International Journal of Tropical Medicine 1(2) : 62-65, 2006

Microbial and Antimicrobial Susceptibility Patterns from Patients with Chronic Otitis Media in Ardebil

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Abstract: Objective of this study is to identify the commonest microorganisms associated with Chronic Suppurative Otitis Media (CSOM) and their antimicrobial sensitivities. This study was carried out from 2003-2004 at the Department of ear and nose and throat of Ardebil University of medical sciences. Sixty one patients with chronic suppurative otitis media were prospectively studied. They had chronic ear discharge and had not received antibiotics for the previous five days. Also they had no cholesteatoma. Swabs were taken and cultured for bacteria. Bacteriological specimens were processed and identified with standard cultures. Antimicrobial susceptibility of these bacterial isolates was assessed by an agar disc diffusion method. Isolates were tested against 10 antibiotics: The most frequently isolated organism in chronic suppurative otitis media was Staphylococcus aureus 19 (31.15%), followed by Pseudomonas aeruginosa 16 (26.23%) and *Proteus* sp. 12 (19.67). Fungi accounted for 4 (6.56%) of the isolates. Sensitivity results showed majority of isolates were susceptible to Ciprofloxacin (85.71%) and resistant to Penicillin (84.97%). In conclusion, the in vitro susceptibility results indicate that Ciprofloxacin can be an effective antibiotic in the treatment of active chronic suppurative otitis media.

Key words: Microorganism, antibiogram, CSOM, microbiology

INTRODUCTION

Otitis media is an inflammation of the middle ear without reference to aetiology or pathogenesis. The cause and pathogenesis of otitis media are multifactorial. The single most important factor is upper respiratory tract viral and bacterial infection[1]. Chronic Otitis Media (COM) is a sequel of acute otitis media (AOM) and its most common forms include chronic dry perforation, Chronic Suppurative Otitis Media (CSOM)[2].

CSOM is a common cause of hearing impairment in low-and middle-income countries[3]. It can lead to intracranial complications, which were more common in pre-antibiotic era as compared to the present antibiotic era[4]. Early and accurate diagnosis of CSOM may have been life saving[5]. Knowledge of the local pattern of infection is essential to enable efficacious, treatment of this disorder.

The objective of this study was to identify the microbial profile and antibiograms of active CSOM patients in Ardebil, Iran.

MATERIALS AND METHODS

This cross-sectional study was carried out in Department of ear and nose and throat of Ardebil University of Medical Sciences from 2003 to 2004. Among patients that had CSOM, only 61 patients who had not received antibiotic therapy (topical or systemic) for the previous five days were included in the study. Patients with ear disease due to cholesteatoma were excluded from the study. Ear(s) discharging for culture was collected from the external auditory canal near the tympanic membrane using a sterile cotton swab. Bacteriological specimens were processed and identified with standard cultures. In vitro antimicrobial susceptibility of these bacterial isolates was assessed by an agar disc diffusion method. Using National Committee for Clinical Laboratory Standards (NCCLS) breakpoints for interpretation of results isolates were tested against 10 drugs: cloxacillin, streptomycin, erythromycin, ciprofloxacin, chloramphenicol, trimethoprim/ sulfamethoxazole, amikacin, amoxicillin, cephalexin and penicillin. Data were analyzed using SPSS to determine their incidences and antibiotic sensitivities.

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Table 1: Age groups of patients

Age groups(year)	No. of patients (%)
<10	9 (14.75)
11-20	13 (21.31)
21-30	16 (26.22)
31-40	6 (9.83)
41-50	12 (19.67)
>51	5 (8.19)

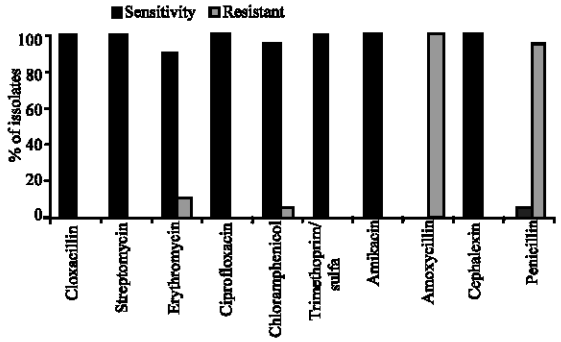

Fig. 1a: Antiboiotic profile of staphylococcus aureus

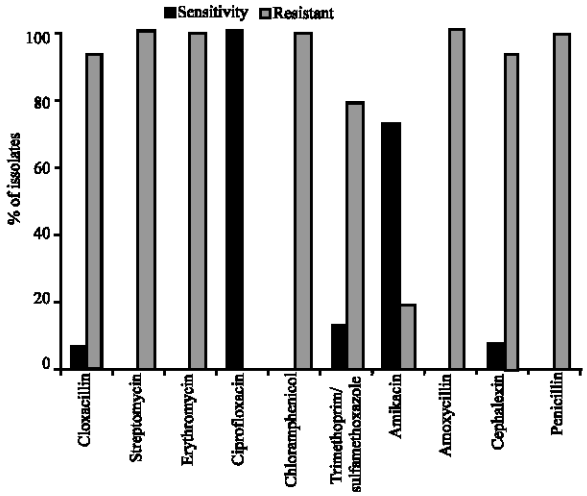

Fig. 1b: Antiboiotic profile of pseudomonas aeruginosa

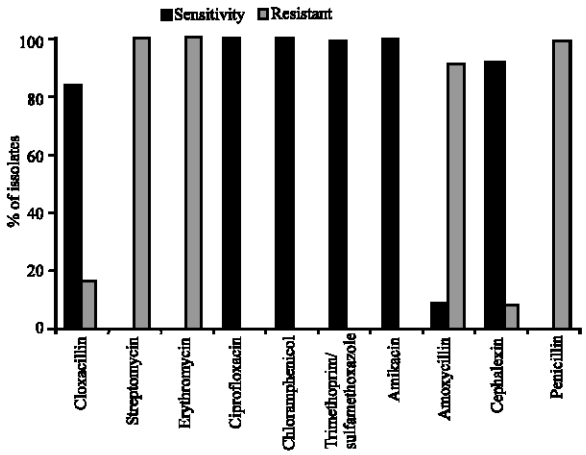

Fig. 1c: Antiboiotic profile of *Proteus* sp.

Table 2: Organisms isolated by bacterial culture from 61 patients with CSOM

Types of organisms	No. of isolates	infected patients (%)
Staphylococcus aureus	19	31.15
Pseudomonas aeruginosa	16	26.23
Proteus sp.	12	19.67
Staphylococcus epidarmidis	5	8.2
Candida albicans	4	6.56
Morganella sp.	3	4.91
Aeromonas sp.	1	1.63
Klebsiella sp.	1	1.63
Total	61	99.9*

* Total does not add up to 100% because numbers were rounded to the nearest 0.1%

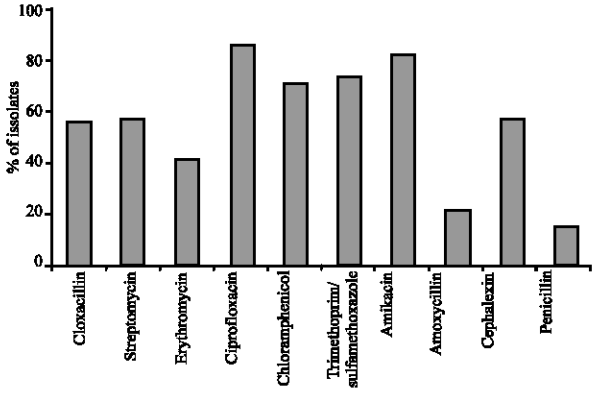

Fig. 2: Percent of total isolates sensitives to 10 anibiotics

RESULTS

The peak of age group in patients was between 21-30 years (26.22%) (Table 1). There was equal distribution between sexes (male 47% and female 53%).

From 61 patients enrolled in the study, there were 61 isolates. All the patients had a single organism isolated from the middle ear culture. All the isolates were association with the aerobes. The most common causal organisms isolated were Staphylococcus aureus 19 (31.15%) followed by Pseudomonas aeruginosa 16 (26.23%), *Proteus* sp.12 (19.67%). Fungi accounted for 4 (6.56%) of the isolates while 10 (16.39%) of cultured organisms comprised the remaining (Table 2).

The antimicrobial susceptibility profiles of three most common isolates were variable and are shown in (Fig. 1a-c).

Of the ten antibiotics that were tested, Ciprofloxacin had the highest susceptibility rate (85.71%) for all the isolates tested, followed by Amikacin (81.75%) and Trimethoprim-sulfamethoxazole (73.21%) (Fig. 2).

DISCUSSION

Chronic Suppurative Otitis Media (CSOM) is a condition of the middle ear that is characterized by

persistent or recurrent discharge through a chronic perforation of the tympanic membrane. Due to the perforated tympanic membrane, bacteria can gain entry into the middle ear via the external ear canal. Untreated cases of CSOM can result in a broad range of complications. These may be related to the spread of bacteria to structures adjacent to the ear or to local damage in the middle ear itself. Such complications range from persistent otorrhoea, mastoiditis, labyrinthitis and facial nerve paralysis to more serious intracranial abscesses or thromboses. While the incidence of such complications is low, they need to be borne in mind when faced by a patient with active CSOM. Treatment hence needs to be instituted early and effectively to avoid such complications. The mainstay of treatment for uncomplicated CSOM is twofold: meticulous aural toilet and instillation of a topical antimicrobial agent. The therapeutic use of antibiotics is usually started empirically prior to results of microbiological culture. Selection of any antibiotic is influenced by its efficacy, resistance of bacteria, safety, risk of toxicity and cost (6). Knowledge of the local microorganism pattern and their antibiotic sensitivity is then essential to allow for effective and cost-saving treatment.

Our results show that CSOM infection in Ardebil is mainly due to Staphylococcus aureus followed by Pseudomonas aeruginosa, *Proteus* sp. Total isolates were in association with the aerobes. This finding is in tandem with the pattern of CSOM infection within the cold region[7,8]. While predominance of predominant agent of CSOM in the tropical region were Pseudomonas aeruginosa followed by other microorganisms[9-12]. In the present study, with specific regard to the three most common pathogens in CSOM, Staphylococcus aureus was found to be resistant to Amoxicillin and Penicillin, and *Proteus* sp. resistant to Erythromycin, Streptomycin and Penicillin. While Staphylococcus aureus showed sensitivity to Ciprofloxacin and Amikacin. Anaerobic bacteria were not a significant pathogen according to our results. Similarly, while fungi were not specifically cultured for in this study, they also not appear to be a significant cause of active CSOM infection compared to bacteria. In this study, Majority of isolates were resistant to Penicillin. For the antibiotics commonly available locally as topical antibiotics, Ciprofloxacin was shown to be the most effective, with high sensitivities for the most commonly isolated organisms, while the lack of ototoxicity of Ciprofloxacin was not tested in our study. Several reports have indicated its efficacy particularly against Staphylococcus aureus and Pseudomonas aeruginosa. They would hence provide a viable alternative for the treatment of patients with active CSOM; although it's higher cost may prove prohibitively expensive for some patients[13,14]. Some reports have showed that Ciprofloxacin is a fluoroquinolone whose antimicrobial spectrum includes most major pathogens reported in CSOM, with the added advantage of not being ototoxic[15-17]. The most important adverse effect of Ciprofloxacin is cartilage damage in young animals, which was limited its use in children. The latter authors used Ciprofloxacin in 202 children aged 3 to 16 years and concluded that Ciprofloxacin appears to be safe and well tolerated in children[18,19]. The introduction of Ciprofloxacin as a topical treatment for CSOM may induce bacterial resistance[20]. Antimicrobial resistance is a growing problem worldwide and surveillance of resistance patterns is essential[21]. Treatment efficacy and safety are the main concerns for the chronic of ototopical preparation. In conclusion, while the lack of ototoxicity of Ciprofloxacin was not tested in our study, this antibiotic may be considered as a potential topical therapy for cases of chronic suppurative otitis media.

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