

BACTERIAL PROFILE AND ANTIBIOTIC SENSITIVITY PATTERN OF CSOM PATIENT IN MEWAT REGION

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ABSTRACT

INTRODUCTION

The purpose of the present study was to determine the microbiological profile and antimicrobial susceptibility pattern of isolates from discharge in CSOM.

MATERIAL AND METHODS

This study included a total of 187 patients of CSOM with unilateral or bilateral discharge attending department of ENT in SHKM Govt. Medical College and Hospital Nalhar, Mewat, Haryana March 2015 to August 2015. Samples were inoculated on blood and Mac Conkey agar for 24- 48hrs and identification of organism was done by using standard biochemical reactions and antibiotic susceptibility testing done by using modified Kirby Bauer method as per CLSI guidelines.

RESULT

Among 187 patients included in the study, most of the patients were between age group 11-20 years. CSOM was found to be more common in female patients (52%) than in male (48%) patients. The most common organisms were: Staphylococcus aureus (36%); Pseudomonas aeruginosa (34%); Klebsiella species, (6%) Proteus species (5%); Escherichia coli (4%); and other bacteria like Coagulase negative Staphylococcal species; Citrobacter spp, Enterobacter spp, Enterococcus spp,. According to antimicrobial susceptibility testing, Staphylococcus aureus was more sensitive to ciprofloxacin and gentamycin. Majority of gram negative isolates were sensitive to imipenem, quinolones and amikacin.

CONCLUSION

Result of our study showed high prevalence and resistance rate of Staphylococci and Pseudomonas isolates from CSOM patients to β - lactam and other commonly used antimicrobials. Our study suggested that Amikacin, Piperacillin-Tazobactam and quinolones are best choice in these cases. Therefore an appropriate knowledge of antibacterial susceptibility of microorganism may contribute to rational antibiotic use and the success of treatment for CSOM.

KEYWORDS

CSOM, Antimicrobial susceptibility pattern, Drug resistance.

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INTRODUCTION: Chronic suppurative otitis media (CSOM) is a common disease of childhood. It is a persistent or intermittent infection of ear for more than three months duration. There is purulent or muco-purulent discharge through the perforated tympanic membrane. Causative micro-organism may be bacteria, fungi and virus resulting in inflammation of mucosal lining of middle ear. If not treated it leads to partial or total loss of the tympanic membrane and ossicles resulting in acquired hearing loss.¹

Infection can spread from the middle ear to involve the mastoid, facial nerve, labyrinth, lateral sinus, meninges and brain leading to mastoid abscesses, facial nerve paralysis, deafness, lateral sinus thrombosis, meningitis and intracranial abscesses.²

The risk of prevalence of the diseases become higher in people with low socioeconomic status, Poor living conditions, overcrowding, substandard hygiene, and malnutrition and under resource health care. It is the commonest childhood infectious disease worldwide starting early in life but in our environment; presentation may be in adult life it can be managed at the primary health care level thereby preventing the development of deafness and even fatal complications.³ It is a highly prevalent condition and an important cause of preventable hearing loss. According to a classification by World Health Organization (WHO) for burden of CSOM, India put into highest (>4%) prevalence group. CSOM often

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presents with hearing loss and for understanding deafness we need to understand the mechanics of sound transmission in diseased middle ears. In CSOM Common aerobic bacteria are *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Escherichia coli*, *Streptococcus pyogenes*, *Proteus mirabilis*, *Klebsiella* species.⁴

MATERIALS & METHODS: 187 isolates were collected from patients of clinically diagnosed CSOM, attended OPD of Ear, Nose and Throat (ENT) department in S.H.K.M. Government Medical College & Hospital from March 2015 to August 2015 were prospectively studied. Maximum patients were with frankly purulent, muco-purulent, and serous or blood stained discharge on occasion. Detailed clinical history regarding unique identification number, name, age and sex, duration of discharge, other associated symptoms and antibiotic therapy were noted down. History was taken from patients.⁵

Inclusion Criteria:

1. Clinically diagnosed cases of CSOM.
2. Active purulent discharge at time of examination.

Exclusion Criteria:

1. Discharge with in < 3 month duration.
2. Discharge with intact tympanic membrane (otitis externa).
3. Patient receiving antibiotic at presentation.
4. History of topical and systemic antibiotic in last 7 days.

Sample Size: Study was done in 187 patients of CSOM who presented to the Ear, Nose and Throat (ENT) department in S.H.K.M. Government Medical College & Hospital.

METHODOLOGY: The ear discharge from the middle ear was collected by sterile swabs under aseptic conditions with help of aural speculum and sent to the department of Microbiology for bacterial culture. The organisms were identified by morphology, cultural characteristics, pigment production and biochemical reaction followed by antibiotic sensitivity test. The swab was sub-cultured on blood Agar, Mac Conkey's and chocolate agar and incubated aerobically at 37°C for an overnight.⁵

RESULT: Out of 187 isolates males were 48 % and females were 52%. Age of patients was ranging from 1year to 75 years. Higher infection rate was observed in age group 11-20 year followed by <10 year. Out of 187 patients, 85% patients were from OPD and 39% had it in right ear, 34% had left and 27% had bilateral ear discharge. 3% patients had history of fever, 8% ear pain and 17% patient had purulent discharge.

Maximum patients were suffered from recurrent upper respiratory infection (60%) and 29% patient use pond/river for bathing and 11% patient had story of trauma. 85% patients were from low socioeconomic strata. Most common organisms isolated were *Staphylococcus aureus* (36%),

followed by *Pseudomonas aeruginosa* (34%), and in others *Klebsiella* spp 6%, *Streptococcus pyogenes* 6%, *Proteus mirabilis* 5%, *Escherichia coli* 4% and *Enterobacter* spp, *Citrobacter*, *Enterococcus* spp each 3%.

In *Staphylococcus aureus* (87% MRSA and 13% MSSA) maximum isolates were sensitive to gentamycin, ciprofloxacin, cotrimoxazole and amoxyclav (88%, 71%, 71% and 70% respectively) and less sensitive to clindamycin 68% and erythromycin 47%. 39% were resistant to both clindamycin and erythromycin (D test positive).

Sensitivity pattern for *Pseudomonas aeruginosa* maximum isolates sensitive to colistin 93%, polymixin B and imipenem 87% each, gentamycin and piperacillin tazobactam combination both were 81 %, fairly sensitive to ciprofloxacin amikacin, netilmycin and ofloxacin (75% each). Less susceptible to ceftazidime and piperacillin (53 and 50%).

Gram negative bacteria other than *Pseudomonas* showed maximum sensitivity to imipenem (94%), and Piperacillin + Tazobactam (91%) followed by Amikacin (80%), amoxicillin clavulanic acid combination (73%) ciprofloxacin (68%) and ceftriaxone (67%). Lesser sensitivity was observed with Cotrimoxazole (63%), ceftazidime (58%) and cefepime (61%). Least sensitivity was seen with Piperacillin (51%).

DISCUSSION: CSOM is one of the common ear infections which are more reported from rural population and lower socio economic status group. It is a chronic infection of middle ear which can even lead to deafness. Poorly treated or untreated CSOM can lead to many complications like mastoiditis, meningitis and brain abscess. Hence, diagnosis of the causative organism is necessary for proper management of these cases. CSOM and various complications associated with the disease such as irreversible local destruction of middle ear structures facial palsy, serious intracranial and extra-cranial complications are also seen by clinician. Early microbiological diagnosis ensures prompt and effective treatment to avoid such complications.⁴

High prevalence of culture positive cases of CSOM was seen in the present study. We found that the CSOM was more prevalent in the first and second decade in our study, Majority of the patients were less than 20 years of age, which is in agreement with the previous literature.⁶

In our study, 53% were females and 47% were males, thus females were more in our study which is in accordance with Prakash et al who showed 55% female, 45% male and Shreshtha et al (55.2% male and 44%) male but differ from Sahu et al (male 58% and female 42%) Mono-microbial growth was seen in 93% of cases, which is similar to the previous study Prakash et al (85%).^{7,8,9}

In Mewat region CSOM is more prevalent. The reason behind this may be more people from low socio economic strata, mostly illiterate with poor sanitary habits. They use mainly pond water for cleaning and bathing due to lack of clean water supply.

Most common pathogen were Staphylococcus spp and Pseudomonas spp similar to Shreshtha et al (s.aureus 32% and pseudomonas 26.9%) and Gopichand et al (s.aureus 32% and pseudomonas 26%).^{7,10} Staphylococcus aureus and Pseudomonas sp. together account for about 70% of cases, which was in accordance with the study by Swayamsidha et al (72%) others pathogen like Escherichia coli, klebsiella spps, proteus spp, and citrobacter, Enterococcus were (30%). In staphylococci aureus 87% were methicillin resistant and 13% were methicillin sensitive.¹¹

Among the gram negative pathogens, next to Pseudomonas, other pathogens were Klebsiella spp, Proteus sp. Escherichia coli, Citrobacter and Enterobacter spp. This is similar to other studies.^{9,12} Antibiotic susceptibility pattern was tested for all the isolated organisms. Most of the isolates were found to be susceptible to amikacin, gentamycin, Imipenem, piperacillin tazobactam combination, amoxicillin clavulanic acid combination, and ciprofloxacin. While many organism resistant to erythromycin, clindamycin, cotrimoxazole, ceftriaxone and cefepime. Staphylococcus aureus bear the inherent trait of resistance.

In the era of antibiotics, the emergence of antibiotic resistance is becoming more common. Patient non-compliance is an important factor responsible for the development of antibiotic resistance. As soon as symptoms subside, many patients stop taking antibiotics before completion of therapy and allow partially resistant microbes to flourish. Such practice should be condemned strongly and patients should be educated to avoid the same for the antibiotics commonly available locally as topical eardrops, Gentamicin and ciprofloxacin were shown to be the most effective, with good sensitivities for the commonly isolated organisms. With specific regard to the two most common pathogens in CSOM.

Pseudomonas aeruginosa isolates were highly susceptible to colistin, polymixin B and imipenem, gentamycin and piperacillin tazobactam combination, fairly sensitive to ciprofloxacin amikacin, netilmycin and ofloxacin and less susceptible to ceftazidime and piperacillin. Pseudomonas to be the most commonly isolated organisms may be that it can grow well in the absence of special nutrition, it proliferates at room temperature and it is highly resistant to antibiotics, making it difficult to treat. Pseudomonas is ubiquitous in our physical environment and has a predilection for the moist areas. It is thought to infect tissues first by adherence to epithelial cells by means of pili or fimbriae. Normal tissues usually resist such attachment, unless there is cellular injury. This phenomenon of opportunistic adherence may represent an important step in the pathogenesis of middle ear infections. Also Pseudomonas has been known to form bacterial biofilms because of which they can resist host defense mechanisms and extremely difficult to eradicate. Both Pseudomonas aeruginosa and Staphylococcus aureus are constituents of normal flora of the external auditory canal. The frequency of Staphylococcus aureus in the middle ear infections can be attributed to their ubiquitous nature and high carriage of

resistant strains in the external auditory canal and upper respiratory tract. The gram negative isolates were highly susceptible to imipenem, piperacillin tazobactam combination, and amikacin and fairly sensitive to amoxicillin clavulanic acid combination, ciprofloxacin, and less sensitive to third generation cephalosporins.^{1,7,8,11,12}

The organisms like Pseudomonas spp. And Proteus spp. were considered mostly as secondary invaders from external auditory canal gaining access to the middle ear via a defect in tympanic membrane resulting from an acute episode of otitis media. Organisms like E. coli and Klebsiella spp. Become opportunistic pathogens in the middle ear when resistance is low.¹⁰ Main advantage of Ciprofloxacin is that it is not ototoxic but there is concern that widespread use of quinolones could lead to emergence of resistance among the organisms. According to the declining sensitivity may be due to number of factors including injudicious use, inappropriate dosage, and easy accessibility and developing enzymatic resistance of organism against quinolones.

CONCLUSION: Result of our study showed high prevalence and resistance rate of Staphylococci and Pseudomonas isolates from CSOM patients to β- lactam and other commonly used antimicrobials. Our study suggested that Amikacin, Piperacillin-Tazobactam and quinolones are best choice in these cases. Therefore an appropriate knowledge of antibacterial susceptibility of microorganism may contribute to rational antibiotic use and the success of treatment for chronic suppurative otitis media.

Organism	No.	% percentage
Staphylococci aureus	67	36%
Pseudomonas spp.	63	34%
Klebsiella spp.	12	6%
Proteus spp.	9	5%
Citrobacter spp.	7	4%
Escherichia coli	6	3%
Enterobacter spp.	6	3%
Streptococcus pyogenes	12	6%
Enterococcus spp.	5	2.6%
Total	187	
Distribution of organism		

Infection	187	Percentage
Monomicrobial	173	92.5%
Polymicrobial	14	7.5%
Type of infection		

Antibiotic	Percentage
Amikacin	80%
Amoxicillin- Clavulanate	73%
Cotrimoxazole	63%
Ceftriaxone	66%
Cefepime	61%
Ciprofloxacin	68%
Ceftazidime	58%
Imipenem	94%
Piperacillin-Tazobactam	91%
Sensitivity pattern of GNB other than pseudomonas in percentage	

Antibiotic	Percentage
Amikacin	75%
Ceftazidime	53%
Piperacillin-Tazobactam	81%
Ofloxacin	75%
Imipenem	87%
Netilmycin	75%
Gentamycin	81%
PolymixinB	87%
Colistin	93%
<i>Sensitivity pattern of pseudomonas in percentage</i>	

Antibiotic	Percentage
Amoxicillin-clavulenate	71%
Clindamycin	68%
Erythromycin	47%
Ciprofloxacin	71%
Cotrimoxazol	71%
Ceftriaxone	64%
Gentamycin	88%
<i>Sensitivity pattern of gram positive cocci in percentage</i>	

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