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Antimicrobial sensitivity profile of bacterial agents in chronic suppurative otitis media patients in Samawa city

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Abstract---Aim: this study was to determine bacterial profile and their antimicrobial susceptibility patterns in COSM from patients attending the Al-Husain Teaching Hospital, Samawah, Al-Muthanna. Material and Method: One hundred and Twenty patients with CSOM who presented to the Ear, Nose and Throat (ENT) department in ENT in Al-Husain Teaching Hospital, Samawah city, from June 2019 to May 2021 were prospectively studied. The discharge was either frankly purulent, muco-purulent, serous or blood stained on occasion. Detailed clinical history regarding unique identification number, name, age, sex, duration of discharge, other associated symptoms and antibiotic therapy were taken. Result: Chronic suppurative otitis media (CSOM) is the result of an initial episode of acute otitis media and is characterized by a persistent discharge from the middle ear through a tympanic perforation. It is an important cause of preventable hearing loss, particularly in the developing area study. Conclusion : The predominant OM aetiologies were *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Proteus mirabilis*, and *Staphylococcus aureus*, and they were generally susceptible to most of the antibiotics tested. Amikacin, cefepime, ciprofloxacin, and meropenem could be valuable in the empirical management of OM.

Keywords---otitis media, bacterial agents, antimicrobial.

Introduction

Chronic suppurative otitis media (CSOM) is a chronic inflammation or persistent infection of the middle ear cleft—the Eustachian tube, middle ear, and mastoid air cells [1, 2]. It is the most commonly occurred infectious ear disease in children, as well as in young adults [3]. It is characterized by chronic, intermittent or persistent otorrhea or ear discharge for at least 2 weeks or more through a perforated tympanic membrane [4, 5]. Chronic suppurative otitis media (CSOM) is defined as chronic inflammation of middle ear cavity that may present with

recurrent ear discharges through a tympanic perforation [6]. Chronic suppurative otitis media is one of the most common chronic diseases of childhood. It is one of the major causes of deafness in Iraq. It is more common in the lower socioeconomic group [7]. Most of the studies on the microbiology of CSOM have revealed that the most common bacteria associated with CSOM are *Pseudomonas*, *Staphylococcus aureus*, *Proteus* and *Klebsiella* [7]. The bacteria are uncommon in the skin of the external auditory canal, but in the presence of trauma, inflammation or high humidity these may proliferate [8]. CSOM has received considerable attention, not only because of its high incidence and chronicity, but also because of issues such as drug resistance and ototoxicity with both topical and systemic antibiotics [9, 10].

The aetiology and pathogenesis of CSOM is multifactorial and includes different causes like genetic, allergy, eustachian tube dysfunction and infection [11]. CSOM is one of the important cause in children for physician visit and can cause enormous economic burden to society [12]. The organism isolated in microbiological culture of CSOM cases can be aerobic, anaerobic or mixed with most commonly isolated organisms being *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Proteus* species, *Klebsiella* species, or anaerobic bacteria like *Bacteroides*, *Peptostreptococcus* or mixed organisms [13, 14].

There are few studies documented in Iraq, for instance a study carried out in samawa city revealed a high prevalence, 42.8% COSM among otitis media patients and the most common isolates were *Klebsiella* spp., *E. coli*, and *Diphtheroids* with the prevalence of 38.97%, 11.7%, and 8.3%, respectively [15]. Another similar study conducted in Thi-qar city showed that the prevalence of COSM was 73.2% and the predominant isolates were *Proteus* spp., *S. aureus* and *Pseudomonas* spp. with a prevalence of 25.2%, 23%, and 15.5%, respectively [16]. Thus, having current information on the etiologies responsible for COSM and their antimicrobial susceptibility pattern is an important for prompt and effective treatment. Therefore, the aim of this study was to determine bacterial profile and their antimicrobial susceptibility patterns in COSM from patients attending the Al-Husain Teaching Hospital, Samawah, Al-Muthanna.

Material and Method

Sample collection

One hundred and Twenty patients with CSOM who presented to the Ear, Nose and Throat (ENT) department in ENT in Al-Husain Teaching Hospital, Samawah city, from June 2019 to May 2021 were prospectively studied. The discharge was either frankly purulent, muco-purulent, serous or blood stained on occasion. Detailed clinical history regarding unique identification number, name, age, sex, duration of discharge, other associated symptoms and antibiotic therapy were taken. Sterile cotton swabs were used to collect ear discharge from CSOM patients. Only those cases were selected who had not taken any treatment either systemic or local for the last 7 days [9, 10].

Culture and identification

The middle-ear discharge was collected by an ENT specialist under strict aseptic conditions using single-use mini-tip culture swabs, after cleaning the external auditory canal with a spirit swab. The swabs were transported to the bacteriology laboratory in the biomedical complex at the Al-Husain Teaching Hospital and Laboratory Sciences for culture and susceptibility testing. The swab was directly inoculated on 5% sheep blood agar, chocolate agar, and MacConkey agar (HiMedia, USA). The blood and Mac- Conkey agar plates were incubated aerobically while chocolate agar was incubated under 5% CO₂ atmosphere at 37 °C for 24–48 h. The isolates were identified by colony morphology, Gram stain, oxidase test, triple sugar iron agar, indole production, H₂S production, citrate utilization, motility test, urease test, carbohydrate utilization tests, catalase, coagulase, DNase, bacitracin, and optochin susceptibility tests [17].

Antimicrobial sensitivity

Antimicrobial sensitivity testing for aerobic isolates was carried out by modified Kirby Bauer disc diffusion method on Muller Hinton agar. Results were interpreted in accordance with Clinical Laboratory and Standard Institute guidelines.

Statistical analysis

The statistical significance level was established at a P-value ≤ 0.05 .

Results

During the 12 months finding period a total of 120 patients admitted for ear discharge to the Ear, Nose and Throat (ENT) section at Al-Husain Teaching Hospital, Samawah city, who had CSOM were enrolled. Thirty (39.3%) were female and 32 (60.7%) were male. The mean age of the study participant was 35 years ranged from 16 to 64 years. Twenty (32.3%) of them were aged below 25 years and 37 (43.5%) were between 16 and 30 years. Thirty-eight (61.3%) of the patients were from the urban area, 46 (67.7%) ear discharge was from adults. Fifty-nine (94.1%) of the patients had unilateral CSOM, involving the right ear in 33 (53.2%). The bacteria isolates from patients of CSOM is shown in (Table 1). *Pseudomonas aeruginosa* was the most common isolate followed by *Staphylococcus aureus*, *Proteus.sp* , *Ecoli* and *Klebsiella.sp* .

Table 1: Bacteria isolated from patient of CSOM

Isolated bacteria	Number of patient	%
<i>Pseudomonas aeruginosa</i>	41	31.8%
<i>Staphylococcus aureus</i>	26	27.3%
<i>Proteus sp</i>	23	13.29%
<i>E.coli</i>	13	5.4%
<i>Streptococcus pyogens</i>	9	4.1%
<i>Klebsiella sp</i>	3	1.92%

Enterococcus sp	3	1.93%
Acinococcus sp	2	1.84%

Table 2: Antibiotic sensitivity pattern of Pseudomonas spp. Isolates

Antibiotics	Pseudomonas
Tobramycin	71.63%
Ticarcillin/Clavulanic acid	40.92%
Meropenem	67.03%
Ciprofloxacin	68.11%
Ceftazidime	35.84%
Cefoperazone sulbactam	41.77%
Aztreonam	81.32%

Table 3: Antibiotic sensitivity pattern of Staphylococcus aureus

Antibiotics	Staphylococcus species
Vancomycin	98%
Linezolid	96%
Cefoperazone/ Sulbactam	83%
Amikacin	71%
Clindamycin	64%
Piperacillin /Tazobactam	51%
Erythromycin	36%

Table 4: Antibiotic sensitivity of proteus sp

Antibiotics	proteus sp
Amkacine	95%
Ciprofloxacin	92%
Pipracillin	79%
Ceftriaxone	71%
Levofloxacin	52%
Pipracillin + tazobactam	47%
Imipenem	39%

Table 5: Antibiotic sensitivity pattern of Gram negative isolates

Antibiotics	E.coli	Klebsiella	Citrobacter
Amkacine	99	96	86
Ciprofloxacin	92	91	79
Pipracillin	83	90	61
Ceftriaxone	81	82	56
Levofloxacin	78	62	51
Pipracillin + tazobactam	66	59	42
Imipenem	81	51	35

Discussion

The present study provides information on the distribution of bacterial isolates causing chronic suppurative otitis media along with their antibiotic susceptibility pattern that plays a decisive role in effective management of the cases. This study also provides insights into the susceptibility profile of bacteria isolated from ear infections. In general, our result has demonstrated that ciprofloxacin, norfloxacin, nalidixic acid, gentamicin and chloramphenicol are effective against Gram-negative bacteria and cephalosporin family, such as cefixime, cefuroxime, cefepime showed a variable range of susceptibility against Gram-negative bacteria. However, amoxicillin-clavulanic acid, gentamicin, chloramphenicol, clarithromycin, and tobramycin were relatively active against Gram-positive bacteria. Antimicrobial resistance patterns are influenced by source of the isolates, classes of antimicrobial agents, pressure exerted by antimicrobial use, and geographic location [18]. In a similar study done by [19, 20] with a total of 92 patients the *Pseudomonas aeruginosa* (48%) and *Staphylococcus aureus* (28.3%) were the most common pathogens found in Chronic suppurative otitis media. With regard to antibiotic susceptibility for organisms, *Staphylococcus aureus* showed maximum sensitivity to erythromycin, followed by cotrimoxazole, and moderate sensitivity to ampicillin. Whereas, maximum resistance was seen for ciprofloxacin, followed by amoxiclavate. Similarly, in a study conducted by [19], *Staphylococcus aureus* showed maximum sensitivity to erythromycin (69%), cotrimoxazole (92%), moderate sensitivity to ampicillin (51%), and ciprofloxacin (43%). A study by [16] showed 50% resistance to ciprofloxacin. In contrast, In a study by [20], *Staphylococcus aureus* showed sensitivity to ciprofloxacin (82%) and erythromycin (73%).

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