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A Study to Assist the Treatment in a Case of Chronic Suppurative Otitis Media by Doing Microbial Profile and Sensitivity Testing.

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ABSTRACT

Background: Chronic Suppurative otitis media (CSOM) is one of the commonest disease seen in all age groups. It is one of the leading causes of deafness if treatment is not initiated at early stage. As newer antibiotics are frequently used for the treatment of CSOM, change in the microbial flora is inevitable. The aim of this study is to know the organisms causing CSOM and the antibiotics that are effective against these microorganisms. **Methods:** This study was done in a 500 bedded tertiary care hospital and patients presenting with history of more than three months of ear discharge were included in the study. The ear discharge was taken with a sterile swab and sent to the microbiology laboratory for processing. Standard microbiological procedures were followed for identification and antibiotic sensitivity testing. **Results:** Our study showed *staphylococcus aureus* including *methicillin resistant staphylococcus aureus* (47%) as the predominant organism followed by *pseudomonas sp* (23%). *Staphylococcus aureus* was found to be highly sensitive to clindamycin (96%), gentamicin (85%) and ciprofloxacin (74%). *Pseudomonas sp* was found to be highly sensitive to imipenem, piperacillin-tazobactam and ciprofloxacin (90%).**Conclusion:** *Staphylococcus aureus* was the commonest organism causing CSOM in our study. Ampicillin was found to be highly resistant and ciprofloxacin was found to be an effective antibiotic to treat both gram positive and gram negative infections. Hence we conclude that ciprofloxacin can be used as an empirical antibiotic for patients with CSOM.

Keywords: Chronic suppurative otitis media, Ear discharge, Sensitivity, *Staphylococcus aureus*.

INTRODUCTION

Chronic Suppurative otitis media (CSOM) is defined as persistent or intermittent infected discharge of more than three months duration through the perforated or non intact tympanic membrane caused by bacteria, fungi and virus resulting in partial or total loss of tympanic membrane and ossicles.[1] The disease is common in all age groups but most prevalent in children of lower socio economic status because of lack of proper hygiene and recurrent upper respiratory tract infection.[2,3]

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It can cause both conductive and sensorineural hearing loss. CSOM is mainly classified as tubotympanic and atticoantral diseases. Tubotympanic is called as a safe type or benign type as there is no serious complication whereas, attico-antral is called as the unsafe or dangerous type because of associated complication.

Most common microorganisms causing CSOM are *Pseudomonas aerigunosa, Staphylococcus aureus, and Proteus mirabilis.*[4,5] A long standing undiagnosed case can lead to intratemporal complications such as mastoiditis, labyrinthitis, hearing loss and intracranial complications such as meningitis, extradural and subdural abscesses.[6,7] Fearing the complications of CSOM antibiotics were used inadvertently which had led to organisms that are now resistant to multiple antibiotics. As a result of this physicians are left to treat with newer and expensive antibiotics aggravating the resistance pattern. If every case of Chronic Suppurative Otitis Media is diagnosed and treated appropriately with the right antimicrobial therapy, the need for surgical intervention can be decreased.

The aim of this study is to identify the most common microorganisms causing CSOM and to know antibiotics that are effective against these microorganisms.

MATERIALS AND METHODS

This study was conducted in a tertiary care hospital in south India for a period of three months duration.

All patients attending the ENT outpatient department with more than three months of ear discharge were included in the study. Patients with intact tympanic membrane and those receiving antibiotics at the time of presentation were not included in the study. Discharge from the ear is taken using two sterile swabs and sent to the microbiology laboratory for processing. One swab was used for gram stain and the other one was used for aerobic and fungal culture. Blood agar, chocolate agar and mac conkey agar were used for culturing aerobic organisms. After streaking, plates were incubated at 37°C for overnight incubation. The presence of growth on the plates were identified by standard microbiological procedures.[8] and antibiotic sensitivity testing was done by Kirby-bauer disc diffusion method.[9] Data was entered in MS Excel and was analyzed using SPSS software version 2.0. Categorical variables are expressed as proportions and continuous variables as mean +/- SD. To compare the various parameters the student's t-test was used.

RESULTS

Out of 100 patients included in the study, maximum (51%) were from 19 – 50 years age group which is depicted in [Table 1].

Table 1: Age distribution of cases of CSOM.

Age group	No. of cases
1-18	32
19-50	51
>50	17

There was a male preponderance (55%) over females (45%). Out of 100 samples processed, 90 samples (90%) showed growth and 10(10%) showed no growth. Among 90 samples that showed growth, 81(90%) were bacteria and 9 (10%) were fungi. [Table 2].

Table 2: Distribution of organism.

Aerobic isolates	Frequency (%)
Staphylococcus aureus	28 (34%)
Pseudomonas sp	23 (28%)
Methicillin resistant staphylococcus aureus (MRSA)	10 (12%)
Streptococcus sp	6 (7%)
E.coli	6 (7%)
Klebsiella sp	4 (4%)
Enterobacter sp	2 (2%)
Proteus sp	1 (1%)
Acinetobacter sp	1(1%)
Total	81(100%)
Fungal isolates	
Aspergillus flavus	5 (55%)
Aspergillus niger	3 (33%)
Candida sp	1 (11%)
Total	9 (100%)

Antibiotic sensitivity testing was carried out on all the 81 samples that showed aerobic growth and the results are depicted in the [Tables 3 and 4].

Table 3: Antibiotic sensitivity for gram positive bacteria.

Antibiotics	Staph. aureus(28)	Streptoccus spp(6)	MRSA (10)
Penicillin	11(39%)	6(100%)	0 (0%)
Cotrimoxazole	12(42%)	1(17%)	8 80%)
Ciprofloxacin	20(71%)	4(67%)	3 30%)
Erythromycin	18(64%)	2(33%)	2 20%)
Clindamycin	25(89%)	4(67%)	7 70%)
Gentamicin	23(82%)		4 40%)
Vancomycin	28(100%)		10 (100%)
Linezolid	28(100%)		10 (100%)

Table 4: Antibiotic sensitivity pattern for gram negative bacteria.

Antibiotics	Pseudomanas spp(23)	Enterobacteriaceae*(13)
Amikacin	16(69%)	8(61%)
Ampicillin		3(23%)
Cefotaxime		9(69%)
Ceftazidime	15(65%)	
Cefoperazone	15(65%)	
Cotrimoxazole		9(69%)
Ciprofloxacin	17(73%)	7(53%)
Imipenem	16(69%)	10(77%)
Piper- tazobactam	17(73%)	9(69%)

*Includes Klebsiella spp, Proteus spp, Enterobacter and E.coli.

DISCUSSION

CSOM is a a major health problem, and India is one of the countries with highest prevalence of CSOM.[10] CSOM is characterised by middle ear discharge due to perforation in the tympanic membrane as a result of which bacteria can easily gain access to the middle ear. If left untreated it can lead to complications like persistent otorrhoea, mastoiditis, labyrinthitis, and intracranial abscesses.[11] These complications can be avoided if an early microbiological diagnosis is made which will ensure accurate and appropriate antimicrobial therapy. In many centers, patients with CSOM are treated as out patients empirically with antibiotics without evaluating the causative agent and drug sensitivity which might lead to drug resistance. Hence knowledge of organisms causing CSOM and the antibiotic to which they are sensitive will guide the physician in treating these patients.

Our study showed that majority (51%) of the patients belong to 20 – 50 years age group which is similar to a study conducted by Loy et al.[12]. In our study males (55%) were more affected than females (45%). A study conducted by Ahmed et al, also showed the same results.

When ear swabs were sent for culture from patients with CSOM, 90% of the samples yielded a positive growth and 10% showed no growth. All the samples that showed growth were monomicrobial. *Staphylococcus aureus* was the predominant organism isolated in our study (30%). This was similar to studies conducted by Yousouf et al and Prakash et al.[14,15]

Pseudomonas sp (28%) was the second most common organism isolated followed by *Entero-bactericeae* (16%).Out of 38 *Staphylococcus aureus*, 10 (26%) were *MRSA* in our study. This reiterates the fact that resistant organism are prevalent even in the community. A study conducted by shetty et al in Mangalore, showed the prevalence of MRSA to be 36%.[16]

We also isolated *Aspergillus sp* and *candida sp* in our study which was 10% of the total isolates. In a similar study conducted by Kumar et al, 16% of the total isolates were fungal in origin.[17]

All the strains were tested against different panel of antibiotics. Clindamycin was found to be the most effective (96%) antibiotic for *staphylococcus aureus* (other than *MRSA*) followed by gentamicin and ciprofloxacin. MRSA strains were 100% sensitive to vancomycin and linezolid. Cotrimoxazole and clindamycin being 80% and 70 % sensitive can be used as an alternative drug to vancomycin and linezolid, which should be reserved for life threatening infections.

Among *pseudomonas sp*, piperacillin – tazobactam (73%) and ciprofloxacin (73%) were found to be the most effective drug followed by imipenem and amikacin both showing 69% sensitivity. In a study conducted by Prakash et al, *pseudomonas* was found to be 100% sensitive to imipenem and 63% was sensitive to ciprofloxacin.[15] Another study conducted by Agrawal et al, *Pseudomonas aeruginosa* showed 100% sensitivity to imipenem, and meropenem , 58.5% sensitivity to gentamicin, 85.4% sensitivity to piperacillin/tazobactam.[18]

The majority of isolates of enterobactericeae which includes *E.coli. Klebsiella sp* and *Proteus sp* in our study were found to be sensitive to imipenem (77%) and piperacillin-tazobactam (69%). Since our hospital is a tertiary care centre, many patients visit the hospital after consuming various antibiotics prescribed by the general practioner elsewhere and end up with drug resistant organisms which could be the reason for high resistance seen in our center. There are studies showing high resistance to these organisms which could be due to increasing drug resistance seen worldwide.[19,20]

Ampicillin was found to be highly resistant(77%) to enterobactericeae in our study. Various studies have shown similar pattern where ampicillin was found to be highly resistant.[21,22] Use of ampicillin as an empirical choice for treating cases of CSOM has to be reconsidered as the majority of the strains are resistant. In this era of multidrug resistance, resistance to ampicillin is of no surprise as this drug has been used as an empirical choice for many infections in outpatient departments.

Our study also showed that ciprofloxacin as an effective drug to treat both gram positive and gram negative infections and hence we recommend to use it as an empirical choice for treating CSOM instead of ampicillin in our ENT outpatient department. A study done by Sharma et al also showed ciprofloxacin as an effective drug in treating cases of CSOM.[23]

CONCLUSION

Staphylococcus aureus and *pseudomonas aeruginosa* were the most common organisms isolated from patients with CSOM in our study. *Staphylococcus aureus* was found to be highly sensitive to clindamycin, gentamicin and ciprofloxacin. *MRSA* remained 100% sensitive to vancomycin and linezolid. *Pseudomonas* was found to be highly sensitive to piperacillin – tazobactam and ciprofloxacin. Higher sensitivity of ciprofloxacin to both *Staphylococcus aureus* and *Pseudomonas aeruginosa* which are the predominant isolates in our study makes it an ideal choice for treating cases of CSOM empirically.

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