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A STUDY OF AEROBIC BACTERIAL AND FUNGAL ISOLATES OF CHRONIC SUPPURATIVE OTITIS MEDIA AT A TERTIARY CARE CENTRE IN HYDERABAD.

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ABSTRACT

Background: Chronic suppurative otitis media (CSOM) is a major health problem causing serious local damage and threatening intra and extra cranial complications. Purpose of this study is to find the prevalence of various isolates and antibiotic susceptibility patterns in CSOM cases. **Method:** In 100 clinically diagnosed CSOM cases, 2 ear pus swabs from middle ear cavity were collected aseptically, one swab was used for Gram stain and KOH, another for inoculating Blood agar, Maconkey agar and Sabouraud's dextrose agar, antibiotic susceptibility done on Muller Hinton agar by Kirby Bauer disc diffusion, multidrug resistance detected and phenotypic tests done for ESBL, MBL detection by combined disc synergy tests, Cefoxitin disc diffusion test was used to detect MRSA. Age, gender, educational and demographic data was collected. **Result:** Of the 103 samples processed from 100 cases, 6 were culture negative and 97 were culture positive, showing 92 bacterial and 10 fungal isolates overall, most predominant organism was Pseudomonas aeruginosa with 50.9% prevalence, of which 25 % were ESBL, 7.69 % were MBL producers, second most common being Staphylococcus aureus with 29.4% prevalence, of which 47% were MRSA . Rest were Proteus (5.8 %), Klebsiella (1.9%), Escherichia coli (1.9%), most of the isolates were sensitive to Amikacin . Aspergillus and candida species were isolated in fungal culture which was 9.8% of total isolates. **Conclusion:** Early intervention is key factor to prevent progression to complications. Periodic assessment of etiological agents, changing drug resistance patterns is essential.

KEYWORDS: Chronic suppurative otitis media, Pseudomonas, Methicillin resistant Staphylococcus aureus.

INTRODUCTION

Chronic suppurative otitis media is presence of a perforated tympanic membrane with persistant discharge from the middle ear for more than 2 weeks.[1] The underlying pathology of CSOM is an ongoing cycle of inflammation, ulceration, infection and granulation. This may continue, destroying surrounding structures and leading to various complications. CSOM with active discharge can be chronic mucosal type or chronic squamosal type with cholesteatoma. According to the WHO/CIBA workshop of Otitis media experts in 1996, countries having prevalence rate of 1%–2% were considered under low prevalence zone, whereas countries having 3%–6% prevalence rate were considered as high prevalence zone.[2] In India, the national average prevalence of CSOM is 5.2%[3] The most common aerobic bacterial isolates in CSOM are Pseudomonas aeruginosa and Staphylococcus aureus. Proteus mirabilis, Klebsiella species, Escherichia coli, Streptococcus pyogenes, Aspergillus species and candida species are other common isolates. However, this may vary according to geographical areas and other factors.[4]

CSOM is more prevalent in developing countries due to malnutrition, overcrowding, poor hygiene, inadequate health care, and recurrent upper respiratory tract infection.[5] It can lead to irreversible complications such as persistent otorrhea, mastoiditis, labyrinthitis, and facial palsy to more serious intracranial abscesses or thromboses.[6] Hearing impairment is one of the most common sequelae of CSOM.[7] The resultant hearing loss can have a negative impact on a child's speech development, education and behavior.[8] Otorrhoea resolved frequently in groups treated with a combination of aural toilet, topical and systemic antibiotics, and topical boric acid compared with aural toilet alone or with no specific therapy.[9] Antibiotic drops in combination with aural toilet are the mainstay of therapy for CSOM, Oral antibiotics are a second-line therapy. Topical quinolones carry a low side-effect profile and are superior to aminoglycosides however many studies report emerging resistance.[10]

AIM

To isolate the aerobic bacterial and fungal etiological agents of CSOM and to determine the antibiotic

susceptibility pattern of predominant aerobic bacterial isolates.

INCLUSION CRITERIA: Clinically diagnosed cases of active mucosal or squamosal type of CSOM with active discharge.

EXCLUSION CRITERIA: Patients with dry ear or less than 2 weeks of discharge, and those on antimicrobials, immunocompromised patients.

STUDY DESIGN: A prospective cross sectional study conducted over a period of 6 months from April 2021 to September 2021.

MATERIALS AND METHODS

This study was conducted in patients attending Government ENT hospital, after taking consent from the patient, external auditory meatus was cleaned with alcohol rub to avoid contaminants, then middle ear discharge was collected with two sterile swabs (Hi media) aseptically & transported to laboratory within 15 minutes, one swab used for Gram staining & KOH mount, other to inoculate Blood agar, MacConkey agar & Saboraud's dextrose agar. Standard methods for isolation & identification of the organisms were used. Antibiotic susceptibility test was done by Kirby Bauer disc diffusion method. Combined disc synergy test for ESBL and MBL detection was done among the MDR gram negative isolates, Cefoxitin disc diffusion test for predominant gram positive isolates to detect for Methicillin resistance was done.

RESULTS

Table 1: Age distribution.

Age	n=100	Percentage
< 20 years	51	51%
20-40 years	20	20%
>40 years	29	29%

Table 2: Gender wise distribution.

Gender	n=100	Percentage
Males	42	42%
Females	58	58%

Table 3: Unilateral /Bilateral cases.

Ear involved	n= 100	Percentage
Unilateral (U/L)	97	97%
Bilateral (B/L)	3	3%

Table 4: Monomicrobial / Polymicrobial.

No. of samples	n=103	Percentage
No growth	6	5.8%
Monomicrobial	90	87.3%
Polymicrobial	7	6.79%

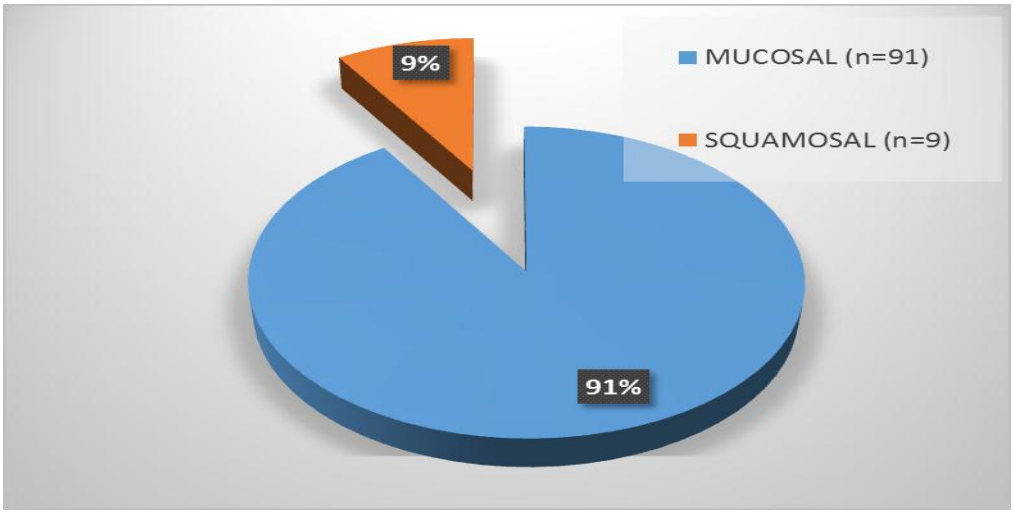

Fig 1: Type of CSOM among the 100 cases.

Table 5: Isolates obtained on culture.

Pattern of Isolates	Mucosal CSOM (n=94) 88 U/L, 3 B/L		Squamosal CSOM (n=9)		Total (n=103)	Overall Percentage
No growth	6	6.3%	-	-	6	5.82%
Pure Bacterial growth	75	79.7%	8	88.8%	83	80.58%
Pure fungal growth	7	7.4%	-	-	7	6.79%
Mixed bacterial	3	3.1%	1	11.1%	4	3.88%
Mixed bacterial and fungal	3	3.1%	-	-	3	2.91%

Table 6: Total number of each organism obtained in pure cultures.

Pure bacterial isolates	No. of isolates (n=83)	Pure fungal isolates	No. of isolates (n=7)
Pseudomonas aeruginosa	50	Aspergillus niger	3
Staphylococcus aureus	25		
Proteus mirabilis	4	Aspergillus fumigatus	2
Klebsiella pneumoniae	2		
Escherichia coli	2	Candida albicans	2

Table 7: Mixed bacterial and fungal isolates obtained.

Mixed bacterial	No. of samples	Mixed bacterial and fungal	No. of Samples
Pseudomonas aeruginosa and Staphylococcus aureus	1	Pseudomonas aeruginosa and Candida albicans	1
Proteus mirabilis and Staphylococcus aureus	2	Staphylococcus aureus and Aspergillus niger	1
		Staphylococcus aureus and Candida albicans	1

Table 8: Total number of each organism among the 102 isolates.

Organism	n=102	Percentage
Pseudomonas aeruginosa	52	50.9%
Staphylococcus aureus	30	29.4%
Proteus mirabilis	6	5.8%
Klebsiella pneumoniae	2	1.9%
Escherichia coli	2	1.9%
Aspergillus niger	4	3.9%
Aspergillus fumigatus	2	1.9%
Candida albicans	4	3.9%

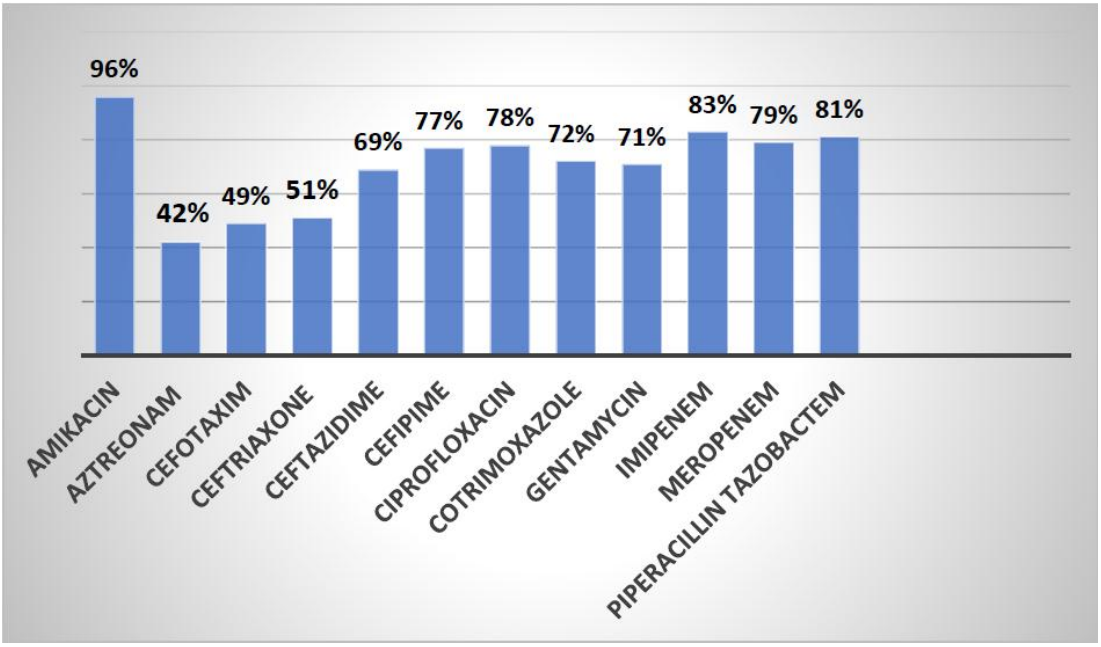

Fig 2: Antibiotic susceptibility pattern of Pseudomonas aeruginosa isolates.

Table 9: Percentage of ESBL and MBL producing Pseudomonas aeruginosa by combined disc test.

Total Pseudomonas isolates	n= 52	Percentage
ESBL producers	13	25 %
MBL producers	4	7.69 %
Non ESBL and MBL	35	67.3 %

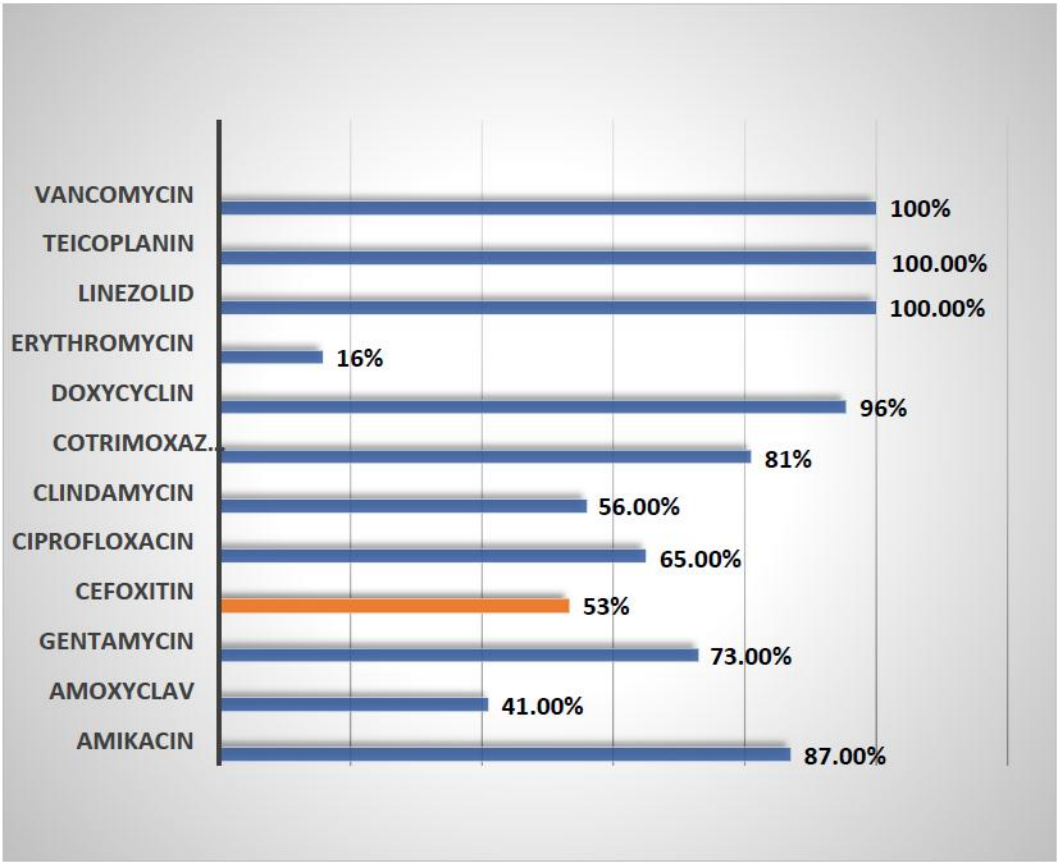

Fig 3: Antibiotic sensitivity pattern of Staphylococcus aureus isolates.

Table 10: Methicillin resistance among Staphylococcus aureus.

Total Staphylococcus aureus	N=30	Percentage
MSSA	16	53 %
MRSA	14	47 %

DISCUSSION

CSOM is usually developed following the first attack of ASOM and is characterized by an intermittent or continuous aural discharge through a perforated eardrum. It is an important cause of conductive deafness, especially in developing countries.[11] The pathogenesis and causes of CSOM are still poorly understood.[12] Therefore, it is of the utmost importance to assess the frequencies of involved microorganisms in various geographical locations.

In this study population < 20 year age group was found to be more predominant and females were more commonly affected than males similar to study by Kumar et al.[13] Most of the cases were from educationally and socio economically weeker sections and from rural areas. Majority were monomicrobial. Polymicrobial isolates were recovered from 6.79% when compared to 6% by Pavani et al, 4% by Neelaveni et al and 1% by Madhuri Mehta et al.[14, 15, 16]

Bacterial isolates were more prevalent than fungal. Most predominant organism was Pseudomonas aeruginosa 50.9% followed by Staphylococcus aureus 29.4% and Proteus 5.8% which correlated with most of the studies, whereas Proteus was the second most common isolate in study by Pavani et al.[12] 17(32.6 %) isolates of Pseudomonas were MDR compared to 44.4% in Study by Neelaveni et al.[15] On phenotypic detection of ESBL and MBL production by combined disc synergy test 25 % and 7.69 % of Pseudomonas isolates were ESBL and MBL producers respectively, when compared to 24.5% ESBL producers in study by Agarwal et al.[17] and 15.3% MBL producers in study by Neelaveni et al.[15] Pseudomonas isolates showed 96 % sensitivity to Amikacin, 83% to imipenem and 81% to Piperacillin tazobactem, were as 78% to ciprofloxacin, 69% to ceftazidime when compared to 89% ceftazidime sensitivity in study by Mansoor et al[18] whereas Imipenem, Piperacillin tazobactam showed 100% sensitivity and Ciprofloxacin showed very low 44.4% sensitivity in study by Neelaveni et al[15], these differences can be due to variation in drug preferences in various geographical regions. Gentamycin was not affective as Amikacin in most of the studies despite of same class of drug.

Among Staphylococcus aureus Amikacin showed high percentage of sensitivity were as increased Ciprofloxacin (65%) and Amoxillin clavulanic acid (41%) resistance was of concern, however Vancomycin, Linezolid and Teicoplanin showed 100% sensitivity. Prevalence of MRSA was 47% compared to Study by Pavani et al 59%

and Madhuri Mehta et al 28%.[14, 16] . 95% of MRSA strains were MDR. Most common resistance pattern among MDR Staphylococcus aureus was for Erythromycin, Clindamycin and Ciprofloxacin. Overall Amikacin showed good sensitivity to both Pseudomonas and Staphylococcus aureus followed by Cotrimoxazole, gentamycin which showed above 70% sensitivity to both.

Fungal isolates were 9.8% when compared to 16.6% in Pavani et al and 1.5% in Madhuri Mehta et al.[13, 15] Among fungi Aspergillus species were predominant, followed by Candida species. All fungal isolates were recovered from mucosal type of CSOM cases similar to study by Sharma et al.[19]

CONCLUSION

In our study Pseudomonas aeruginosa and Staphylococcus aureus were most significant pathogens. Amikacin was effective in covering both these organisms. Gentamycin, Ciprofloxacin, Cotrimoxazole were fairly good against both. Imipenem and piperacillin tazobactem showed good sensitivity for Pseudomonas isolates .Emerging MDR especially MRSA and MDR Pseudomonas poses significant treat of treatment failure and development of complications. Thus culture and performing antibiotic sensitivity plays crucial role and it is desirable for laboratory to culture all cases of CSOM for bacteria and fungus on a routine basis.

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FUNDING: No funding sources.

CONFLICTS: None declared.

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