



MICROBIOLOGICAL PROFILE OF CHRONIC SUPPURATIVE OTITIS MEDIA AND THEIR ANTIBIOTIC SENSITIVITY PATTERN IN A TERTIARY CARE HOSPITAL OF NORTHERN KERALA, INDIA.

Microbiology

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ABSTRACT

Aims: To identify the bacteriological and mycological aetiology of CSOM and to detect the antibiotic sensitivity pattern of the bacterial isolates.

Materials and Method: A total of 100 patients attending the Ear Nose & Throat (ENT) department, with complaints of ear discharge were included in the study. Two swabs were collected. First swab was used for gram staining and the second for culture and sensitivity.

Results: Culture reports showed 91% growth, of which *Pseudomonas aeruginosa* and *Klebsiella* sp were the most predominant species (35.23%). Fungal growth obtained had *Candida non-albicans* as the predominant species followed by *Aspergillus*. *Pseudomonas aeruginosa* showed high sensitivity to Piperacillin-tazobactam (100%) and Tobramycin (100%) and was least sensitive to Cefazidime (54%).

Conclusion: This study will help the clinicians in the ENT department to choose the appropriate treatment and formulate a protocol for empirical therapy.

KEYWORDS

CSOM, bacteria, fungi, antibiotic sensitivity.

INTRODUCTION

According to WHO, Chronic Suppurative Otitis Media (CSOM) is defined as chronic inflammation of the middle ear cleft with recurrent discharge through tympanic membrane perforation over a period of at least 3 months. The disease can be classified into two types:

1) Mucosal or tubotympanic type which occurs due to the sequel of acute otitis media or an ascending infection from nasopharynx through the Eustachian tube.

2) Squamous or atticointral type which is an active squamous disease in which squamous epithelium present in middle ear cleft erodes the bone.[1]

The incidence of CSOM is higher in developing countries where the living standards like health and sanitation facilities are low. According to WHO, in developing countries each year 51,000 children aged below five years die from complications of otitis media.[2]

The basic aim of this cross sectional prospective study was to evaluate the bacteriological and mycological causes of CSOM and their antibiotic sensitivity pattern to commonly used antibiotics at a tertiary care hospital in Northern Kerala. It will help in providing a guideline for making a protocol for empirical antibiotic therapy.

MATERIALS AND METHODS

Study Outline: The present study was a descriptive, cross-sectional study, conducted for a period of 2 months between May to June 2016 at a tertiary care hospital in Northern Kerala, India. A total of 100 patients attending the outpatient department of ENT, with complaints of ear discharge for more than 3 months were included in the study after obtaining written informed consent.

INCLUSION CRITERIA:

Patients of any age, gender & with an active purulent ear discharge of more than 3 months duration were included.

EXCLUSION CRITERIA:

1. Patients with ear discharge with an intact tympanic membrane.
2. Patients receiving antibiotics at the time of presentation or history of topical and systemic antibiotics in the last 7 days

SAMPLE COLLECTION:

The ear discharge was collected with two swabs under aseptic precautions, labelled and taken to the Microbiology laboratory immediately for processing.

Isolation of Pathogens:

Ist swab- Direct smear examination by gram stain.

IInd swab- Inoculated onto Blood agar, MacConkey agar and Chocolate agar for isolation of aerobic bacteria & onto Sabouraud Dextrose Agar with chloramphenicol for isolation of fungal pathogens. Antibiogram for bacterial isolates: The antibiotic susceptibility testing was done by standard Kirby Bauer disc diffusion method. Results were interpreted according to Clinical and Laboratory Standards Institute (CLSI) 2014 guidelines. [3]

RESULTS:

Out of the 100 patients, females outnumbered the males having 54 cases of females and 46 cases of males (Figure 1). There were 99 cases of Tubotympanic type and 1 case of atticointral type (Figure 2).

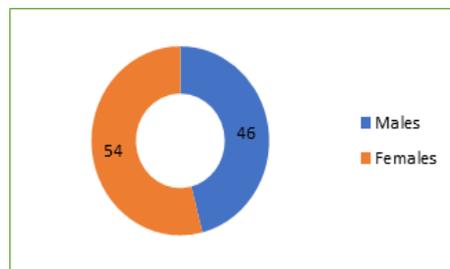


Figure 1: Gender distribution

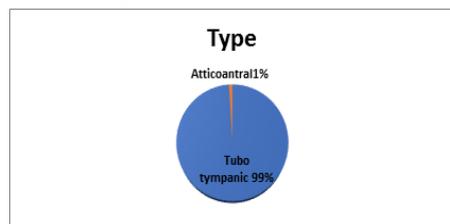


Figure 2 :Type Of CSOM

Out of the 100 patients, 91 showed growth giving an isolation rate of 91%. Among the 91 specimens, bacterial growth was obtained in 82 patients of which a majority of 62 patients had monobacterial growth and 20 patients had polybacterial. Of the 9 patients left, that showed growth, 6 patients were positive for Fungi and 3 patients had a mixed growth containing a bacterium as well as a fungi (Table 1). Age wise analysis showed that CSOM was more common in the age group 30-39 yrs (Table 2).

Table 1: Bacterial and Fungal Culture Positive Results

Specimen	Number	Percentage
Bacteria	82	90.1%
-Monobacterial	62	75.60%
-Polybacterial	20	24.39%
Fungi	6	6.5%
Bacterium + Fungi	3	3.2%
TOTAL	91	

Table 2: Age wise distribution of patients

AGE (YEARS)	MALE	FEMALE	TOTAL
<10	2	2	4
10-19	6	5	11
20-29	8	9	17
30-39	11	16	27
40-49	6	9	15
50-59	4	9	13
>60	8	5	13
TOTAL	45	55	100

Out of 82 bacterial isolates, *Pseudomonas aeruginosa* and *Klebsiella* sp were the most predominant species among gram negative bacteria. *Staphylococcus aureus* was the predominant species among gram positive bacteria (Table 3). There were 20 specimens containing mixed bacteria. They have been depicted in Table 4. Fungal growth obtained had *Candida non-albicans* as the predominant species followed by *Aspergillus* sp (Figure 3).

Table 3: Bacterial isolates

Species	Number	Percentage
GRAM POSITIVE BACTERIA		
<i>Staphylococcus aureus</i>	6	5.71%
<i>Coagulase negative staphylococcus</i>	2	1.9%
MRSA	5	4.76%
GRAM NEGATIVE BACTERIA		
<i>Pseudomonas aeruginosa</i>	37	35.23%
<i>Klebsiella</i> sp	37	35.23%
<i>Acinetobacter</i> sp	3	2.85%
<i>Citrobacter</i> sp	3	2.85%
<i>E. coli</i>	6	5.71%
<i>Enterobacter</i> sp	3	2.85%
<i>Proteus</i> sp	2	1.9%
<i>Enterococci</i> sp	1	0.95%
TOTAL	105	100%

Table 4: Mixed growth

SPECIES	NUMBER	PERCENTAGE
<i>Pseudomonas</i> + <i>Klebsiella</i>	11	55 %
<i>MRSA</i> + <i>Acinetobacter</i>	1	5%
<i>MRSA</i> + <i>Pseudomonas</i>	1	5%
<i>Pseudomonas</i> + <i>Enterobacter</i>	2	10%
<i>Pseudomonas</i> + <i>Citrobacter</i>	1	5%
<i>Klebsiella</i> + <i>Staphylococcus aureus</i>	1	5%
<i>Klebsiella</i> + <i>Proteus</i>	2	10%
<i>Pseudomonas</i> + <i>Ecoli</i>	1	5%
TOTAL	20	100%

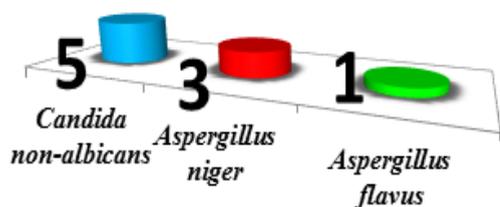


Figure 3: Prevalence of Fungal species isolated

In our study, all the *Pseudomonas aeruginosa* organisms were sensitive to Piperacillin-tazobactam (100%) and Tobramycin (100%) (Table 5). Majority of the *Klebsiella* organisms were sensitive to Amikacin (97.2 %) (Table 6). Sensitivity of *Staphylococcus aureus* shows that 72.8% were resistant to Penicillin, 54.6% resistant to Cefoxitin, 45.6% were resistant to Erythromycin (Table 7).

The 2 isolates of *Proteus mirabilis* were sensitive to Amikacin (100%), Ciprofloxacin (100%), Piperacillin-tazobactam(100%), Ceftriazone(100%), Amoxicillin-clavulanate (100%), Cefuroxime (100%), Cephalexin (100%).

The sensitivity pattern of *E. coli* showed that they were sensitive to Amikacin (100%), Ciprofloxacin (100%), Piperacillin-tazobactam (100%) and 66.7% resistant to Cephalexin.

Among 3 isolates of *Citrobacter*, it were sensitive (100%) to Amikacin, Ciprofloxacin, Piperacillin-tazobactam, Ceftriazone, Cefpirome, 66.7% resistant to Cephalexin.

The sensitivity pattern of *Acinetobacter* showed that they were sensitive to Amikacin, Ciprofloxacin, Piperacillin-tazobactam, Amoxicillin-clavulanate, Cefpirome(100%).

The sensitivity pattern of *Enterobacter* showed that they were sensitive to Amikacin, Ciprofloxacin, Piperacillin-tazobactam (100%) and resistant to Cephalexin.

The sensitivity pattern of *Enterococci* showed that it was sensitive to Teicoplanin and High Level Gentamicin (100%) and resistant to Linezold, Erythromycin, Vancomycin, Penicillin and Ampicillin.

Table 5: Antibiogram of Pseudomonas aeruginosa (37)

DRUG	SENSITIVE	RESISTANT	% OF SENSITIVITY
Amikacin	36	1	97.2%
Ceftazidime	20	17	54%
Ciprofloxacin	35	2	94.5%
Piperacillin-tazobactam	37	-	100%
Ceftriaxone	34	3	91.8%
Netilmicin	35	2	94.5%
Tobramycin	37	-	100%
Cefoperazone-sulbactam	25	12	67.5%

Table 6: Antibiogram of Klebsiella sp (37)

DRUG	SENSITIVE	RESISTANT	% OF SENSITIVITY
Amikacin	36	1	97.2%
Ciprofloxacin	36	1	97.2%
Piperacillin-tazobactam	31	6	83.7%
Ceftriaxone	30	7	81%
Amoxycillin-clavulanate	15	22	40.5%
Cefuroxime	25	12	67.56%
Cephalexin	28	9	75.67%
Cefpirome	27	10	72.97%

Table 7: Antibiogram of Staphylococcus aureus

DRUG	SENSITIVE	RESISTANT	% OF SENSITIVITY
Amikacin	10	1	90.9%
Ciprofloxacin	7	4	63.6%
Cefuroxime	10	1	90.9%
Cefoxitin	6	5	54.5%
Linezolid	11	-	100%
Gentamicin	11	-	100%
Erythromycin	5	6	45.4%

Clindamycin	10	1	90.9%
Vancomycin	11	-	100%
Penicillin	3	8	27.2%

DISCUSSION:

Out of 100 specimens, there were 54 % female and 46 % male. Thus females were more in our study which is in accordance with a study by Prakash [4] who showed 55% female and 45% male and also by Shreshtha [5] (55.2% female and 44% male).

In our study majority of patients were of the age group 30 to 39 years, which is in agreement with Loy [6].

In our study, 99% of the cases were tubotympanic type and 1% atticointral type. High prevalence of culture positivity was noted in the study. Among 100 patients, microbial growth was obtained in 91 (91%) samples. Bacterial growth was observed in 82 (90.1%) samples, being monomicrobial in 62 (75.6%) while polybacterial in 20 (24.3%). Among 91 culture positive cases, 6 (6.5%) were fungi and 3(3.2%) were mixed growth of bacteria as well as fungi. Similar results were also seen in the study conducted by Aslam [7]. This data differs with the results found by Poorey [8].

The most prevalent organisms in the study were gram-negative organisms, *Pseudomonas aeruginosa* and *Klebsiella sp* being the majority and having the same percentage (45.12%).

The second most common bacteria and the most common gram positive bacteria in this study was *Staphylococcus aureus* (Methicillin sensitive) (7.31%). The third most common species was *E. coli* (7.31%) followed by MRSA (6.09%), *Acinetobacter* (3.6%), *Citrobacter* (3.6%) *Enterobacter* (3.6%), *Coagulase Negative Staphylococcus* (2.43%), *Proteus* (2.43%) and *Enterococci* (1.21%). Fungus was isolated in 6 cases, of which *Candida sp* was the most common and was similar to the study by Kumar & Seth [9].

Based on the antibiogram pattern in both types of CSOM, *Pseudomonas aeruginosa* organisms showed 100% sensitivity to Piperacillin-tazobactam and Tobramycin. In the study done by Yang [10], *Pseudomonas* was found to have maximum sensitivity to ciprofloxacin. According to Poorey [11] the highest susceptibility of *Pseudomonas* was for meropenem, cefoperazone-sulbactam, cefpirome, and piperacillin-tazobactam combinations.

Majority of the *Klebsiella* organisms were sensitive to Amikacin (97.2 %). Sensitivity of *Staphylococcus aureus* shows that 72.8% were resistant to Penicillin, 54.6% resistant to Cefoxitin, 45.6% were resistant to Erythromycin.

Hence from this study, we can conclude that the maximum sensitive drug was Amikacin followed by Ciprofloxacin, Piperacillin-tazobactam, Ceftriazone and Cefuroxime. The emerging sensitivity of Aminoglycosides and the declining sensitivity to Fluroquinolones and Cephalosporins have been believed to be due to injudicious use, inappropriate dosage, easy accessibility and developing enzymatic resistance of organism against the drugs.

CONCLUSION:

The basic objective of this study was to determine the microbial and fungal profile in patients having Chronic Suppurative Otitis Media. Out of the 100 cases, results show that the predominant organisms in this study were *Pseudomonas sp* and *Klebsiella sp*. Among all the organisms the drug having maximum sensitivity was Amikacin. Fungi isolated predominantly belonged to *Candida non-albicans*.

This study, in the light of other various studies, indicates that there can be a variation in the organisms infecting and their susceptibility pattern based on geographical factors, climate, season, locality and ethnicity of the patient with CSOM. Hence, it is prudent for any health care centre catering to a defined area of population to conduct periodically the microbiological study of CSOM in order to establish effective treatment protocols for the population minimizing its complications and emergence of resistant strains. We believe that our data may contribute to an effective management of CSOM.

Conflicts of interest:

There are no conflicts of interest.

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