ORIGINAL ARTICLE

Microbiology of chronic suppurative otitis media (CSOM) in tertiary care setup, Civil Hospital Karachi, Pakistan

Tariq Zahid, Zeba Ahmed, Zehra Aqeel

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Abstract:

Objective: the aim of this study is to identify the most common bacterial isolates causing CSOM in our setup to help guide the effective management of the disease.

Background: Chronic Suppurative Otitis Media is one of the most common infection and a major health problem in developing countries like Pakistan which leads to serious complications if not treated properly. Its poor response to routine treatment and emergence of resistance strains were the factors responsible for undertaking this study.

Materials and Methods: Total 100 patients were included in the study with unilateral or bilateral discharge for more than 3 months attending ENT out patient department, civil hospital Karachi from December 2015 to May 2016. Samples were taken by using sterile swabs and were cultured on aerobic media and their drug susceptibility was tested according to the standard protocol by using Kirby bauer disc diffusion method.

Results:Overall microbiology of 100 samples was studied. Mono microbial growth was present in all 95 samples and five were sterile. Pseudomonas aeruginosa (38%) was the most common bacterial isolate, followed by staphylococcus (28%), Proteus mirabilis (21%), E coli, (3%), Klebsiella (3%) and Candida (2%). Among Staphylococcus aureus, 12 cases were Methicillin resistant (MRSA).

Conclusion: Knowledge of the local micro organism pattern and their antibiotic sensitivity is essential for the early, effective and cost saving treatment of CSOM and to prevent the complications and development of antibiotic resistance

Keywors: Chronic Suppurative Otitis Media, aerobic media, Pseudomonas aeruginosa, Staphylococcus aureus, Proteus mirabilis, Klebsiella, Candida, MRSA

Dow University of Health Sciences and Civil Hospital Karachi
T Zahid
Z Ahmed
Z Aqeel

Correspondence:
Dr. Zeba Ahmed
Department of Otorhinolaryngology, Head and Neck Surgery, Dow Medical College, Dow University of Health Sciences and Civil Hospital, Karachi
Email:ahmedkhanz@hotmail.com
cell # 03002321329

Introduction:

Chronic suppurative otitis media (CSOM) is a chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent ear discharges or otorrhoea through a tympanic membrane perforation.[1] The diagnosis of chronic otitis media implies a permanent abnormality of the pars tensa or flaccida, that may results due to earlier acute otitis media, negative middle ear pressure or otitis media with effusion.[3]

The episodes of otorrhoea are often provoked by upper respiratory infections particularly in children. Soiling of the middle ear from swimming or bathing also leads to intermittent and unpleasant discharges.[1]

CSOM is divided in two types, Tubotympanic and Atticoantral disease, Tubotympanic disease is a mucosal disease and it is called as active when there is a perforation of pars tensa with inflammation of mucosa and mucopurulent discharge. It is called inactive when there is permanent perforation of pars tensa but middle ear mucosa is not inflammed and there is no discharge.[4] It is called healed when there are permanent abnormalities of pars tensa, but the ear does not have propensity to become active because pars tensa is intact and there are no significant retractions of the pars tensa or flaccida.[3] Atticoantral has been called Squamous disease and it may be inactive when there are retraction pockets in pars tensa or flaccida. There is no discharge

Table 1: *Sex wise distribution*

Gender	Frequency
Male	47
Female	53
Total	100

Table II: *Age wise distribution of isolates in chronic suppurative otitis media*

Age	Frequency%
0-10	42
11-20	21
21-30	15
31-40	16
41-50	5
51-60	1
Total	100

Table III: *Distribution of various isolates in chronic suppurative otitis media*

Microorganism	Frequency%
Pseudomonas Aeroginosa	38%
Staphylococcus Aureus	28%
Proteus mirabilis	21%
Escherichia Coli	3%
Klebsiella Pneumoniae	3%
Candida Albicans	2%
No Growth	5%
Total	100

but there is a possibility of squamous debris in retraction pockets to become infected and start discharging. While active squamous disease implies presence of cholesteatoma of posterosuperior region of pars tensa or flaccida.[4] Infection can spread from middle-ear to vital structures such as mastoid, facial nerve, labyrinth, lateral sinus, meninges and brain leading to mastoid abscess, facial nerve, paralysis, deafness, lateral sinus thrombosis, meningitis and intracranial abscess.[6,7]

The incidence of chronic suppurative otitis media is higher in developing countries, especially in lower socio-economic status (with an urban: rural ration of 1:2) because of poor nutrition, improper hygiene and lack of health education.[5] It affects both sexes and all age groups.[4] Most common micro organisms found in CSOM are Pseudomonas aeruginosa, Staphylococcus aureus, Proteus mirabilis, Klebsiella pneumoniae, Escherichia coli, Aspergillus spp and Candida spp but these organisms vary in various geographical areas.[2] This study was conducted to determine the local pattern of aerobic isolates in cases of CSOM in this region to guide the clinician for the effective medical management of the disease.

Materials and Methods:

A cross sectional study was conducted for a period of 6 months (from December 2015 to May 2016) in ENT department of Tertiary Care Setup, Civil Hospital Karachi.

Total 100 patients were included in the study who were clinically diagnosed as a case of CSOM. Patients who had ear discharge (unilateral or bilateral) for more than 3 months and did not received antibiotic therapy (both topical and systemic) for the last 5 days were selected. Patients of all age groups and both sexes were included. Samples were taken by using sterile cotton swabs. Samples were used for aerobic culture and was plated on nutrient agar, blood agar and Mac conkey agar and incubated at 37°C for 24 – 48 hrs. Drug susceptibility was tested according to the standard protocol by Kirby Bauer Disc diffusion method in Muller Hinton agar. Results were interpreted in accordance with Clinical Laboratory and Standard Institute guidelines (CLSI)[9].

The data was analyzed by using Statistical Package for Social Sciences (SPSS) version 16 and the prevalence of organisms was determined and expressed in percentage.

Results:

Total 100 cases of CSOM were randomly selected and out of it 95 were culture positive with mono microbial growth. Five cases were culture negative. There was predominance of females (53%) over males (47%) (Table 1). The peak incidence of CSOM was observed in age range of 0-10 years followed by 11-20 years. Age wise distribution of culture positive cases is shown in Table 2.

The most common organism isolated in this study was found to be Pseudomonas Aeroginosa in 38% of cases followed by Staphylococcus Aureus in 28% of cases and Proteus mirabilis being the 3rd most common organism isolated in 21% of cases. Escherichia Coli and klebsiella pneumoniae were the other gram negative organisms isolated. Only 2 cases showed fungal growth that was of candida albicans as shown in table 3.

Among Staphylococcus aureus, 12 cases were Methicillin resistant (MRSA)

Discussion:

CSOM is a major health burden in developing countries like Pakistan. Malnutrition, overcrowding, substandard hygiene, frequent upper respiratory tract infections and under-resourced health care (all linked to low socioeconomic status) are the risk factors for developing CSOM.[10] Due to lack of awareness and inaccessibility to health care, patients in our environment tend to live with the disease and tolerate its discomfort with resultant fatal consequences[11]. It is an important cause of preventable hearing loss. According to the WHO survey, the global burden of illness from CSOM involves 65–330 million individuals with draining ears, 60% of whom (39–200 million) suffer from significant hearing impairment.[1] Early microbiological diagnosis and targeted antibiotic treatment can reduce the incidence of complications associated with CSOM. In our study 95% cases were culture positive with mono microbial growth and 5 cases were sterile. Corresponding results were reported in a similar study with 100% mono microbial growth[13]. In contrast some authors reported poly microbial growth in few cases with predominant mono microbial growth[14,15,18]. Slight predominance of females (53%) over males (47%) was seen in our study but that finding might be incidental due to random selection of cases. This was parallel with the findings of few other authors[14,17,18] and contrast to[15,16,5]. Children were found to be most affected group predominantly of age group 0-10 years followed by 11-20 years. This finding was parallel to the findings reported by few other researchers[19,15,18] Reason being the frequent episodes of upper respiratory tract infections in children and subsequent otitis media with effusion that results in tympanic membrane perforation through which bacteria causing CSOM gains entry into the middle ear. URTI, LRTI, Poor hygiene, introduction of foreign body in Ear, parental smoking, artificial feeding and misuse of antibiotics were found to be the major risk factors for Otitis Media according to a study[12]. A study from Hisar and Jaipur reported high number of cases in second and third decade[5,16,13] whereas a study in Singapore reported high incidence in 4th decade[17].

The most common bacterial isolates found in this study were Pseudomonas aeroginosa (38%) and staphylococcus Aureus, 2nd most common isolate (28%), which is in correspondence with microbial flora of csom in studies reported by Attallah et al[21], from India[5,16] and by Loy et al[17] from Singapore. In contrast, study reported by Prakash et al[15] from India and Nikakhlagh et al[20] from Iran reported Staphylococcus aureus being the most common bacterial isolate. Among the Gram negative bacteria, after Pseudomonas, Proteus mirabilis was the 3rd most common bacteria isolated from 21% of cases whereas Klebsiella and Ecoli were isolated from 3% & 3% of cases respectively. This is in corroboration with the findings in a study by Mansoor et al[18] from Pakistan, by Kumar et al[16] from Jaipur, India and by Attallah et al from KSA. A study by Poorey et al[22] reported klebsiella as second most common bacterial isolate. Same was reported by Kumar et al[13] in a study from India. E coli was isolated in only 3-4 % of cases according to different researches. Frequent isolation of water bacteria like pseudomonas and fecal colliforms like ecoli and klebsiella indicates poor hygienic conditions.

These causative bacteria of CSOM are infrequently found in the skin of external canal, but they may proliferate in the presence of trauma, inflammation, laceration or high humidity. Among these bacteria, P. aeruginosa has been particularly blamed for the deep-seated and progressive destruction of middle ear and mastoid

structures through its toxins and enzymes.[1]

Paeruginosa uses pili to attach to necrotic or diseased epithelium of the middle ear. Once attached, the organism produces proteases, lipopolysaccharide, and other enzymes to prevent normal immunologic defense mechanisms from fighting the infection. The ensuing damage from bacterial and inflammatory enzymes creates further damage, necrosis, and, eventually, bone erosion leading to some of the complications of CSOM. Fortunately, in the immunocompetent individual, the infection rarely causes serious complications or disseminated disease. Pseudomonal infections commonly resist macrolides, extended-spectrum penicillins, and first- and second generation cephalosporins. This can complicate treatment plans, especially in children.[6]

In view of the findings of our study and the literature review, it was found that microbiological profile in CSOM is changing from time to time and slight differences observed in the isolates and species were might be because of geographical and or ethnic variations.

Conclusion:
In conclusion, knowledge of the responsible local pathogens in CSOM is essential for the proper management of the disease to prevent the complications associated with its persistence and emergence of resistant bacterial strains.

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Role and contribution of authors:
Dr Tariq Zahid, Assistant Professor Dept of ENT Head and Neck Surgery, DUHS CHK, did major contribution to conception and design of work. Major part in collecting the data and final approval of the version to be published and drafted the work, revised it critically for important intellectual content

Dr Zeba Ahmed, Associate Professor, Dept of ENT Head and Neck surgery, DUHS CHK, did data collector and also analysed the data. The corresponding author takes primary responsibility for communication with the journal during the manuscript submission, peer review, publication process, and ensures that all the journal's administrative requirements

Dr Zehra Aqeel, Post graduate trainee, did data collection and helped in discussion writing.

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