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MICROBIOLOGICAL PROFILE AND ANTIBIOTIC SENSITIVITY PATTERN IN MUCOSAL TYPE OF CHRONIC OTITIS MEDIA - HOSPITAL BASED CASE SERIES STUDY

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ABSTRACT **Aim:** This study is aimed to know the microbiological pattern in tubotympanic type of chronic otitis media and the antibiotic sensitivity pattern of the organism. **Background:** Chronic suppurative otitis media (CSOM) is the most common cause of childhood hearing impairment in the developing countries and tubotympanic type is the most common type. Aggressive management is necessary as untreated and poorly treated unsafe CSOM can result in a variety of complications. Complications associated with CSOM have reduced after the introduction of antibiotics; however, irrational use of antibiotics has led to the emergence of multidrug resistant bacterial strains and disease complications. **Methodology:** It was an hospital based case series study done in the SNMC, Bagalkot. 100 samples of ear swab was collected from patients who were clinically diagnosed with chronic otitis media -tubotympanic type and who were not on any prior antibiotic treatment. **Results:** Amikacin and Linezolid exhibited 100% sensitivity against Proteus mirabilis and Coagulase-negative Staphylococcus aureus while Meropenem and Piperacillin/Tazobactam displayed moderate to high sensitivity against several Gram-negative organisms. Ciprofloxacin and Cefuroxime demonstrated poor sensitivity across multiple bacterial species. MRSA and Klebsiella showed low sensitivity to multiple antibiotics, raising concerns regarding multidrug resistance and the necessity for cautious selection of antibiotics. **Conclusion:** Periodic evaluation of microbiological pattern and antibiotic sensitivity of CSOM is needed to decrease potential risk of complications by early institution of appropriate treatment. This will not only help in minimizing the complications but also help in preventing the emergence of resistant strains.

KEYWORDS : CSOM, Microbiological pattern, Antibiotic sensitivity

INTRODUCTION

Chronic otitis media [COM] is an inflammation of the middle ear cleft of long duration. It is characterized by a permanent abnormality of the pars tensa (PT) or pars flaccida (PF), which may manifest in the form of atelectasis, dimer formation, perforation, tympanosclerosis, retraction pocket development or cholesteatoma[1]. Poor living conditions, overcrowding, poor hygiene and nutrition have been suggested as the basis for widespread prevalence of COM in developing countries like India[2].

Chronic suppurative otitis media (CSOM) is a commonly encountered infection of the middle ear. It can cause extra cranial and intracranial complications and involves considerable morbidity[3]. The fundamental principles in the medical management of CSOM include aural hygiene and the use of topical antimicrobial agents. However, the indiscriminate and haphazard use of antibiotics, coupled with inadequate follow-up care, has led to the emergence of antibiotic-resistant bacterial strains and the persistence of low-grade infections[4].

The main objective of this study is to know the microbiological pattern in tubotympanic type of chronic otitis media and the antibiotic sensitivity pattern of the organism

OBJECTIVES OF THE STUDY

1. To study the microbiological pattern in tubotympanic type of chronic otits media.
2. To know the antibiotic sensitivity pattern of the organism

CRITERIA

Inclusion Criteria: All patients of any age or sex ,clinically diagnosed with chronic suppurative otitis media tubotympanic type as per WHO definition (2004)[5]

Exclusion Criteria: Patients with chronic suppurative otitis media atticoantral disease. Patients with prior antibiotic treatment.

METHODOLOGY

The study was conducted in the ENT OPD, SNMC ENT, included all the patients with history of ear discharge and having a pars tensa perforation. After fulfilling the criteria of inclusion and exclusion the patients were selected. Discharge was sent for culture and sensitivity after taking in a sterile swab. After which the results were collected and based on which they were treated with appropriate antibiotic sensitivity.

Statistical Analysis

Data was analysed using Statistical Package for Social Sciences (SPSS) version 21. The study variables which were categorical, were summarized as proportions where as continuous data is reported in terms of mean and standard deviation. Graphs were prepared on Microsoft Excel. For the assessment of categorical data, Chi square test was used. The level of statistical significance will be set at 0.05.

The study population had a mean age of 32.3 years (±14.3 years), with participants ranging from 14 to 69 years old, indicating a diverse age distribution. The sample included 56 males (56%) and 44 females (44%), showing a slight male predominance. This demographic distribution suggests that ear infections and related bacterial growth are prevalent across different age groups and both sexes.

The p-values indicate statistically significant differences in sensitivity patterns among certain antibiotics. For example, Ciprofloxacin ($p = 0.001$) and Gentamicin ($p = 0.022$) show significant variability in sensitivity across different organisms, highlighting their inconsistent efficacy. On the other hand, antibiotics like Cefuroxime ($p = 0.32$) and Meropenem ($p = 0.812$) did not show statistically significant differences, suggesting a more uniform sensitivity profile across bacterial species.

RESULTS

The mean age of the study population was 32.3 years (±14.3 years), with an age range of 14 to 69 years (table 1). There was a slight male predominance (56%) in the sample. This indicates that CSOM is prevalent across all age groups and both sexes, with no significant demographic preference.

Table 1: Demographic Characteristics

Characteristic	Value
Age (Mean ± SD)	32.3 ± 14.3
Age Range	14 - 69
Male	56
Female	44

The study identified various bacterial pathogens, with notable ones being: Proteus mirabilis, Pseudomonas aeruginosa , Staphylococcus aureus (including MRSA) , Coagulase-negative Staphylococcus , Klebsiella spp. , Escherichia coli , Citrobacter spp. , Proteus vulgaris.

Pseudomonas aeruginosa and Staphylococcus aureus are frequently implicated in CSOM and showed variable sensitivity patterns.

Table 2 shows that Amikacin, Amoxicillin/Clavulanic Acid, and Linezolid showed **100% sensitivity** against **Proteus mirabilis and**

Coagulase-negative Staphylococcus aureus, indicating their potential as first-line treatment options while **Meropenem and Piperacillin/Tazobactam** showed **moderate to high sensitivity** against several Gram-negative bacteria, making them effective choices for resistant infections.

Table : Antibiotic Sensitivity Results

Organism / Antibiotic	Amoxicillin/ Clavulanic Acid	Amikacin	Cefuroxime	Ceftriaxone	Cefepime	Ceftazidime	Ciprofloxacin	Colistin	Clindamycin	Gentamicin	Imipenem	Levofloxacin	Linezolid	Meropenem	Piperacillin/ Tazobactam	Tigecycline	Vancomycin
Citrobacter	100.0	100.0	-	20.0	100.0	100.0	20.0	40.0	-	-	0.0	100.0	100.0	50.0	-	20.0	-
Coagulase negative staphylococcus aureus	100.0	100.0	0.0	50.0	100.0	50.0	100.0	50.0	0.0	100.0	50.0	100.0	100.0	100.0	-	0.0	0.0
Escherichia Coli	45.5	70.0	0.0	27.3	0.0	50.0	40.0	22.2	0.0	0.0	55.6	81.8	66.7	66.7	83.3	77.8	80.0
Klebsiella	50.0	66.7	0.0	40.0	16.7	33.3	16.7	40.0	0.0	0.0	80.0	100.0	50.0	75.0	100.0	50.0	25.0
Methicillin resistant staphylococcus aureus	0.0	50.0	0.0	0.0	100.0	50.0	0.0	20.0	0.0	60.0	66.7	-	33.3	100.0	50.0	66.7	75.0
No growth	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Proteus mirabilis	100.0	100.0	50.0	33.3	50.0	100.0	66.7	50.0	0.0	50.0	0.0	100.0	0.0	100.0	0.0	50.0	0.0
Proteus vulgaris	100.0	100.0	0.0	0.0	0.0	100.0	100.0	0.0	-	-	-	100.0	-	-	-	0.0	-
Pseudomonas Aeruginosa	76.9	73.7	40.0	35.3	47.1	58.3	43.8	52.6	0.0	42.9	81.2	100.0	50.0	66.7	90.9	77.8	0.0
Staphylococcus Aureus	77.8	68.0	58.8	78.9	44.4	73.7	61.5	39.3	11.1	73.9	80.8	81.2	44.4	65.2	76.5	84.2	77.8
Staphylococcus aureus	0.0	0.0	-	0.0	-	-	0.0	-	-	-	0.0	100.0	100.0	100.0	-	0.0	-
no growth	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
p-value	0.079	0.159	0.32	0.0	0.105	0.692	0.001	0.905	0.68	0.022	0.0	0.016	0.315	0.812	0.179	0.034	0.062

Methicillin-resistant Staphylococcus aureus (MRSA) and Klebsiella exhibited **low sensitivity** to multiple antibiotics, highlighting antibiotic resistance concerns. **Cefuroxime and Ciprofloxacin** showed **poor sensitivity** across multiple organisms, indicating their limited effectiveness for empirical therapy.

Statistically, Ciprofloxacin (p = 0.001) and Gentamicin (p = 0.022) exhibited **significant variability** in sensitivity across different microorganisms. **Cefuroxime (p = 0.32) and Meropenem (p = 0.812)** did not show significant differences in sensitivity across organisms, suggesting a more uniform response.

DISCUSSION

CSOM is a significant public health issue, with India being one of the countries experiencing a high prevalence rate. It is a chronic condition that carries a substantial risk of irreversible complications. As a leading cause of preventable hearing loss, particularly in the developing world, it is estimated that approximately 13.8–36.2% of individuals suffer from hearing impairment due to CSOM[6].

CSOM is more prevalent among individuals from low socioeconomic backgrounds, particularly in communities with overcrowding, inadequate housing, poor hygiene, limited access to healthcare, and factors such as lack of breastfeeding, malnutrition, compromised immune function, passive smoking, and frequent upper respiratory infections. Additionally, high rates of nasopharyngeal colonization by potentially harmful bacteria contribute to the spread of the condition[7]. While the occurrence of complications is relatively low, untreated CSOM can lead to a range of serious issues, including persistent otorrhea, labyrinthitis, mastoiditis, facial nerve paralysis, and, most notably, hearing impairment, which is one of its most common long-term consequences[8,9].

According to this study, Amikacin and Linezolid as First-Line Agents can be used for cases involving Proteus mirabilis and Coagulase-negative Staphylococcus aureus, as these antibiotics show high efficacy. While, Meropenem and Piperacillin/Tazobactam in Resistant Cases as these antibiotics should be considered for severe infections, especially in Klebsiella and Pseudomonas aeruginosa infections.

Ciprofloxacin and Cefuroxime should be avoided for empirical treatment due to their poor sensitivity in this study, their routine use should be reconsidered unless supported by culture reports.

Patients should be instructed to complete the full course of prescribed medication. This practice not only helps reduce complications but also prevents the development of antibiotic-resistant strains[10]

CONCLUSIONS

This study underscores the **shifting trends in antibiotic resistance** among CSOM pathogens, necessitating **evidence-based antibiotic stewardship**. The **high resistance in MRSA and Klebsiella** highlights the growing challenge of antimicrobial resistance, reinforcing the need for **culture-based treatment strategies**. By adapting empirical therapy based on local resistance patterns, we can improve treatment outcomes and reduce the burden of antibiotic-resistant infections in CSOM.

Given the variability in antibiotic resistance, empirical therapy should be guided by periodic surveillance of local bacterial trends and Routine Culture and Sensitivity Testing should be sent.

Understanding the prevailing flora and their susceptibility to antimicrobials will help guide clinicians in prescribing an appropriate empirical regimen, ensuring more effective and targeted management for patients.

Ongoing and periodic assessment of antibiotic susceptibility patterns is crucial to mitigate the risk of resistance. Regular monitoring of microbial patterns and antibiotic sensitivity in SOM cases is essential for minimizing the risk of complications.

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