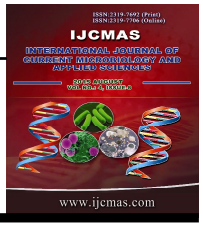
Int.J.Curr.Microbiol.App.Sci (2015) 4(8): 23-27

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 4 Number 8 (2015) pp. 23-27**
http://www.ijcmas.com



Original Research Article

A Study of Bacterial Profile and Antibiotic Susceptibility Pattern of Chronic Suppurative Otitis Media (CSOM)

Ashutosh Rawat[1] and Roma Goyal[2*]

Department of Microbiology, Rama Medical College, Hapur, India
**Corresponding author*

Keywords

Chronic suppurative otitis media (CSOM), Antibiotic susceptibility, Bacterial isolates, Ear discharge

A B S T R A C T

Chronic suppurative otitis media (CSOM) is one of the commonest illnesses in ENT practice. This study was conducted to find out the various aerobic microorganisms associated with CSOM and their current antimicrobial susceptibility pattern to commonly used antibiotics. Samples were collected from 133 clinically diagnosed cases of CSOM and processed using standard microbiological techniques. Out of 133 clinically diagnosed CSOM patients 113 showed positive bacterial culture. *Pseudomonas species* (36.09%) was the most predominant bacteria isolated followed by *Staphylococcus aureus* (19.54%), *Escherichia coli* (9.77%), *Klebsiella* species (8.27%), *Proteus* species (6.76%) and *Citrobacter* species (3.0%). The knowledge of bacterial spectrum and there changing susceptibility trends contribute significantly to successful use of antibiotics rationally.

Introduction

Chronic Suppurative Otitis Media (CSOM) is a persistent disease of middle ear, which is capable of causing severe destruction leading to complications of perforation, discharge and deafness (Altuntas *et al.*, 1996). It is well known for its recurrence and persistent infection. Disease is more common in children.

CSOM is mostly caused by bacteria, but fungi and virus can also be a cause of CSOM. The aerobic microorganisms most frequently isolated in CSOM are *Pseudomonas aeruginosa, Staphylococcus aureus,* Gram-negative organisms such as *Proteus spp., Klebsiella spp.*, and *Escherichia spp.*, Citrobacter species, *Haemophilus influenzae*, and *Moraxella catarrhalis* (Gül *et al.*, 2006; Verhoeff *et al.*, 2006; de Miguel Martínez *et al.*, 2005). The most frequently isolated anaerobic organisms are *Bacteroides spp.* and *Fusobacterium spp* (de Miguel Martínez *et al.*, 2005; Saini *et al.*, 2005)

Infection of the middle ear mucosa subsequently results in ear discharge. Untreated cases of CSOM can result in a broad range of complications. It can cause severe adverse effects like intra and extracranial complications which can be life

threatening. The incidence of CSOM is increasing in the developing countries because of the poor hygienic practices and lack of health education. These may be related to the spread of bacteria to structures adjacent to the ear or to local damage in the middle ear itself. Such complications range from persistent otorrhoea, mastoiditis, labyrinthitis, facial nerve paralysis to more serious intracranial abscesses or thromboses (Healy and Rosbe, 2003; Loy *et al.,* 2002; Sweeney *et al.,* 1982).

Typically, the disease follows viral infection of the upper respiratory tract, but it soon sets the conditions for the middle ear to be invaded by pyogenic organisms (Collee *et al.,* 1996). The goals of management are to achieve a safe, dry ear, eradicate disease and improve hearing.

So, Knowledge of the common causative organisms and their antibiotic sensitivity is helpful in deciding the drug of choice in perioperative management of unsafe CSOM. The goals of management are to achieve a safe, dry ear, eradicate disease and improve hearing.

The objective of this study was to determine the microbial profile and the antibiograms of active CSOM patients attending ENT OPD of Rama Medical College, Hapur, Uttar Pradesh. CSOM is very common in our set up and is seen mostly in populations from areas of low socio economic status (with an urban: rural ration of 1:2).

Materials and Methods

This study was carried in Rama Medical College, Hapur over a period of twelve months from March 2014 to March 2015. A total of 133 clinically diagnosed patients of CSOM who were not on antibiotics were selected. Ear discharge was collected following strict aseptic precautions with help of two sterile cotton swabs. Samples were transported & processed immediately in the microbiology laboratory.

The first swab was used for direct Gram stain and the second swab was cultured in nutrient agar, blood agar and MacConkey agar plates and incubated at 37°C for 24 – 48 hrs. The isolates grown were identified conventionally by their cultural characteristics, morphology and biochemical reactions. Antibiotic susceptibility testing of the organisms diagnosed was done by Kirby Bauer method in Muller Hinton agar. The plates were read after overnight incubation at 37°C by measuring the zone of inhibition around the antibiotic discs as per CLSI (Clinical Laboratory Standards Institute) guidelines (CLSI, 2014).

Results and Discussion

The study shows, out of 133 ear swabs processed 113 (84.96%) samples showed pure culture, 3 (2.25%) samples showed mixed culture. No growth was observed in 20 (15.03%) samples. The mean age of patients with bacterial growth was 16.14 and peak incidence of growth was observed in the age group between 11 years to 30 years (Table 1). Sex distribution of the patient were 82/133 males and 51/133 females.

A total of 116 bacterial isolates were identified out of which 31/116 (26.72%) were Gram positive and 85/116 (73.27%) were Gram negative bacteria. Bacteria isolated from pure culture were *Pseudomonas* species 48 (36.09%), followed by *Staphylococcus aureus* 26 (19.54), *Escherichia coli* 13 (9.77%), *Klebsiella* species 11 (8.27%), *Proteus* species 9 (6.76%), Coagulase Negative *Staphylococcus* (CONS) 5(3.75%) and *Citrobacter* species 4(3.0%) (Table 2). Mixed culture were isolated in 3 (2.25%) of 133 ear samples. The combination includes

Pseudomonas species with *Staphylococcus aureus* in 2/3 and *Pseudomonas* species with *Escherichia coli* in 1/3 samples.

The antibiotic sensitivity was carried out for 116 pure isolates. Among *Staphylococcus aureus* 21/24 was Methicillin Resistant *Staphylococcus aureus* (MRSA) and 11 were also D-Test positive. Among Coagulase Negative *Staphylococcus* (1/4) was Methicillin Resistant (MRCons). These organisms were highly sensitive to Amikacin, Chloramphanicol and Piperacillin.

Pseudomonas species was 100% sensitive to Imepenem. They showed 91% susceptibility to Amikacin, 88% susceptibility to Gentamicin, 60–68% to Cephalosporin and 60–63% to Floroquinilones.

Escherichia coli, *Klebsiella* species and other members of Enterobacteriaceae were 100% susceptible to imepenem and 72-80% susceptible to Amikacin, Gentamicin and 65–72% susceptible to Cephalosporin. So, Amikacin was most effective antibiotic in the present study.

Chronic Suppurative Otitis Media (C.S.O.M.) and its complications is among the most common conditions seen by the Otologist, Paediatrician arid the General Practitioner. It is a persistent disease with great risk of irreversible complications. Early bacteriological diagnoses of all cases will assume accurate and appropriate effective therapy.

Out of 133 cases studied, pure growth was obtained from 113, mixed growth from 03 cases and no growth in 20 cases and this is in agreement with many previous investigators (Singh and Bhaskar, 1972; Tulsidas *et al.*, 1954).
The result of this study showed that Pseudomonas species was the most common aerobic isolates in CSOM followed by Staphylococcus aureus which is the similar finding reported in different parts of the world (Gül *et al.*, 2006; Verhoeff *et al.*, 2006; de Miguel Martínez *et al.*, 2005). However, others reported that Staphylococcus aureus was the commonest isolated microorganism in CSOM patients (Mozafari Nia *et al.*, 2011).

Coliforms including Klebsiella species and E.coli were isolated from 6.67% and 2.22% cases respectively. Rao *et al.* (2011), Shymala *et al.* (2012) and Poorey *et al.* (2013) reported fairly common occurrence of coliforms in CSOM. More frequent isolation of fecal bacteria like *E. coli*, *Klebsiella* species and water bacteria like *Pseudomonas* species indicates that individuals are at high risk of infection due to poor hygiene conditions (Poorey *et al.*, 2013).

CONS were isolated from 3.33% ears. This organism was also isolated frequently from CSOM cases by several investigators (14). Although CONS are generally considered as non-pathogenic, their association in CSOM cases can be attributed to the extreme lowering of resistance in middle ear due to invasion by other organisms.

All the pathogenic strains isolated in the present series were tested against various antibiotics. Amikacin was found to be the most effective drug followed by ciprofloxacin, cefoperazone, gentamicin, cefotaxime and amoxicillin. These findings are in accordance with other authors (Gulati, 1997; Mishra Anupam et al.). When the results of various workers were compared, one fact became obvious that the bacteriology and antibiotic sensitivity pattern of C.S.O.M. has been changing from time to time. The strains of yesterday which were sensitive to Streptomycin, Tetracycline

and Chloramphenicol no longer exhibit the old sensitivity pattern today. These drugs have been replaced by Aminoglycosides, Quinolones and Cephalosporines.

In summary, the results of this study showed high prevalence and resistance rate of *Staphylococci* and *Pseudomonas* isolates from CSOM patients to ß- lactam and other commonly used antimicrobials. Our study suggests that Amikacin, Cefoperazone, and Piperacillin are best choices in these cases associated with complications, where the situation demands the use of a systemic antibiotic. One important fact to be kept in mind is that the antibiotic susceptibility pattern of the CSOM causing organisms keep changing.

Therefore, an appropriate knowledge of antibacterial susceptibility of microorganisms may contribute to rational antibiotic use and the success of treatment for chronic supportive otitis media.

Table.1 Age wise distribution of culture pattern in CSOM patients attending Tertiary Health Care Centre

Age(Years)	Pure Growth	Mixed Growth	No Growth	Total
0-10	18	0	4	22
11-20	25	0	7	32
21-30	24	2	5	31
31-40	19	0	2	21
41-50	7	1	2	10
51-60	14	0	0	14
61-70	6	0	0	6
Total	113(84.96%)`	3(2.25%)	20(15.03%)	136

Table.2 The bacteriological findings obtained from 133 CSOM patients

Species	No. of isolates	% of isolates
No growth	20	15.03
Pseudomonas *species*	48	36.09
Staphylococcus *aureus*	26	19.54
Escherichia *coli*	13	9.77
Klebsiella *species*	11	8.27
Proteus *species*	09	6.76
Coagulase (-) Staphylococcus	5	3.75
Citrobacter *species*	4	3.0
Mixed infection	3	2.25

References

Altuntas, A., Aslam, A., Eren, A. 1996. Susceptibility of microorganisms isolated from CSOM to Ciprofloxacin. *Eur. Arch. Otorhino Laryngol.*, Pp. 364–6.

CLSI, 2014. Performance standards for antimicrobial susceptibility testing; twenty-fourth informational supplement. CLSI document M100-

S24. Clinical and Laboratory Standards Institute, Wayne, PA.

Collee, J.G., Duguid, J.P., Fraser, A.G., Marmion, B.P., Simmons, A. 1996. Laboratory strategy in the diagnosis of infective syndromes. Mackie and McCartney practical medical microbiology, 14th edn. Churchill Livingstone, Singapore. Pp. 53–94.

de Miguel Martínez, I., Del Rosario Quintana, C., Bolaños Rivero, M., Ramos Macías, A. 2005. Etiology and therapeutic considerations in chronic otitis media. Analysis of a 5 year period. *Acta Otorrinolaringol. Esp.*, 56: 459–62.

Gül, H.C., 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.

Gulati, S.K. 1997. Investigative profile in patients of chronic suppurative otitis media. *Indian Jr. of Otol.*, 3(2).

Healy, G.B., Rosbe, K.W. 2003. Otitis media and middle ear effusion. In: Snow, Ballenger, J.J. (Eds), Vol. 16. Ballenger's otorhinolaryngology head neck surgery, BC Decker Inc. Pp. 249–260.

Loy, A.H.C., Tan, A.L., Lu, P.K.S. 2002. Microbiology of chronic suppurative otitis media in Singapore, *Singapore Med. J.*, 43(6): 296–299.

Mishra Anupam, Shukla Girish, Nag Devika Mishra Subhash Chandra. Bacteriological study of chronic suppurative otitis media. Vol. 5, No. 2 (June 99), Pp. 87–91.

Mozafari Nia, K., Sepehri, G., Khatmi, H., Shakibaie, M.R. 2011. Isolation and antimicrobial susceptibility of bacteria from chronic suppurative otitis media patients in Kerman, Iran. *Iran. Red Crescent Med. J.*, 13(12): 891–894.

Poorey, V.K., Iyer, A. 2002. Study of bacterial flora in CSOM and its clinical significance. *Indian J. Otolaryngol. Head Neck Surg.*, 54(2): 91–95.

Rao, M.V.R., Jayakar, P.A. 1980. Bacteriological study of chronic suppurative otitis media. *J. Indian M. A.*, 75(2): 30–34.

Saini, S., Gupta, N., Aparna, Seema, Sachdeva, O.P. 2005. Bacteriological study of paediatric and adult chronic suppurative otitis media. *Indian J. Pathol. Microbiol.*, 48: 413–6.

Shyamala, R., Reddy, P.S. 2012. The study of bacteriological agents of chronic suppurative otitis media-aerobic culture and evaluation. *J. Microbiol. Biotech. Res.*, 2(1): 152–162.

Singh, N., Bhaskar, R. 1972. Microbiological study of otitis media. *Ind. J. Otolaryngol.*, 24: 4, 161.

Sweeney, G., Piccozi, G.L., Browning, G.G. 1982. A quantitative study of aerobic and anaerobic bacteria in chronic suppurative otitis media. *J. Infect.*, 5: 47.

Tulsidas, Singh, M., Taneja, G.M., Khanna, S.D., Chaddah, M.R. 1954. Chronic suppurative otitis media. *Arch. Otol.*, 60: 158.

Verhoeff, M., van der Veen, E.L., Rovers, M.M., Sanders, E.A., Schilder, A.G. 2006. Chronic suppurative otitis media: a review. *Int. J. Pediatr. Otorhinolaryngol.*, 70: 1–12.