Antibiotic Susceptibility Pattern Among CSOM Patients Attending AIMSR

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Abstract: Background and Aim**:** CSOM causing deafness is seen in more than one third of the population in developing countries and is responsible for more than two thirds of deafness in children thereby causing intellectual and educational problems which have a profound impact on the society. Knowledge of the pathogens responsible for CSOM and their antibiotic sensitivity can assist in the selection of the appropriate treatment regimen in these cases. Objective: To identify the bacteria causing CSOM in our hospital area and to determine their antibiotic sensitivity. Methodology: Prospective study of 20 samples from clinically suspected cases of CSOM was performed over a period of two months. Samples were subjected to culture and the isolates were identified by standard biochemical tests. Antibiotic sensitivity testing was performed by modified Kirby-bauer disc diffusion technique as per CLSI guidelines. Results: The predominant organism isolated was Staphylococcus aureus. No other organism was isolated in our study. The antimicrobial sensitivity of the isolates in our study showed 100% sensitivity to ciprofloxacin,ofloxacin and netilmycin followed by 75% sensitivity to cefotaxime and ceftriaxone. Conclusion: The bacterial pathogens causing CSOM are unique to each geographical area. There is a high carriage of Staphylococcus aureus strains in the external auditory canal and upper respiratory tract prevalent in our hospital area. Quinolones and third generation cephalosporins are the most effective drugs for CSOM in our hospital area and can be considered for empiric therapy of these cases. [Gandham P NJIRM 2016; 7(1):108-111]

Key Words: CSOM, Antimicrobial sensitivity.

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Introduction: CSOM is defined as a chronic inflammation of the middle ear and mastoid mucosa accompanying tympanic membrane perforation and otorrhoea. [1] It is a destructive disease with irreversible sequelae and can lead to serious intra and extracranial complications. [2] If untreated, CSOM may cause septicemia, meningitis, brain abscess and facial palsy.[3] CSOM has profound impact on society by causing deafness is more than one third of the population in developing countries and is responsible for more than two thirds of deafness in children thereby causing intellectual and educational problems.[4] It is found to be the single main cause of conductive deafness and is responsible for 60.27% of the cases. [5] The incidence of chronic suppurative otitis media is higher in developing countries especially amongst the lower and the middle socio-economic strata of the society,because of poor nutrition,improper hygiene and lack of health education.[6] This infection occurs mostly in children during the first 6 years of a child's life,with a peak around 2years. The most common bacterial pathogens of CSOM are Streptococcus pneumoniae,Haemophillus influenzae and Moraxella catarrhalis .Other pathogens include Staphylococcus aureus, Escherichia coli, Klebsiella, Pseudomonas aeruginosa and Proteus species.The type of pathogens involved in CSOM are dependent on the geographical location. [7] Bacterial culture and identification will help in appropriate management of otitis media and its complications. Knowledge of the pathogens responsible for CSOM and their antibiotic sensitivity can assist in the selection of the most appropriate treatment regimen.. Hence the present study was conducted to identify the bacteria causing CSOM and to determine their antibiotic sensitivity.

Materials and Methods: A Cross sectional study was conducted and a prospective study of 20 patients with clinical evidence of CSOM attending the outpatient department of ENT section of Apollo General Hospital , Jubillee hills , Hyderabad was conducted for a period of 2 months from July to September 2015. The processing of the samples was done in the Microbiology department of AIMSR. Institutional ethics committee approval was obtained prior to the study. Patients of all ages and either gender suffering from CSOM as determined by otoscopic examination were included in the study. Patients with current febrile illness, current antibiotic usage / use in the preceding 2 weeks ,recent ear surgery,in situ grommet or tympanostomy tube, congenital ear or hearing problems and obstructed middle ear conditions were excluded from the study.

Details of patient name , age, sex, history of antibiotic use and other exclusion criteria were taken from the patient .Two sterile swabs were used to collect pus samples from each patient. The first swab was used to make a smear on a clean, grease-free slide to screen for the presence of bacteria and for preliminary differentiation of bacteria by gram staining. Gram

staining was done by modified Kopeloff and Beerman's method. The second swab was plated on 5% blood agar , Mac conkey's agar and chocolate agar by streak culture. Then the plates were incubated at 37^0C for 48 hours after which a part of the colony is picked up with a sterile loop and a smear is made . The smear was stained by Gram staining again and findings recorded. [8] Then the bacterial colonies isolated in culture were identified by standard biochemical reactions .[9] Antibiotic sensitivity testing was carried out using modified Kirby-bauer disc diffusion technique using Muellar Hinton agar as per CLSI guidelines.

The antibiotic discs used were ampicillin sulbactam(15µg), Amoxyclav (10 µg), ciprofloxacin (10 µg), Ofloxacin (5µg), vancomycin(10 µg), , cefazolin(30 µg), , cefotaxime (10 µg), ceftazidime (30 µg),netilmycin (10 µg),chloramphenicol(30 µg), Amikacin (10 µg), Doxycycline (30 µg), tetracycline (30 µg), cotrimoxazole (1.25 + 23.75 µg), azithromycin(15µg), ceftriaxone(10 µg), cefuroxime(30 µg), and cefepime(30 µg)

Results of the antibiotic sensitivity test were interpreted in accordance with Central laboratory standards institute guidelines. [10] All dehydrated media, reagents and antibiotic discs were procured from Hi-media Laboratories Pvt. Ltd., Mumbai, India.

Results: A total of 20 CSOM samples were studied to identify the bacteria agents causing CSOM and to determine the antibiotic susceptibility of these isolates.

Table 1: Age distribution of CSOM cases

Age In Years	No. of patients(percentage)
0-10	15(75%)
11-20	5(25%)
21-30	0(0%)
30-40	0(0%)
40-50	0(0%)
50-60	0(0%)
Above 60	0(0%)

In the present study, out of the 20 samples of CSOM processed,all of them (100%) were culture positives.

The predominant organism isolated was Staphylococcus aureus which constituted 100% of our isolates. No other organism was isolated in our study.
Majority of the cases 15(75%) were of the below 10 years age group followed by the 11-20years age group. Table 1 shows the age distribution of CSOM cases.

Table 2: Sex Distribution Of CSOM Cases

SEX	No. of cases	Percentage of cases
MALES	20	100%
FEMALES	0	0%

The antimicrobial sensitivity of the isolates in our study showed highest sensitivity (100%) to ciprofloxacin,ofloxacin and netilmycin followed by high sensitivity to cefotaxime and ceftriaxone (75%). Table 3 shows the antibiotic sensitivity of the isolates.

Table 3: Antibiotic susceptibility pattern of the isolates

Antibiotic	No(%) of sensitive isolates
Ampicillin sulbactum	0(0%)
Amoxyclav	11(55%)
Ciprofloxacin	20(100%)
Ofloxacin	20(100%)
Vancomycin	12(60 %)
Cefazolin	0(0%)
Cefotaxime	15(75%)
Ceftazidime	11(55%)
Netilmycin	20(100%)
Chloramphenicol	12(60%)
Amikacin	10(50%)
Doxycycline	0(0%)
Tetracycline	0(0%)
Cotrimoxazole	0(0%)
Azithromycin	0(0%)
Ceftriaxone	15(75%)
Cefuroxime	0(0%)
Cefepime	0(0%)

Discussion: In Chronic suppurative otitis media, due to the perforated tympanic membrane in CSOM ,bacteria gain entry into the middle ear via the external ear canal. In the present study, Staphylococcus aureus was found to be the most prevalent bacterial pathogen . The preponderance of Staphylococcus aureus in our study is in agreement with the study conducted by Divya vaishnavi et al.[5] In contrast, the study of Okesola et al. [7] revealed Pseudomonas aeruginosa as the major isolate. The organism isolation pattern in the present study was consistent with the study of Divya vaishnavi et al because both these studies were conducted in and around Hyderabad , the same place. Several CSOM studies have reported different organisms in different climates and different populations .This emphasizes the fact that the organisms causing CSOM vary from

place to place and bacterial pattern of CSOM is unique to the place. In our study Staphylococcus aureus was the sole pathogen isolated accounting to 100% isolation of this organism .No other organism was isolated . This finding differed from the study of Divya vaishnavi et al [5] owing perhaps to our low sample size . Moreover the increased isolation of Staphylococcus aureus in middle ear infections in our study can be attributed to the ubiquitous nature of this organism and high carriage of this organism in the external auditory canal and upper respiratory tract in our hospital area.

In our study the peak incidence of CSOM was found in the 0-10 yrs age group (75%) followed by 11 -20 yrs age group (25%) which was in accordance with the study of Okesola et al [7] who reported 47% incidence in 0-10 yrs age group followed by 22.7% incidence in the 10 -20 yrs age group . The study of Fathima et al [11] revealed increased incidence in the 30 -40 yrs age group which was in contrast to our study.The increased incidence of CSOM in 0-10 yrs age group is due to the shorter, wider and horizontal eustachian tube in children compared to adults, which offers greater opportunity for pathogens of nasopharynx to ascend to the sterile middle ear cavity. Moreover children are more exposed to upper respiratory tract infection due to their immature immune system that hardly protects them against the opportunistic organisms . Maximum incidence of CSOM in 30-40 yrs age group was reported by Fathima et al because this study was based on hospital records, it was not a prospective study.

Our study revealed male preponderance of CSOM cases .The studies of Okesola etal [7] and Paradise et al [12] also reported increased male preponderance , while only few researches found equal sex distribution in these cases.[11] Male preponderance in most of the CSOM studies is due to the active and adventurous nature in male children and young adults which predispose to traumatic conditions.

The antibiotic sensitivity of CSOM isolates in our study revealed maximum sensitivity to ciprofloxacin, ofloxacin and netilmycin(100%) followed by cefotaxime and ceftriaxone(75%) .Our antibiotic sensitivity pattern was consistent with the antibiotic sensitivity pattern of the studies of Divya vaishnavi et al [5] , Swarooprani et al [13] and Harvinder kumar etal [6] which revealed maximum sensitivity to quinolones & third generation cephalosporins. Previously amoxicillin and ampicillin were more frequently used than quinolones in chronic middle ear infections.But in the present day studies there is a changing behaviour of microorganisms showing more sensitivity to quinolones, cephalosporins and netilmycin.The clinicians usually avoid the use of quinolones due to their adverse effects on cartilage in growing children after their prolonged usage. However, it has been documented that quinolones can be used if required in children without any apprehensions [14, 15]. Third generation cephalosporins are very effective against the bacterial isolates of CSOM due to their extended antimicrobial system[16].However there remains a controversy over the question of ototoxicity with the topical usage of aminoglycosides like netilmycin . And also its systemic usage has been known to have a deleterious effect on the inner ear. Moreover,the fact that the disease process in CSOM itself causes a sensorineural hearing loss [17] makes the benefits derived from the usage of topical aminoglycosides in CSOM treatment and prevention of complications far outweigh the ototoxic side effects which may potentially occur. Keeping in mind all these facts, quinolones and third generation cephalosporins can be regarded as the most effective drugs in CSOM cases and can be considered for empiric therapy of CSOM in our hospital area.

Conclusion: The bacterial pathogens causing CSOM are unique to each geographical area. High carriage of Staphylococcus aureus strains in the external auditory canal and upper respiratory tract is prevalent in our hospital area. This emphasizes the need for continuous and periodic evaluation of the organisms causing CSOM and their antibiotic sensitivity from time to time. Immature immune system and anatomy of the Eustachian tube are responsible for the increased prevalence of CSOM in young children .Adventurous nature in males predispose to traumatic conditions.

Quinolones and third generation cephalosporins are the most effective drugs for CSOM in our hospital area and can be considered for empiric therapy of these cases. Knowledge of antibiotic sensitivity of bacteria causing CSOM is necessary to guide the physicians in prescribing appropriate antibiotics for successful treatment of CSOM. This will in turn lead to reduction in the treatment cost to the patient and in the long run also helps in minimizing the burden of deafness in the society.

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