BACTERIAL PROFILE AND THEIR ANTIBIOGRAM IN CASES OF CHRONIC SUPPURATIVE OTITIS MEDIASamiullah¹, Mohd Rashid²¹Associate Professor, Department of ENT, Era's Lucknow Medical College and Hospital, Sarfarazganj, Lucknow, Uttar Pradesh.²Associate Professor, Department of Microbiology, F. H. Medical College, Near Etmadpur, Firozabad, Uttar Pradesh.

ABSTRACT: BACKGROUND: In Chronic Suppurative Otitis Media (CSOM), the spread of micro-organisms to adjacent structures can result in a broad range of intracranial and extracranial complications.

OBJECTIVES: The aim of our study was to determine the microbial profile and their anti-biogram pattern and to prepare a protocol for empirical antibiotic therapy based on the local pattern of microbial isolates.

SETTINGS AND DESIGN: This prospective study was conducted in the E.N.T. outpatient Department of Era's Lucknow Medical College.

MATERIALS AND METHODS: Middle ear discharges were collected and cultured from 80 CSOM diagnosed patients attending the ENT clinic. The organisms isolated were identified by standard microbiological methods and antibiogram pattern was determined.

RESULTS: The most commonly affected sex is female with 55% cases in comparison to males where only 45% cases were found to be positive for CSOM. CSOM mostly affected the individuals in the age group of 21-30 years. Most widespread organism isolated was *Pseudomonas* spp. [25 (31.25%)] followed by *Staphylococcus aureus* [16 (20%)] and Coagulase negative staphylococcus [9 (11.25%)]. Gram negative bacteria showed >80% sensitivity to Ceftazidime, Ciprofloxacin, Lomefloxacin, Gentamicin and Netilline whereas gram positive bacteria shows >90% sensitivity to Cephalixin, Linezolid and Gentamycin.

CONCLUSION: The knowledge of the local pattern of infection is essential for starting empirical treatment and reducing the potential risks of complications. Periodic monitoring of the microbiological profile along with their sensitivity pattern is essential for formulating an effective antibiotic policy for CSOM.

KEYWORDS: Antibiogram, Antibiotic Resistance, Bacterial Isolates, Chronic Suppurative Otitis Media, Culture and Sensitivity.

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INTRODUCTION: Ear is responsible for hearing and maintaining balance and it's the first sensory organ to develop. It is divided into the inner, middle and outer ear with the middle and outer regions being most susceptible to injury and infections.^[1] Ear infections are of different types with otitis media being the most common.^[2] Chronic suppurative otitis media (CSOM) is defined as chronic inflammation of middle ear and mastoid cavity that may present with recurrent ear discharges through a tympanic membrane perforation.^[3]

Due to the perforated tympanic membrane, microorganisms can gain entry into the middle ear via the external ear canal. Infection of the middle ear mucosa subsequently results in ear discharge. Incidence of this disease is higher in developing countries especially among low socio-economic society because of malnutrition, overcrowding, poor hygiene condition, inadequate health care and recurrent upper respiratory tract infection.^[4]

The urban to rural ratio of the disease is 1:2 and the poorer rural communities have its highest prevalence.^[5]

Also, it is one of the most common causes of deafness and can also cause permanent perforation of the tympanic membrane.^[6]

The disease usually occurs after upper respiratory viral infections followed by invasion of pyogenic organisms.^[7] 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. CSOM 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.

The complications of CSOM have been reduced to a greater extent because of the invention of antibiotics. But irrational use of antibiotics has lead to the emergence of resistant organisms to the commonly used drugs.

Hence this study is carried out to know the bacterial etiology of CSOM and their antibiotic susceptibility pattern. This knowledge is very important for the clinicians for appropriate management of the cases and to prevent or minimise the occurrence of complications. Treatment of the cases after studying the antimicrobial susceptibility pattern will help in preventing the emergence of resistant strains in the community.

MATERIALS AND METHODS: 80 clinically diagnosed cases of CSOM from E.N.T. outpatient department of Era's Lucknow Medical College were taken for the study. The ear discharge from the middle ear was collected by sterile swabs under aseptic conditions and sent to the department of Microbiology for bacterial culture.

Samples were collected from those patients who had not taken any treatment either locally or systemic for the last 7 days. The sample was examined microscopically for the presence of pus cells, and bacteria. For culture sample was plated on 5% sheep blood agar and MacConkey agar.

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The organisms were identified by morphology, cultural characteristics and pigment production followed by conventional biochemical tests. The antibiotic susceptibility testing of the bacterial isolates was done by Kirby-Bauer's disc diffusion method on Mueller Hinton agar according to CLSI guidelines.^[8]

RESULT: CSOM has received more attention because of its higher incidence and also due to increasing bacterial resistance to both topical and systemic antibiotics. The study was carried out in a total of 80 patients comprising 36 males and 44 females (Figure 1, Table 1).

In our study group maximum numbers of cases were from the female group 44 cases (55%) and males were 36(45%).

In this study, maximum number of cases i.e. 22(27.5%), were from the age group 21 to 30 years (Table 2, Figure 2). Out of total 80 specimens, 11 showed no growth of organism while 69 specimens showed growth of one or two organisms. Out of 69 specimens, 58 showed single isolate and 11 showed two isolates.

The occurrence of gram negative organisms (GNB) was higher than gram positive (GPB) with GNB 51/80 (63.75%), GPB 29/80 (36.25%). In our study, out of 80 bacterial isolates, *Pseudomonas* spp., *Proteus* spp., *Citrobacter* spp., *Klebsiella* spp., *Acinetobacter* spp., *Enterobacter* spp. and *E. coli* were the most common GNB isolated whereas GPB *Staphylococcus aureus*, *CONS* and *Streptococcus* spp. were the most common (Table 3).

GNB showed >80% sensitivity to Ceftazidime, Ciprofloxacin, Lomefloxacin, Gentamicin and Netilline. >75% sensitivity to Pefloxacin, Ofloxacin, Cefaperazone and Amikacin. They are resistance to Amoxycylav, Cefotaxime and Cefuroxime (Table 4).

GPB shows >90% sensitivity to Cephalexin, Linezolid and Gentamicin. >80% sensitivity Cloxacillin, Cefotaxime, Lincomycin, Co-trimoxazole, Tetracycline and Amoxycylav (Table 5).

DISCUSSION: An ear infection (Otitis Media) refers to an infection of the middle part of the ear. It can occur at any age but it is common in babies and young children, especially those aged between 6 to 18 months. Most children will have an ear infection before the age of 5 years.^[1] CSOM is the chronic inflammation of middle ear, which affects the tympanic membrane, middle ear mucosa and other middle ear structures.^[9]

In our study, maximum numbers of cases i.e. 44 cases (55%) were female and 36(45%) were males. Whereas maximum number of infection i.e. 22 cases (27.5%) were from the age group 21 to 30 years. The ear infection rate in this study is similar to that of Raakhee T et al. 2014, which shows majority of the patients who had ear discharge was between 16-25 years.

This was followed by the age group between 6-15 years.^[10] Studies carried out by Raakhee T et al. 2014 showed that females were most commonly affected than males which are consistent with our results.^[10] Whereas our result contradicts the result obtained by Humera Rashid et al. where 54% male and 46% females and R Shyamala et al. where 57% males and 43% females were mostly affected by CSOM.^[11,12]

The bacteriologic study of otitis media revealed the isolation of a variety of organisms. *Pseudomonas* spp. is the most prominent organism being isolated in 25(31.25%) of the cases followed *Staphylococcus aureus* in 16 (20%) cases, *CONS* in 9(11.25%) cases, *Proteus* spp. in 7 cases (8.75%) and *Klebsiella* spp. in 5 cases (6.25%). Iqbal et al. examined 200 ear swabs the bacterial isolates were *P. aeruginosa* 41.5% *Staphylococcus* spp. 19%, *Proteus mirabilis* 18%, and *Klebsiella pneumonia* 10.5%, *E. coli* 4% and Beta-hemolytic *Streptococcus* 5%.^[13] In another study, Gul et al. found that the frequency of *P. aeruginosa* in CSOM was 52.2%, *S. aureus* 15%, *Proteus* spp. 6.5% and *Klebsiella* spp. 2.6%.^[14]

These results correspond to the frequency of bacterial isolates obtained in our study as well. *Pseudomonas* spp. in our study showed high sensitivity to Ofloxacin (95.44%), Pefloxacin (94.8%), Gentamicin (94.8%), Ciprofloxacin (93.2%), Cefaperazone (90.3%) and Amikacin (89.74%). Antibigram in this study showed >90% sensitivity to Ceftazidime, Ciprofloxacin, Lomefloxacin, Gentamicin and Netilline for GNB whereas >90% sensitivity to Linezolid, Gentamicin and Tetracycline for GPB, this corresponds to the results obtained by Rakhee and Srinivasa however different workers showed different sensitivity patterns.^[10,12]

CONCLUSION: A large variation can be seen in the organisms infecting and their susceptibility pattern in ear infection. In our study *Pseudomonas*, *Proteus*, *Klebsiella*, *Acinetobacter*, *Staphylococcus aureus* and *CONS* were the most important organisms associated with ear infection. For GNB, Ceftazidime, Ciprofloxacin, Lomefloxacin, Gentamicin and Netilline and for GPB, Cephalexin, Linezolid, Gentamicin, Amoxycylav and Tetracycline appear to be the first line antibiotic to treat CSOM. The patients should also be advised to complete the drug course without stopping in between. This will not only help in minimizing the complications, but also help in preventing the emergence of resistant strains. Microbial predominance and their antibiotic sensitivity pattern change over time due to the climate, antibiotic usage and geographic factors. So periodical monitoring of microbiological profile of CSOM cases is essential for making effective empirical protocol for the cases in the particular locality.

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Figure. 1: Sex wise distribution of clinically diagnosed cases of CSOM

Figure. 2: Age wise distribution of CSOM affected males and females

Sex	Number	%
Male	36	45%
Female	44	55%

Table 1: Sex distribution of cases

Age Group	Male	Female	Total (n=80)	%
Children <1 Year	2	4	6	7.5
11 Years to 20 Years	6	8	14	17.5
21 Years to 30 Years	10	12	22	27.5
31 Years to 40 Years	7	8	15	18.75
41 Years to 50 Years	4	6	10	12.5
51 Years to 60 Years	5	3	8	10
>61 Years	2	3	5	6.25

Table 2: Age wise distribution of Cases

n = no of isolates,

Sl. No.	Organisms		Isolates (n=80)	%
1	Gram Negative Bacteria (n=51) 63.75%	Pseudomonas spp.	25	31.25
		E.coli	2	2.5
		Klebsiella spp.	5	6.25
		Proteus spp.	7	8.75
		Enterobacter spp.	3	3.75
		Citrobacter spp.	5	6.25
		Acinetobacter spp.	4	5.00
2	Gram Positive Bacteria (n=29) 36.25%	Staphylococcus aureus	16	20.00
		Streptococcus spp.	4	5.00
		Coagulase negative staphylococcus	9	11.25

Table 3: Aerobic bacteria isolated from ear infection

n = no of isolates,

Sl. No.	Antibiotics	Antibiotics Symbol	Pseudomonas spp.(n=25) %	Proteus spp. (n=7) %	Klebsiella spp. (n=5) %	Acinetobacter spp. (n=4) %	Enterobacter spp. (n=3) %
1	Pefloxacin	PF	94.8	75	100	77	100
2	Ofloxacin	OF	95.44	100	100	75	100
3	Ciprofloxacin	RC	93.2	100	100	100	100
4	Lomefloxacin	LO	88.1	100	100	100	66.7
5	Cefaperazone	CS	90.3	87.5	100	100	100
6	Amikacin	AK	89.74	87.5	100	100	100
7	Gentamicin	G	94.8	100	100	100	66.6
8	Netilline	NT	80	100	100	100	100
9	Cefuroxime	CU	R	87.5	58	R	66.67
10	Cefotaxime	CE	R	87.5	76	65	66.6
11	Ceftazidime	CA	100	100	100	82	100
12	Amoxyclav	AMC	R	R	R	R	R

Table 4: Antibigram of Gram-negative isolates

n = no of isolates,

Sl. No.	Antibiotics	Antibiotics Symbol	Staphylococcus aureus (n=16) %	CONS (n=9) %
1	Cloxacillin	CX	82.2	88.8
2	Ampicillin+Sulbactam	AS	76	73.4
3	Cefotaxime	CE	76	82.7
4	Roxythromycin	AT	76	58.1
5	Cefotaxime	CF	82.2	87.7
6	Ciprofloxacin	RC	54.2	87.7
7	Tetracycline	TE	85.5	100
8	Linezolid	LZ	94.7	100
9	Cephalexin	PR	92.7	100
10	Co-trimoxazole	BA	86.5	82.7
11	Gentamicin	G	91.7	100
12	Lincomycin	LM	91.7	82.7
13	Amoxyclav	AMC	85.2	100

Table 5: Antibigram of gram-positive isolates

n = no of isolates,