PROSPECTIVE STUDY OF AEROBIC BACTERIOLOGICAL AND MYCOLOGICAL PATTERN IN CHRONIC SUPPURATIVE OTITIS MEDIA PATIENTS

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Introduction

Chronic Suppurative Otitis Media (CSOM) is significant health problem and is an important cause of preventable hearing loss. The WHO estimates that up to 28 000 yearly deaths can be attributed to CSOM on a global basis. .The disease is classified into tubotympanic and atticoantral depending upon where the disease affects. Tubotympanic is called safe type as there is no serious complication whereas, attico-antral is called the unsafe type because of higher rate of complications that may be life threatening . Various studies reported different bacteriological and mycological patterns of predominance in CSOM. Commonly isolated aerobic bacteria are Pseudomonas aeruginosa, Escherichia coli, Staphylococcus aureus, Streptococcus pyogenes, Proteus mirabilis and Klebsiella spp also Fungi like Candida species and Aspergillus species. The type of organism isolated varies between geographical areas and other factors. Inadequate treatment can result in severe, life-threatening adverse effects such as mastoid abscess, facial nerve paralysis, lateral sinus thrombosis, meningitis, and intracranial abscess. The identification of the microorganisms responsible for CSOM can help in the selection of the most appropriate antibiotic for the treatment regimen.

Aim of the work

1-Assess the current aerobic bacterial and mycological profile of CSOM patients attending Alexandria university Otorhinolaryngology outpatient clinic.
2-Compare incidence of different microorganisms among safe and unsafe CSOM.
3-Determine the antimicrobial susceptibility of different isolates to guide empirical antimicrobial treatment.

Subjects and Methods

study design and setting: A prospective study that included patients complaining of CSOM referred to Otorhinolaryngology, Faculty of Medicine, Alexandria University from April 2024 to April 2025. Study population: 110 patients with chronic suppurative otitis media (CSOM) . Study measures and data collection : Patient assessment : The medical records of all included patients were analyzed. Data obtained were categorized according to age, sex ,complete otological examination and type of ear pathology , Swab collection : Pus specimens from discharging ears were collected using two sterile cotton swabs taken from the deeper part of the canal , then Both swabs were transferred to the diagnostic microbiology lab of Alexandria university hospital for processing without delay. Specimens processing started by Gram-stained smear preparation, the other swab was cultured on chocolate, blood, MacConkey and Sabouraud's dextrose agar and incubated for 48 hours .Finally All isolated microorganisms were identified using standard microbiological procedures and antimicrobial susceptibility was be performed using CLSI guidelines Statistical analysis: Data were fed to the computer and analyzed using IBM SPSS software package version 20 . A p-value of < 0.05 was considered statistically significant.

Results

The microbiological and antimicrobial susceptibility profiles of 110 patients with chronic suppurative otitis media (CSOM) were analyzed. The results revealed distinct patterns in microbial prevalence, distribution between safe and unsafe CSOM, and antibiotic resistance trends, as detailed below.

The study was conducted on 110 patients (55 safe and 55 unsafe cases), (6) of them had bilateral ear pathology, (59) right ears and (57) left ears and we managed to get (132) isolates from them. Most cases were observed in the 21–30 years (27.3%) and 31–40 years (26.4%) age groups, collectively accounting for more than half (53.7%) of the study population. Most of cases (94.5%) were unilateral, while only 5.5% of cases exhibited bilateral involvement. The occurrence of unsafe CSOM (50.9%) was slightly higher than that of safe CSOM (49.1%), though the difference is minimal. The distribution of isolated organisms from the studied cases is as follows ,Pseudomonas spp. (28.0%) was the most frequently isolated pathogen, followed by Staphylococcus CoNS (13.6%), Proteus spp. (12.1%), and Staphylococcus aureus (9.8%). Fungal infections, represented by Aspergillus spp. (9.1%) and Candida spp. (1.5%), were less common. Also 15.2% of isolates showed no growth

Table (1): Distribution of the Isolated Organisms According to Ear Pathology (n = 110)
*Statistically significant at p < 0.05

Organism Type	Safe CSOM (n = 55)	%	Unsafe CSOM (n = 55)	%	p-value
Pseudomonas SPP	12	21.8	25	45.5	0.0154*
Staphylococcus Aureus	8	14.5	5	9.1	0.5547
Staphylococcus CONS	8	14.5	10	18.2	0.7966
Klebsiella	1	1.8	5	9.1	0.2078
Proteus SPP	4	7.3	12	21.8	0.0583
Corynebacterium SPP	0	0.0	2	3.6	0.4755
E. coli	0	0.0	2	3.6	0.4755
Acinetobacter SPP	2	3.6	2	3.6	1.0000
Aspergillus SPP	8	14.5	4	7.3	0.3589
Candida	2	3.6	0	0.0	0.4755
No growth	16	29.1	4	7.3	0.0153*

table (1) Pseudomonas spp. was significantly more prevalent in **unsafe CSOM** (45.5%) compared to **safe CSOM** (21.8%), with a statistically significant difference (**p = 0.0154**). Similarly, cases with **no growth** were significantly higher in safe CSOM (29.1%) than in unsafe CSOM (7.3%) (**p = 0.0153**). Other organisms, including Staphylococcus aureus, CoNS, Proteus spp., and fungi, did not show significant differences between the two groups (**p > 0.05**). These findings suggest a stronger association of **Pseudomonas spp. with unsafe CSOM**, highlighting its clinical importance in more severe disease presentations

The antimicrobial susceptibility profile of Pseudomonas spp,The highest sensitivity was observed for Gentamicin (100%) and Meropenem (100%). Piperacillin-Tazobactam (88.2%), Ceftazidime-Avibactam (81.0%), and Ceftazidime (80.6%) also demonstrated strong efficacy, However, resistance to fluoroquinolones was particularly concerning, with Ciprofloxacin (63.3%) and Levofloxacin (64.3%) showing high resistance rates, suggests that these antibiotics should no longer be considered first-line treatments for CSOM. Staphylococcus aureus and Coagulase-negative Staphylococci (CoNS) , Glycopeptides (Vancomycin 100%, and Linezolid 91.7%)were the most effective agents making them first-line options for Staphylococci infections. Similarly, Linezolid (100%) and Vancomycin (88.9%) exhibited the highest efficacy against CoNS. Fluoroquinolone and Macrolides resistance was particularly high

Among the Staphylococcus aureus isolates, 46.2% demonstrated resistance to cefoxitin, confirming the presence of methicillin-resistant Staphylococcus aureus (MRSA). Similarly, 38.8% of CoNS isolates were cefoxitin-resistant.

the susceptibility profile among the antifungals tested, Voriconazole stands out with a 92.3% sensitivity, making it the most effective and preferred option Nystatin, with 66.7% sensitivity, shows moderate effectiveness, Fluconazole, with 83.3% resistance

Conclusion

This study emphasizes the aerobic bacterial and fungal profile of chronic suppurative otitis media (CSOM), identifying Pseudomonas spp. as the predominant isolate, followed by Staphylococcus CoNS, Proteus spp., and Staphylococcus aureus. Antibiotic susceptibility testing showed excellent efficacy of Gentamicin, Meropenem, and Vancomycin, while resistance to Ciprofloxacin and the detection of methicillin-resistant strains underscore the growing challenge of antimicrobial resistance in otologic infections. Fungal pathogens, notably Aspergillus spp., were also observed, with high sensitivity to Voriconazole and marked resistance to Fluconazole. These findings support the need for routine culture-based diagnosis and the use of targeted antimicrobial therapy to improve patient outcomes and reduce the misuse of broad-spectrum agents. From a public health perspective, continued surveillance of resistance patterns and the promotion of antimicrobial stewardship are critical in managing CSOM effectively.