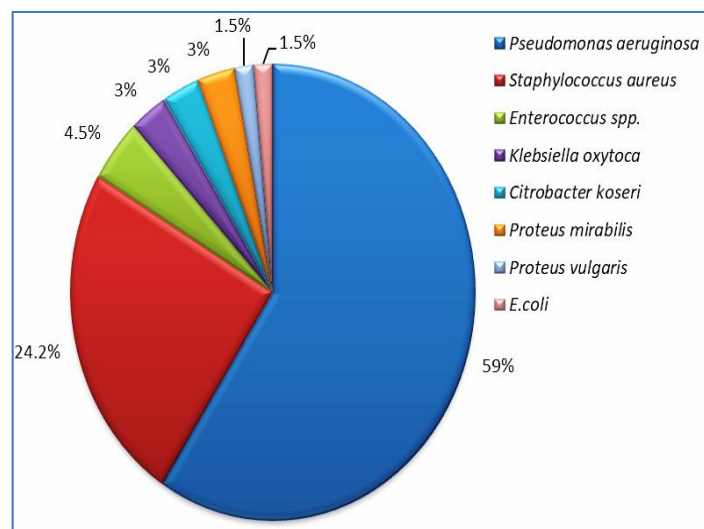
**Table I: Age- and Gender-wise Distribution of Patients**

Age group (in years)	Males (n=40)	Females (n=32)
0-10	1(2.5%)	0
11-20	4(10%)	2(6.25%)
21-30	6(15%)	4(12.5%)
31-40	8(20%)	4(12.5%)
41-50	7(17.5%)	9(28.1%)
51-60	4(10%)	11(34.3%)
Above 60	10(25%)	2(6.25%)

Most common symptoms after ear discharge were ear pain (72.2%), feeling of fullness (66.6%), tinnitus (62.5%) and hearing loss (54.1%). Other symptoms included dizziness, headache and fever. Majority (91.6%) of the patients presented with mucopurulent ear discharge. Postero-superior type of TM perforation was most commonly seen followed by central perforation.

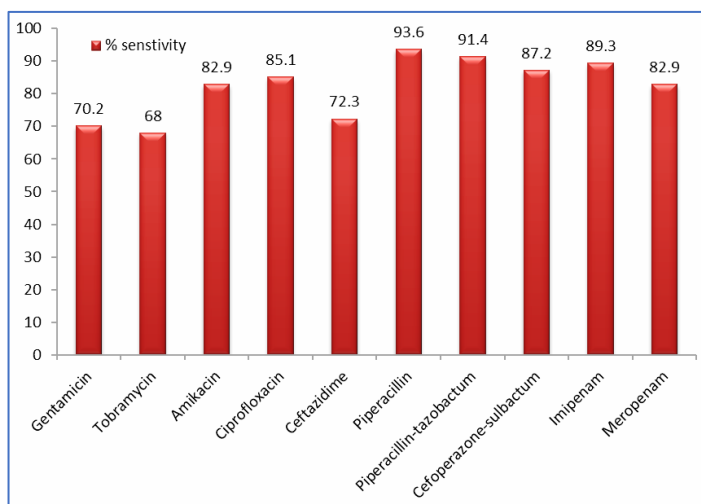
Based on these clinical findings, 29 (40.3%) cases were categorized as Safe/ tubotympanic type & 43 (59.7%) cases as Unsafe/ atticofacial type of CSOM. Co-morbidities like Hypertension and Diabetes mellitus was seen in 25% and 30.5% cases respectively. History of previous ear surgery was present in 3 cases. Complications due to CSOM like mastoiditis and facial nerve paralysis was observed in 7(9.7%) cases. 15 (20.8%) cases opted for surgical management.

Of the 72 samples received for culture & sensitivity testing, 60(83.3%) yielded positive culture and 12 (16.7%) samples were sterile. Out of 60 positive samples, 54 (90%) had a single organism isolated from culture, while 6 (10 %) had two organisms isolated. Out of 66 isolates obtained, 47 (71.2%) were gram negative & 19 (28.8%) were gram positive. The most common aerobic microorganisms isolated were *Pseudomonas aeruginosa* and *Staphylococcus aureus*. (Figure 1) Anaerobic growth of *Clostridium spp.* was obtained in only one sample.

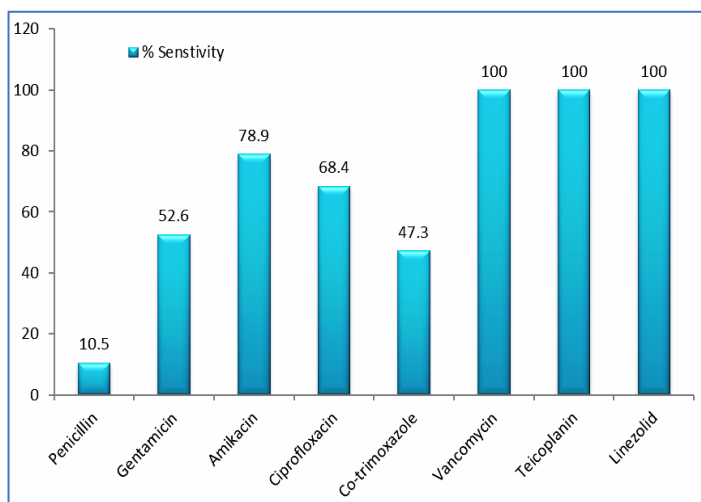


**Figure I: Distribution of bacterial isolates (n = 66)**

Gram negative isolates showed maximum sensitivity to piperacillin (93.6%), piperacillin-tazobactam (91.4%), imipenam (89.3%), and ciprofloxacin (85.1%) followed by aminoglycosides. All Gram-positive isolates were sensitive to vancomycin, teicoplanin and linezolid and majority (90%) showed resistance to penicillin. (Figure 2 and 3).



**Figure 2: Antimicrobial susceptibility of Gram negative isolates (n=47)**



**Figure 3: Antimicrobial susceptibility of Gram positive isolates (n=19)**

*P. aeruginosa* isolates showed 92.3% sensitivity to piperacillin, 89.7% to piperacillin-tazobactam, imipenam, ciprofloxacin and aztreonam, 87.1% to ceftazidime, 84.6% to cefoperazone-sulbactam, 82% to tobramycin and meropenam followed by less than 80% to aminoglycosides.

All isolates of *S. aureus* were sensitive to vancomycin, teicoplanin and linezolid and majority (93.8%) showed resistance to penicillin. Isolates showed 93.7% sensitivity to amikacin, 68.7% to ciprofloxacin, 62.5% to gentamicin, erythromycin and clindamycin followed by 56.2% sensitivity to co-trimoxazole. Out of the *S. aureus* isolates, 12.5% were MRSA (Methicillin resistant *Staphylococcus aureus*).

## DISCUSSION

Otitis media is one of the most common ear diseases which is encountered in day-to-day practice. If left untreated, it may cause destruction of middle ear structures leading to hearing loss and may also cause complications like mastoiditis, periostitis, facial paralysis, labyrinthitis, brain abscess, meningitis, lateral sinus thrombophlebitis etc. Aural toileting with meticulous antimicrobial treatment is essential to prevent complications. In our study, CSOM was more common in males compared to females. This correlates with the study report of VK Poorey and Nwasbuisi *et al.* [4, 12].

Male predominance may be because of their more exposed way of life. In contrast to this result, study by Mansoor *et al.* [13] and Raakhee T. [14] revealed a higher female preponderance.

In our study, majority of the patients who had ear discharge were in the age group of 41-60 years. This was in contrast to a study from South India which showed more incidence in population < 25 years of age [14].

Because of variation in community and patient characteristics, the pattern of microbiological distribution varies in CSOM. About 83.3 % of cases yielded positive result. Majority of isolates in our study were Gram negative bacteria, among which *P.aeruginosa* was commonest. These results were in concordance with the literature [4, 13, 14]. Whereas Arti Aggarwal reported *Staphylococcus spp.* as the most predominant isolate in CSOM [15].

Amongst the various antibiotics tested for Gram negative bacteria, sensitivity of amikacin (82.9%) and gentamicin (70.2%) was found to be better than tobramycin (68%) and in the quinolone group ciprofloxacin (85.1%) & amongst systemic antibiotics, piperacillin-tazobactam (91.4%), imipenam (89.3%) & cefoperazone-sulbactam combination (87.2%) were found to be most effective. High fluoroquinolone antibacterial activity against *Pseudomonas* isolates has been reported by many authors, although strains of *Pseudomonas* resistant to fluoroquinolones were also detected in other studies [16, 17].

All Gram-positive cocci were sensitive to vancomycin, teicoplanin & linezolid.

In our study, among the topical antibiotics, ciprofloxacin was most commonly prescribed by the ENT physicians in treating ear discharge. Sensitivity to ciprofloxacin was found to be good (85.1%). Main advantage of ciprofloxacin is that it is not ototoxic. Since it is quite effective without possible damage, this quinolone was the best to be prescribed in treating CSOM. Our study also correlates with other studies which show ciprofloxacin to be safe and effective particularly against *P. aeruginosa* and *S. aureus* [14, 18].

## CONCLUSION

- *P. aeruginosa* and *S. aureus* are the most common pathogens isolated in otitis media.
- Most of them are sensitive to ciprofloxacin and amikacin. So, ciprofloxacin should be chosen as the

first line antibiotic to treat CSOM as it is safer drug with fewer side effects.

- Continuous and periodic evaluation of microbial pattern and antibiotic sensitivity of pathogens causing CSOM will help to decrease the potential risk of complications.
- Therefore, appropriate use of antibiotics by selection, dosage and duration and public enlightenment for personal hygiene and environmental cleanliness might be helpful in decreasing the disease burden.

## COMPLIANCE WITH ETHICAL STANDARDS

**Source of funding = INSTITUTIONAL**

**Ethical Approval** = This article does not contain any studies with human participants and/or animals performed by any of the authors

**Informed Consent = NONE**

## ACKNOWLEDGEMENT

Mr. Girdhari Lal (Senior technician)

## REFERENCES

1. Acuin J. (2004) Global burden of disease due to chronic suppurative otitis media: Disease, deafness, deaths and DALYs Chronic Suppurative Otitis Media—Burden of Illness and Management Options. Geneva: *World Health Organization*. p. 9-23.
2. Woodfield G, Dugdale A. (2008) Evidence behind the WHO guidelines: hospital care for children: What is the most effective antibiotic regime for chronic suppurative otitis media in children. *J Trop Pediatr*; 54(3):151-6.
3. Report of WHO/CIBA Foundation workshop. (1996) Prevention of hearing impairment from chronic otitis media. *World Health Organization*.
4. Poorey V K, Iyer A. Study of bacterial flora in CSOM and its clinical significance. *Indian J of Otolaryngol and Head and Neck Surg* 2002; 54: 91-5.
5. Rout MR, Mohanty D, Vijaylaxmi Y, Kamalesh B, Chakradhar M. (2012) Prevalence of cholesteatoma in chronic suppurative otitis media with central perforation. *Indian J Otol*; 18:7-10.
6. Berman S. (1995) Otitis media in developing countries. *Pediatrics*; 96:126-31.
7. Wiwanitkit S, Wiwanitkit V. (2012) Pyogenic brain abscess in Thailand. *N Am J Med Sci*; 4:245-8.
8. Muftah S, Mackenzie I, Faragher B, Brabin B. (2015) Prevalence of Chronic Suppurative Otitis Media and Associated Hearing Impairment Among School-aged Children in Yemen. *Oman Med J*;30(5):358-65.
9. Hassan O, Adeyemi. (2007) A study of bacterial isolates in cases of otitis media in patients attending Oautch, Ile-Ife. *Afr J Exp Microbiol*; 8:130-6.
10. Mackie TJ, McCartney JE. (2014) Practical Medical Microbiology. 14<sup>th</sup> ed. Elsevier.
11. CLSI. (2015) Performance Standards for Antimicrobial Susceptibility Testing; Twenty-Fifth Informational Supplement. CLSI document M100-S25. Wayne, PA: *Clinical and Laboratory Standards Institute*.
12. Nwabuisi C, Ologe FE. (2002) Pathogenic agents of Chronic Suppurative Otitis Media in Ilorin, *Nigeria. East African Medical Journal*; 79(4):202-5.
13. Mansoor T., Musani M., Khalid G., Kamal M. (2009) Pseudomonas aeruginosa in Chronic Suppurative Otitis Media: Sensitivity Spectrum against various Antibiotics in Karachi. *J Ayub Med Coll Abbottabad*;21(2):120-3.
14. Raakhee T., Unguturu SR. (2014) Bacteriological study of discharging ear in patients attending a tertiary care hospital *Int J Res Med Sci*;2(2):602-60.
15. Agrawal A, Kumar D, Goyal A, Goyal S, Singh N, Khandelwal G. (2013) Microbiological profile and their antimicrobial sensitivity pattern in patients of otitis media with ear discharge. *Indian J Otol*; 19(1).
16. Gul HC, Kurnaz A, Turhan V, Oncül O, Pahsa A. (2006) Microorganisms isolated from middle ear cultures and their antibacterial susceptibility in patients with chronic suppurative otitis media. *Kulak Burun Bogaz Ihtis Derg*; 16:164-8.
17. Macfadyen CA, Acuin JM, Gamble C. (2006) Systemic antibiotics versus topical treatments for chronically discharging ears with underlying eardrum perforations. *Cochrane Database Syst Rev*; (1):CD005608.
18. Indudharan R, Haq JA, Alyar S. (1999) Antibiotics in chronic suppurative otitis media: a bacteriologic study. *Ann otol rhinol laryngol*. 108(5):440-5.

### How to cite this article:

Sandhu D, Gupta V, Chhina DK and Munjal M. Clinico-microbiological profile of Chronic Suppurative Otitis media in a Tertiary Care Hospital. *Int. J. Res. Dev. Pharm. L. Sci.* 2018; 7(3): 2995-2998. doi: 10.13040/IJRDPL.2278-0238.7(3).2995-2998

This Journal is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 3.0 Unported License.