

# Microbial Assessment of Chronic Suppurative Otitis Media in a Tertiary Care Center of Rajasthan

Dr. Ramesh Agrawal<sup>1\*</sup>, Dr. P.K. Khatri<sup>2\*\*</sup>, Dr. R.S. Parihar<sup>3\*\*</sup>,  
Dr. Harshada Shah<sup>4\*</sup>

<sup>1</sup>Assistant Professor, <sup>2</sup>Professor & Head, <sup>3</sup>Professor, <sup>4</sup>Professor & Head,  
\*Department of Microbiology R. D. Gardi Medical College, Ujjain, M.P. India  
\*\*Microbiology Department, Dr. S. N. Medical College Jodhpur, Rajasthan, India

Corresponding Author: Dr. Ramesh Agrawal

Received: 27/12/2016

Revised: 11/01/2017

Accepted: 12/01/2017

## ABSTRACT

**Introduction:** Chronic Suppurative Otitis Media (CSOM) is defined as infection of the middle ear that lasts for more than three months and is accompanied by otorrhoea and tympanic membrane perforation.

**Aims:** Purpose of the study was to determine the prevalence of microbiological agents in CSOM, associated risk factors and establish antimicrobial resistance pattern of these micro-organisms.

**Materials and Methods:** The study was conducted after ethical approval by ethical committee in Department of Microbiology, Dr. S. N. Medical College, Jodhpur Rajasthan. Two pus swabs were collected with sterile cotton swabs from CSOM patients attending ENT OPD. Isolation, identification and characterization of bacterial isolate were done by standard phenotypic microbiological procedure.

**Observations & Results:** Out of 150 cases 137(91.34%) was culture positive and 13 (8.66%) no growth (sterile) was obtained. Peak age of presentation was 11-20 years. Out of 150 cases 58% were males and 42% females. Most of these resides in rural area 53.3% and 46.7% belongs to urban area. Among the 150 cases 134 (89.3%) were unilateral while 16 (10.7%) bilateral CSOM patients. Out of total 78% patients already received antibiotic treatment while remaining 22% patients did not receive any treatment. Bacterial isolates were found to be present in 127 (92.7%) cases and rest 10 (7.3%) was Fungal was isolates.

*Pseudomonas aeruginosa* showed highest resistance to Ceftazidime and least resistance to imipenem. *Staphylococcus aureus* showed highest resistance to Methicillin and least resistance to linezolid.

**Conclusion:** The increasing rate Ceftazidime resistance and MRSA in our study is likely due to misuse of antibiotics and decrease concerns about infections caused by antibiotic resistant bacteria.

**Keywords:** CSOM, Ear discharge, microbial profile, antimicrobial resistance.

## INTRODUCTION

Chronic Suppurative Otitis Media (CSOM) is defined as infection of the middle ear that lasts for more than three months and is accompanied by otorrhoea and tympanic membrane perforation. CSOM is a massive health problem (prevalence >4%) in developing countries like India where urgent attention is needed

(WHO-2004).<sup>[1]</sup> CSOM is a global problem and affects all ages but especially prevalent in children younger than 7 years due to horizontal, wider and short Eustachian tube. In many study males are at higher risk of CSOM than females but there are studies in which females have higher infestation.<sup>[2]</sup> The most probable risk factors included are untreated sore throat, mechanical

obstruction of Eustachian tube due to adenoid hypertrophy, low socio-economic status, younger age, poor hygiene, upper respiratory tract infection, immunocompromised, nutritional factors, environmental factors, lack of breast feeding in infancy, passive exposure to smoking and facial anomalies etc. [3] Situation is more critical in some of the rural areas because of lack of hygiene sense and bathing in stagnant water. This becomes more complicated due to self medication. [4] Chronic Suppurative Otitis Media can cause complications like facial nerve paralysis, meningitis, intracranial and extra cranial abscesses if left untreated. [5] Commonly found pathogens in CSOM are Pseudomonas aeruginosa, Staphylococcus aureus, Proteus mirabilis, Klebsiella pneumoniae, Escherichia coli, Aspergillus Niger and Candida albicans. [6] CSOM can cause significant morbidity; therefore knowledge of local pathogens can assist in selection of most appropriate treatment regimen. Identification of the aetiological organisms not only aids in the diagnosis and improves the management of patients, but also assists in advising the patients about the modes of spread, methods of prevention and anticipating the possible complications. Also, as certain aetiological agents are more common in healthcare settings, the healthcare institutions can be directed regarding appropriate hygiene and sterility practice when relevant. [7] Therefore in the present study we investigated the etiological agents (bacteria, fungi) from ear discharge of CSOM patient with emphasis on the antimicrobial resistance and the effect of demographic factors in the causation.

#### **OBJECTIVE**

To study microbial profile and their antibiotics resistance pattern of organism isolated from CSOM patients.

#### **MATERIALS AND METHODS**

**Study Type:** prospective observational study.

**Sample Size:** 150

**Study Population:** Individuals attending the Outpatient Department of Otorhinolaryngology of tertiary care Hospital Jodhpur, Rajasthan.

**Study design:** The present prospective study was undertaken at the department of Microbiology Dr. S. N. Medical College & its associated groups of hospital (Mathura das Mathur hospital) Jodhpur, Rajasthan.

**Data collection:** The following clinically significant data was collected: patients name, age, gender, residential status, registration number, site & duration of discharge, severity of discharge, antibiotics or drug taken history, and any associated risk factors.

**Inclusion criteria:** Patients are eligible for the study if they met all of the following criteria:

1. Patients diagnosed as CSOM after thorough clinical evaluation by an ENT surgeon.
2. Patients who had not received antibiotic therapy (topical or systemic) for previous 48 hours.
3. All age group patients.

**Exclusion Criteria:** The following patients excluded from the study are

1. Patients with duration of ear discharge less than 2 weeks.
2. Patients have taken treatment with topical or systemic antibiotics within 48 hours.
3. Patients who did not give their consent.

**Microbiological Methods:** All patient specimens are collected and analyzed at the microbiological laboratory of the Dr. S. N. Medical College Jodhpur. Two pus swabs were collected with sterile cotton swabs from CSOM patients attending ENT OPD. The samples collected were processed as follows

- a) Direct microscopy
- b) Culture
- c) Bio-chemical tests
- d) Antibiotics sensitivity

Isolation, identification and characterization of bacterial isolate were done by standard phenotypic microbiological procedure.

**Ethical Consideration**

Ethical committee approval was received for this study from the Institutional Review Board of Ethical committee.

**Statistical analysis:** All collected data were checked and verified thoroughly and the numerical data obtained from this study were compiled and analyzed using standard statistical method. For statistical analysis - a standard scientific calculations as well as computer software were used.

## RESULTS & OBSERVATIONS

Out of total 150 cases 137(91.34%) were culture positive and while in 13 (8.66%) no growth (sterile) was obtained. Out of these 58% were male and 42% female. The age of the participants ranged from 1 to 68 years. Mean age was 23.96 years and standard deviation was 16.30 years. The incidence was the highest (32.66%) in 11-20 years age group followed by 21- 30 yrs (21.34%). Among the 150 CSOM cases studied, 134 (89.3%) were unilateral cases while bilateral CSOM were recorded in 16 (10.7%) patients Incidence of laterality was statistically not significant ( $p = 0.867$ ). Among total 150 cases of CSOM maximum patients resides in rural area 80/150 (53.3%) and 70/150 (46.7%) belongs to urban area. Approx similar observation was seen in culture positive cases (52.5% rural & 47.5% urban). Treatment seeking

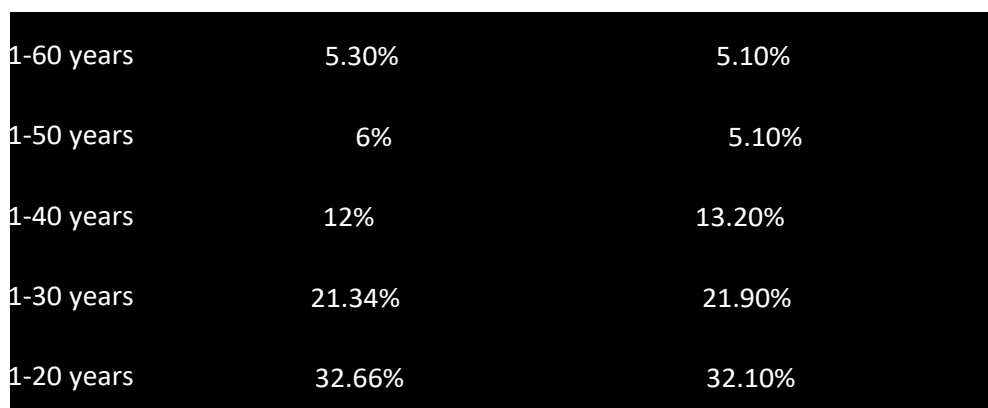
pattern was observed in our study out of 150 cases 117 (78%) patients already received antibiotic treatment while remaining 33 (22%) patients did not receive any treatment. The incidence of receiving Antibiotic for CSOM was highly significant statistically ( $p = 0.0004$ ). The culture samples of the 137 out of 150 patients were positive, 127 (84.6%) patients yielding 129 bacteria. Fungi were isolated in 10 patients (6.7%) and 13 patients (8.7%) had neither bacteria nor fungi infections.

**Table 1: Age distribution among CSOM cases**

Age in years	Total cases (n=150)	Culture positive (n=137)
0-10years	29 (19.34%)	26 (18.9%)
11-20years	49 (32.66%)	44 (32.1%)
21-30years	32 (21.34%)	30 (21.9%)
31-40years	18 (12%)	18 (13.2%)
41-50years	9 (6%)	7 (5.1%)
51-60years	8 (5.3%)	7 (5.1%)
61-70years	5 (3.3%)	5 (3.6%)

**Table 2: organisms isolated from CSOM patients**

Bacterial isolate	Number (n=129)	Percentage (%)
<b>Gram positive bacteria</b>		
Staph aureus	50	38.7
Coagulase negative staph	11	8.5
Micrococcus	2	1.5
Enterococcus	2	1.5
<b>Gram negative bacteria</b>		
Pseudomonas aeruginosa	53	41.1
Proteus vulgaris	4	3.1
Proteus mirabilis	2	1.5
Escherichia coli	3	2.3
Citrobacter spp.	2	1.5
<b>Fungal isolates</b>		
Aspergillus species	7	70%
Candida species	3	30%



**Fig . 1: Shows age wise incidence of CSOM cases**

Pseudomonas aeruginosa (41.1%) were the most prevalent microorganisms followed by Staphylococci aureus (38.7%) isolated from CSOM cases in our study.

Gram-positive isolate showed maximum resistance to Methicillin followed by ampicillin and minimum resistance to Linezolid. Staphylococcus aureus isolates was shown Methicillin resistance in 88% cases followed by resistance to ampicillin in 72% cases and Vancomycin resistance was seen in 10% of cases. Coagulase negative Staphylococci were resistance to Methicillin in 90.9% cases followed by resistant to

amox-clav in 81.8% cases and Vancomycin resistance was seen in 9% of cases. Gram-negative isolates were mainly resistance to Cefixime followed by Ceftazidime and least resistance to Imipenem. Pseudomonas aeruginosa was mainly resistance to Ceftazidime (75.4%) followed by ticarcillin (71.4%) and least resistance (6%) was seen to Imipenem.

**Table 3: Antibiotics resistance pattern of the gram positive bacterial isolated**

Antimicrobial agent	Staph aureus(n=50)		CONS (n=11)		Enterococcus (n=2)		Micrococcus (n=2)	
	NO	%	NO	%	NO	%	NO	%
Amox-clav	36	72	9	81.8	2	100	1	50
Ampicillin	37	74	8	72.7	2	100	2	100
Cefazolin	20	40	2	18.2	1	50	0	0
Clindamycin	3	6	1	9	0	0	0	0
Erythromycin	22	44	6	54.3	2	100	1	50
Linezolid	1	2	0	0	0	0	0	0
Methicillin	44	88	10	90.9	2	100	2	100
Ofloxacin	14	28	3	27.3	1	50	0	0
Tetracycline	3	6	0	0	0	0	0	0
Vancomycin	5	10	1	9	0	0	0	0

**Table 4: Antibiotics resistance pattern of the gram negative bacterial isolates from CSOM.**

Antimicrobial agent	Proteus vulgaris (n=4)		Proteus mirabilis(n=2)		Esch. coli (n=3)		Citrobacter (n=2)		Pseudomonas aeruginosa (n=53)		
	NO	%	NO	%	NO	%	NO	%	Antibiotics	No	%
Cefixime	4	100	2	100	3	100	2	100	Amikacin	9	16.9
Cefoperazone	1	25	0	0	1	33.3	0	0	Aztreonam	25	47.2
Cefotaxime	2	50	1	50	3	100	0	0	Ceftazidime	40	75.5
Ceftazidime	3	75	2	100	2	66.6	2	100	Cefta-clav	16	30.2
Cefta-clav	1	25	1	50	1	33.3	0	0	Ceftriaxone	26	49
Gentamicin	1	25	0	0	1	33.3	0	0	Ciprofloxacin	14	26.7
Imipenem	0	0	0	0	0	0	0	0	Imipenem	3	6
Levofloxacin	0	0	0	0	0	0	1	50	Piperacillin	8	15

## DISCUSSION

Chronic Suppurative Otitis Media (CSOM) is a major public-health problem, and India is one of the countries with high-prevalence where urgent attention is needed. It's a persistent disease with great risk of irreversible complications. Early microbiological diagnosis ensures prompt and effective treatment to avoid such complications. Culture analysis revealed that out of 150 patients swabs studied 137 yielded positive cultures and 13 showed no growth this was accordance with Shalini Gupta et al [8] whereas Chakravarthy et al [9] (2%) found lower percentage of culture negative samples in their studies.

In the present study male patients was predominance then female. Male and female were (58%) and (42%) respectively having ratio 1.38:1 which is accordance to

Mahesh V et al. [10] Age distribution was accordance to V Rao et al. [11] The younger children are more prone to otitis media related to their immune status, the shorter and horizontal nature of Eustachian tubes, frequent exposure to upper respiratory tract infections and malnutrition.

In the present study, unilateral infection was predominant (89.34%) of which, Right ear – 46% and left ear – 43.34% and 10.66% of the patients had bilateral CSOM, these findings correspond with the Kumar S et al. [12]

In our study geographically 53.4% patients was belongs to rural area and 46.6% patients were belongs to urban area. This is consistence with result of previous studies by Agrawal et al. [13]

Pseudomonas aeruginosa (41.1%) was the most predominant organism causing

CSOM in this region and this is in accordance to many previous studies like Raghu Kumar et al, [14] Aparna et al [15] In contrast to many other studies like Kuchal et al [16] that found Pseudomonas was the second most common organism in their study. Staphylococcus aureus (38.7%) was found to be the second most common isolate in our study it is in accordance with the Harvinder et al. [17] In our study fungus was isolated in 7.2% of the cases; this is consistence with the previous study by Biradar et al. [18]

Out of the total fungal isolated cases aspergillus species was found to be most common (70%) of cases and Candida albicans were 30% of cases. similar finding observed in study done by Prakash et al. [19] In the present study Methicillin resistance staphylococcus aureus (MRSA) was observed in 88% of isolates this was similar to Rawat et al [20] but most of studies observed lower percentage of MRSA. Cefixime was the most resistance drug against gram negative isolates observed in our study this was consistence with study done in Nigeria by Okesola et al. [21] The probable reasons for high resistance of Cefixime could be due to overuse of this drug or it is a commonly prescribe antibiotic by local doctor. Antimicrobial resistance profile of bacterial isolates varies among population because of difference in geography, local antimicrobial prescribing practices and prevalence of resistant bacterial strains.

Vancomycin resistance staphylococcus aureus (VRSA) found in 10% of cases in our study which was accordance to Rao et al. [11] In the present study P. aeruginosa showed more resistance against Ceftazidime (75.5%), similar observations was seen by Umadevi S et al. [22]

Evaluation of Microbiological pattern in local area becomes helpful in prescribing empirical antibiotics for successful treatment of otitis media and thus minimizing its complications and emergence of resistant strains.

## CONCLUSION

We concluded that incidence of CSOM was higher in younger age group which reason was well established. There was a no significant difference statistically between male and female in occurrence of CSOM. Incidence of CSOM was higher in rural as compared to urban patients because of various risk factor. Pseudomonas was the most common cause of CSOM in our study because it is established pathogen of ear and it was resistant to most of antibiotics and antiseptics used in the hospitals. The increase isolation rate of MRSA in our study is likely due to misuse of antibiotics and decrease concerns about infections caused by antibiotic resistant bacteria.

The high rate of multiple drug resistance as well as the high levels of resistance to individual antibiotics in a cause for concern

## ACKNOWLEDGEMENT

We are grateful to Professor & Head of ENT department MDM hospital for permitting us to conduct this work.

## REFERENCES

1. Singh AH, Basu R, Venkatesh A. Aerobic bacteriology of chronic suppurative otitis media in Rajahmundry, Andhra Pradesh, India. *Biology and Medicine* 2012; 4(2):73-79.
2. Akinjogunla, O.J., Eghafona, N.O. And Enabulele, I.O., 2011. Aetiologic agents of acute otitis media (AOM) prevalence, antibiotic susceptibility, B-lactamase (BL) and extended spectrum B-lactamase (ESBL) production. *J. Microbiol. Biotechnol. Fd. Sci.*, 1: 333-353.
3. Ghulam Fatima, Maria Shoaib, Mohammad Zeeshan Raza, Syed Bilal, Antimicrobial Susceptibility Pattern of Bacterial and Fungal Isolates from Patients with Chronic Suppurative Otitis Media in Perspective of Emerging Resistance, *Pakistan Journal of Otolaryngology* 2013; 29 : 49-53.
4. Maji P.K, Chatterjee T.K, Chatterjee S, Chakrabarty J, Mukhopadhyay B.B. “The investigation of bacteriology of chronic suppurative otitis media in



- patients attending a tertiary care hospital with special emphasis on seasonal variation.” *Indian J Otolaryngol Head and Neck surg.* 2007; 59:128-131s.
5. Bluestone CD, Klein JO. Chronic suppurative otitis media. *Pediatrics in Review.*1999; 20; 8:2779.
  6. Gül H, Kurnaz A, Turhan V, Oncül O, Pahsa A. Microorganism isolated from middle ear cultures and their antibacterial susceptibility in patients with chronic suppurative otitis media]. *Journal of ear, nose, and throat.* 2006; 16; 4:164.
  7. RP Dayasena, MBKC Dayasiri, C Jayasuriya, and DSC Perera, Aetiological agents in chronic suppurative otitis media in Sri Lanka, *Australasian medical journal*,2011; 4(2):101–104 published online Feb 28, 2011 doi: 10.4066 / AMJ.2011.549.
  8. Rakesh Kumar, RK Agarwal And Shalini Gupta. A Microbiological Study Of Chronic Suppurative Otitis Media, *International Journal Of Recent Scientific Research* Vol. 6, Issue, 7, Pp.5487-5490, July, 2015.
  9. Dr. G V S S D. Deepak Chakravarthy, Dr. G. Prabhakar. A Bacteriological Study of Ear Discharge, *JMSCR* Volume 2, Issue 4. P:715-721. April 20 14.
  10. Mahesh V. Kattimani, Shweta Anand. “Aerobic Bacteriology of Chronic Suppurative Otitis Media: Our Experience”. *Journal of Evolution of Medical and Dental Sciences* 2015; Vol. 4, Issue 67, August 20; Page: 11686-11694, DOI: 10.14260/jemds/2015/1685
  11. V.Rama Chandra Rao, K. Srilatha, S. Visweswara Rao, K. N. Manohar. “Microbiological Study of Ear Discharge and their Antibiotic Sensitivity Pattern in Chronic Suppurative Otitis Media”. *Journal of Evolution of Medical and Dental Sciences* 2014; Vol. 3, Issue 49, October 02; Page: 1169811705, DOI: 10.14260/jemds /2014/3537.
  12. Kumar S, Sharma R, Sexena A, Panday A, Gautam P, Taneja V, Bacterial flora of infected unsafe CSOM, *Indian J Otol* 2012[cited 2015 Sep 23] :18:208-11.
  13. Agrawal A, Dharmendra K, Ankur G, Sapna G, Namrata S, Gaurav K. Microbiological profile and their antimicrobial sensitivity pattern in patients of otitis media with ear discharge. *Indian J Otol* 2013;19:1.
  14. KG Raghu Kumar, S Navya, KG Basavarajappa, A Study of Bacterial Profile and Antibiotic Susceptibility Pattern of Chronic Suppurative Otitis Media among Patients attending a Tertiary Care Centre, Davangere, *Sch.J.App. Med. Sci.*, 2014; 2(5B):1606-1612.
  15. Dr Aparna Chavan ,Dr Rajhans Nagarkar, Dr GN Chavan , Dr PT Deshmukh, A study of microbiological spectrum with its antibiotic susceptibility in patients of chronic suppurative otitis media at RIMS, Adilabad (AP), *International J. of Healthcare and Biomedical Research*, Volume: 03, Issue: 01, October 2014, Pages 152-157.
  16. Kuchhal V. Antibiotic sensitivity pattern in chronic suppurative otitis media in kumoun region. *Indian J Otol* 2010;16:17-21.
  17. Harvinder Kumar, Sonia Seth, Bacterial and Fungal Study of 100 Cases of Chronic Suppurative Otitis Media, *journal of clinical and diagnostic research*, year 2011.
  18. Sunilkumar Biradar and C. Roopa. Study of Microbiological Profile and their Antibigram in Patients with Chronic Suppurative Otitis Media, *International Journal of Current Microbiology and Applied Sciences* ISSN: 2319-7706 Volume 4 Number 9 (2015) pp. 981-985.
  19. Rajat Prakash, Deepak Juyal, Vikrant Negi et. al. Microbiology of Chronic Suppurative Otitis Media in a Tertiary Care Setup of Uttarakhand State, India, *N Am J Med Sci.* Apr 2013; 5(4): 282–287. doi: 10.4103/1947-2714.110436.
  20. Ashutosh Rawat, Roma Goyal. A Study of Bacterial Profile and Antibiotic Susceptibility Pattern of Chronic Suppurative Otitis Media (CSOM) *Int. J. Curr. Microbiol. App.Sci* (2015) 4(8): 23-27.
  21. A.O. Okesola & O.A. Fasina Trends In The Resistance Pattern Of Bacterial

Pathogens Of Otitis Media In Ibadan, Nigeria. African Journal Of Clinical And Experimental Microbiology January 2012 Isbn 1595-689x Vol 13(1) Ajcem/201176/21202.

22. Umadevi S, Joseph NM, Kumari K, Easow JM, Kumar S, Stephen,

Srirangaraj et al. Detection of extended spectrum beta lactamases, AmpC beta lactamases and metallo beta lactamases in clinical isolates of ceftazidime resistant *Pseudomonas aeruginosa*. Braz J Microbiol. 2011;42:1284-1288.

How to cite this article: Agrawal R, Khatri PK, Parihar RS et al. Microbial assessment of chronic suppurative otitis media in a tertiary care center of Rajasthan. Int J Health Sci Res. 2017; 7(2):120-126.

\*\*\*\*\*