Original Research Article

Bacteriological profile of chronic suppurative otitis media

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Abstract

Background: Chronic suppurative otitis media (CSOM) is the most commonly encountered middle ear disease. The knowledge of the etiological agents causing CSOM and their antimicrobial susceptibility pattern is of great importance for an effective treatment and prevention of complications. Hence, this study was carried out to know the bacterial etiology of CSOM and their antibiotic susceptibility pattern. **Material and Methods:** A total 89 ear swab samples were collected and sent to Microbiology laboratory. Bacterial isolates were identified using standard methods and antibiotic susceptibility testing was done. **Results:** P. aeruginosa had the highest prevalence of 34 (38.2%) followed by E. coli 28 (31.4%) and Staphylococcus aureus 11 (12.3%). Amikacin was the most effective antibiotic in the present study. It was effective against maximum number of strains 84 (93.3%) followed by Gentamicin 81 (90%) and levofloxacin 80 (88.8%). **Conclusion:** The most common the bacteriological agent associated with CSOM in our area was *Pseudomonas aeruginosa* with a gradual decline in their sensitivity to fluoroquinolones. Amikacin and levofloxacin has proven to be the drug of choice.

Key Words: Chronic suppurative otitis media, culture and antibiotic susceptibility, *Pseudomonas aeruginosa,* Amikacin.

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INTRODUCTION

Chronic suppurative otitis media (CSOM) is the most commonly encountered middle ear disease in the day to day practice of otorhinolaryngology. It is characterized by persistent or recurrent purulent discharge from the middle ear through a perforated tympanic membrane at least for 2 weeks[1]. CSOM was found to be a single major cause of conductive deafness. Prevalence of CSOM is more in the developing and underdeveloped countries. The incidence is highest among low hygiene populations or with overcrowding and malnutrition[2]. The disease usually occurs after upper respiratory viral infections followed by invasion of pyogenic organisms. Pseudomonas spp., *Staphylococcus aureus*, *Klebsiella pneumoniae*and Proteus spp.are found to be the common pyogenic organisms isolated from cases of CSOM[3]. There are two main varieties of CSOM viz. tubotympanic type and atticoantral CSOM. The later type of CSOM can cause severe adverse effects like intra and extracranial complications which can be life threatening. The complications of CSOM can be prevented to a greater extent by the judicious use of antibiotics. Due to the recurrent nature of the disease and the development of drug resistant pathogenic organisms, the control of infection poses a great therapeutic challenge. The knowledge of bacteriological profile helps in appropriate management of the cases. Hence this study was carried out to know the bacterial etiology of CSOM and their antibiotic susceptibility pattern.

MATERIAL AND METHODS

This study was carried out in an Ear Nose and Throat outpatient department of a tertiary care hospital. Patients presenting with chronic or recurrent ear discharge and on

clinical examination found to have discharging ears with perforation of the tympanic membrane were included in the study. A total of 75 patients with symptoms of CSOM were enrolled in the study. Out of 75 patients, 61 were unilateral cases and 14 were bilateral cases. Thus the total 89 samples were available for culture. Samples from 89 discharging ears were collected with the help of aural speculum by swabbing the discharging ears with two sterile cotton swabs. The swabs were sent to the Microbiology laboratory without delay. The first swab was used for direct Gram stain and the second swab was cultured on Blood agar and Macconkey's agar plates and incubated at 37^0C for 24 -48 hrs. The isolates grown were identified by their cultural characteristics, morphology and biochemical reactions[4].Antibiotic susceptibility testing of the organisms was done by Kirby Bauer method in Muller Hinton agar. The plates were read after overnight incubation at 37^0C by measuring the zone of inhibition around the antibiotic discs as per CLSI (Clinical Laboratory Standards Institute) guidelines[5].

RESULTS

Out of total 75 patients, 46 (61.3%) were male and 29 (38.6%) were female patients. Their ages ranged from 2 years to 62 years. 61 cases were unilateral and 14 were bilateral cases (Table 1).

Table 1: Demographic data of studied population

Demographic data	Number (%)
Age (years)	
<10	21 (28%)
11–20	18 (24%)
21–30	15 (20%)
31–40	06 (8%)
41–50	09 (12%)
51–60	04 (5.3%)
>60	02 (2.6%)
Sex	
Male	46 (61.3%)
Female	29 (38.6%)
Laterality	
Unilateral	61 (81.3%)
Bilateral	14 (18.6%)

Out of 89 samples cultured, 82 (92.1%) showed microbial growth while 7 (7.8%) had no growth. Among the 82 samples with growth, 74 (90.2%) samples showed growth of single isolates while 8 (9.8%) showed mixed isolates. Further, 56 (68.3%) were Gram negative isolates and 34 (41.4%) were Gram-positive isolates. The frequency of occurrence of the bacterial isolates as shown in Table 2 showed that *P. aeruginosa* had the highest prevalence of 34 (38.2%) followed by *E. coli*28 (31.4%) and *Staphylococcus aureus* 11 (12.3%). *Proteus* spp. had the lowest prevalence of 3 (3.3%).

Table 2: Distribution of bacterial species associated with CSOM patients

Bacterial isolates	No. of isolates (%)
Gram positive isolates	
Staphylococcus aureus	11 (12.3%)
Coagulase negative Staphylococcus	06 (6.7%)
Gram negative isolates	
Pseudomonas spp.	34 (38.2%)
Escherichia coli	28 (31.4%)
Klebsiella pneumonia	08 (8.9%)
Proteus spp.	03 (3.3%)

Antimicrobial susceptibility testing was carried out for all the isolates. Imipenem and colistin resistance was not seen to any of the isolate. Amikacin was the most effective antibiotic in the present study. It was effective against maximum number of strains 84 (93.3%) followed by Gentamicin 81 (90%) and levofloxacin 80 (88.8%).

Table 3: Antibiotic susceptibility pattern of CSOM isolates

Antibiotics	No. of susceptible strains (%)
Ciprofloxacin	67 (74.4%)
Ofloxacin	78 (86.6%)
Levofloxacin	80 (88.8%)
Amikacin	84 (93.3%)
Gentamicin	81 (90%)
Co-trimoxazole	48 (53.3%)
Cefotaxime	43 (47.7%)
Cefoperazone	53 (58.8%)
Imipenem	100 (100%)
Colistin	100 (100%)

DISCUSSION

CSOM is a middle ear disease affecting leading to considerable morbidity by causing hearing loss; and even life threatening complications like mastoiditis, meningitis and brain abscess, if left untreated over long periods of time. The present study showed that 46 (61.3%) were male and 29 (38.6%) were female patients. Okesola and Fasina[6], Akingbade *et al*[7] and Shrestha *et al*[8] studies also demonstrated more males than females. The male preponderance may be due to decreased attention to personal hygiene thus increased vulnerability of the male child to pathogens. Majority of the patients were below 10 years of age this finding agrees with the fact that CSOM is predominantly a childhood disease, particularly the under 10. This is partly because the immune system of children is not well developed compared to adult. Among the 82 samples with growth, 74 (90.2%) samples showed growth of single isolates, which is similar to the previous study by Agarwal *et al*[9]. In present study, no growth was seen in seven (7.8%) samples. Vijaya *et al* also found 5.28% sterile samples in their study[10]. In our study, *P. aeruginosa* (38.2%) has the highest prevalence of the isolated organism. Many of the previous studies showed Pseudomonastobe the most common bacteria isolated

from CSOM cases[11-13]. The predominance of *Pseudomonas* could be attributed to its higher adaptation ability compared to other organism. *S. aureus* (23.2%) was the second highest isolate in this study which is similar to the study done by Kazeem MJ, Aiyeleso R[14] andOni *et al*[15].The other isolated organisms in our study are *E. coli* and *Klebsiella pneumoniae*. This is similar to study by Loy *et al*[16]. Antibiotic susceptibility pattern was tested for all the isolated organisms. Imipenem and colistin resistance was not seen to any of the isolate. These drugs are considered as reserve drugs and should not be used primarily. Amikacin was the most effective antibiotic next to imipenem and colistin in the present study. It was effective against maximum number of strains 84 (93.3%) followed by Gentamicin 81 (90%) and levofloxacin 80 (88.8%). Fluoroquinolones such as ciprofloxacin, ofloxacin and levofloxacin are generally used for the treatment of Pseudomonas infections. But, sensitivity of these drugs is seem to be gradually dropping probably because of widespread self-medication due to availability of these drugs over the counter in developing countries like India. To conclude, the most common the bacteriological agent associated with CSOM in our area was *Pseudomonas aeruginosa*with a gradual decline in their sensitivity pattern to a number of fluoroquinolones. Amikacin and levofloxacin has proven to be the drug of choice. The knowledge of the etiological agents causing CSOM and their antimicrobial susceptibility pattern is of great importance for an effective treatment and prevention of complications.

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