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Original Research Article

Microbiology in Chronic Otitis Media: A Study in a Tertiary Care Hospital

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Abstract:

Background: Microbiota of CSOM include aerobes, anaerobes and fungi as potential pathogens though its reported profile and frequency differ based on patient's age, geography and the presence of complications like cholesteatoma. Complications associated with CSOM were frequent in pre-antibiotic era, however, the irrational use of antibiotics led to the emergence of multi-drug resistant bacterial strains and disease complication in return. The aim of our study is to determine microbiology in CSOM patients and their sensitivity to antimicrobials for prompt treatment.

Methods: This is a retrospective observational study performed on 80 patients presenting with ear discharge and diagnosed as Chronic Otitis Media (COM) at Assam Medical College, Dibrugarh, Assam from the period of July 2022 to June 2023.

Results: In our study, overall Pseudomonas aeruginosa was the most common isolate from bacterial culture followed by Staphylococcus aureus and Streptococcus pneumonia. Aspergillus niger was the most common isolate from fungal culture followed by Candida albicans. In one case of mucosal COM, Mycobacterium tuberculosis was found. Amikacin was found to be most sensitive antibiotic even against MRSA followed by Piperacillin+Tazobactam. We use Amoxycillin+clavulanic acid empirically followed by definite antibiotic according to aural swab culture. In patients with sterile swab, mostly Amoxicillin+ clavulanic acid and ciprofloxacin used. In cases of persisting discharge, we use Amikacin.

Conclusion: To decrease the potential risk of complications and reduce development of resistant strains, evaluation of microbiological pattern and antibiotic sensitivity of isolates is necessary in every case of COM for appropriate treatment.

Keywords: Chronic Otitis Media, Aural Swab Culture, Antibiotic Sensitivity.

Introduction

Chronic otitis media (COM) describes chronic middle ear disease and is defined as an inflammatory process in the middle ear space that results in long term, or more often, permanent changes in the tympanic membrane. [1]

In pre-antibiotic era, complications associated with CSOM were frequent however, and the irrational use of antibiotics led to the emergence of multi-drug resistant bacterial strains and disease complication in return. [2]

Dispersal of bacteria from a biofilm in the middle ear could serve as a potential reservoir and explain the recurrent and chronic nature of CSOM with reduce efficacy of antibiotic treatment. Microbiota of CSOM include aerobes, anaerobes and fungi as potential pathogens though its reported profile and frequency differ based on patient's age, geography and the presence of complications like cholesteatoma. [3]

According to WHO, countries were categorized by CSOM prevalence rate into those having low infection when prevalence rate of ear infection is 1-2% and high when it is 3-6%. India has a prevalence rate of >4% and comes under highest infection category which needs urgent attention to deal with massive public health problem. CSOM was found to be responsible for hearing impairments in 77% of cases in India. India accounts for most deaths (12 per thousand) and years of life lost and DALYs from otitis media according to WHO data. [4]

The aim of our study is to determine microbiology in CSOM patients and their sensitivity to antimicrobials for prompt treatment.

Materials and Methods

This retrospective observational study was performed on 80 patients presenting with ear discharge and diagnosed as Chronic Otitis Media (COM) at Assam Medical College, Dibrugarh, Assam from the period of July 2022 to June 2023.

The written and informed consent was taken from all patients. The data collected was tabulated in Microsoft Excel worksheet and computer based analysis done.

Inclusion Criteria: Patients of all age groups with ear discharge diagnosed as COM -both mucosal and squamosal with and without complications.

Exclusion Criteria: Post-operative cases of COM with recurrence.

Method of Collection

Using sterile swab sticks, ear discharge was collected, labeled and sent for bacteriological and fungal culture studies. The swabs were placed on MacConkey agar, Blood agar and Chocolate agar, incubated aerobically at 37°C for 24hours and the organisms were identified. All isolated strains were tested for susceptibility to antibiotics on Mueller Hinton Agar using Kirby Bauer disc diffusion method and results were interpreted using Clinical Laboratory Standards Institute (CLSI) guidelines. Fungi identified by KOH mount, where hyphae identified under microscope and culture on SDA medium. The culture tube kept for 2-4weeks at 22oC. In the case of yeast, for identification of Candida Albicans, germ tube fermentation test was done.

Results

The current study was a retrospective hospital based study involving 80 subjects who are diagnosed as COM.

Table 1: Age wise distribution of cases included in the study

Age group in yrs	Number of patients	% of cases
<10	6	7.5
11-20	28	35
21-30	22	27.5
31-40	14	17.5
41-50	5	6.25
51-60	2	2.5
61-70	2	2.5
71-80	1	1.25
Total	80	100

In our study age group was from 6 months to 80 yrs. Maximum patients were seen in age group 11-20 yrs (28 in number, 35%), followed by 22 patients (27.5%) in 21-30 yrs and 14 patients (17.5%) in 31-40 yrs age group. Only 1 patient was seen in age group 71-80yrs.

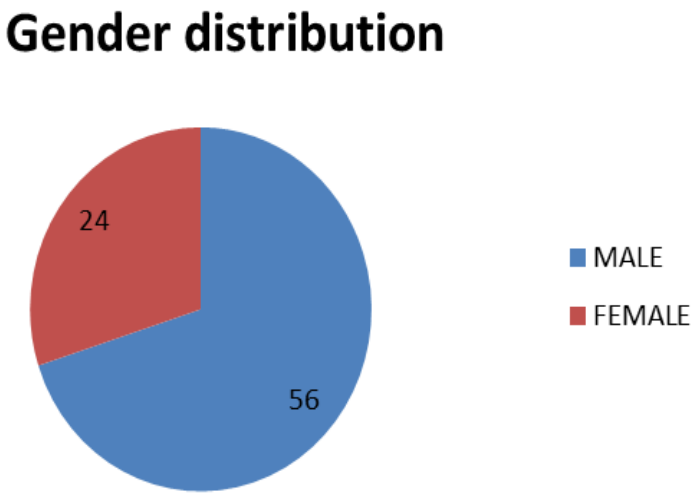

Figure 1: Gender Distribution of Patients

In our study, 56 (70%) patients were male and 24 (30%) patients were female.

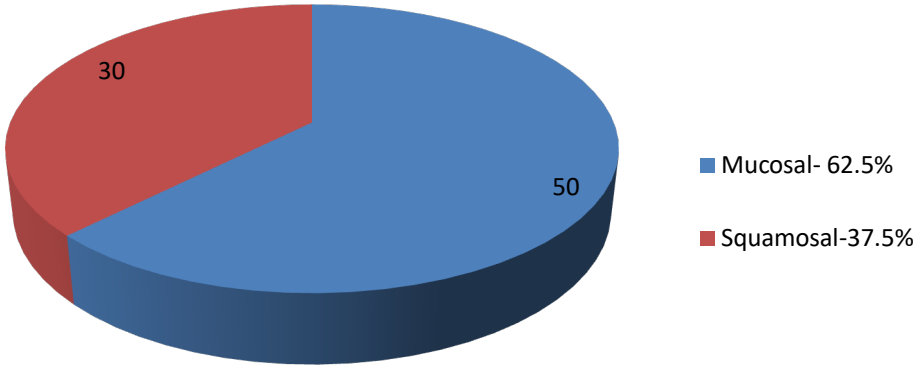

Figure 2: Distribution of Patients According to the Type of Com

In our study, 62.5% had mucosal COM and 37.5% had squamosal COM.

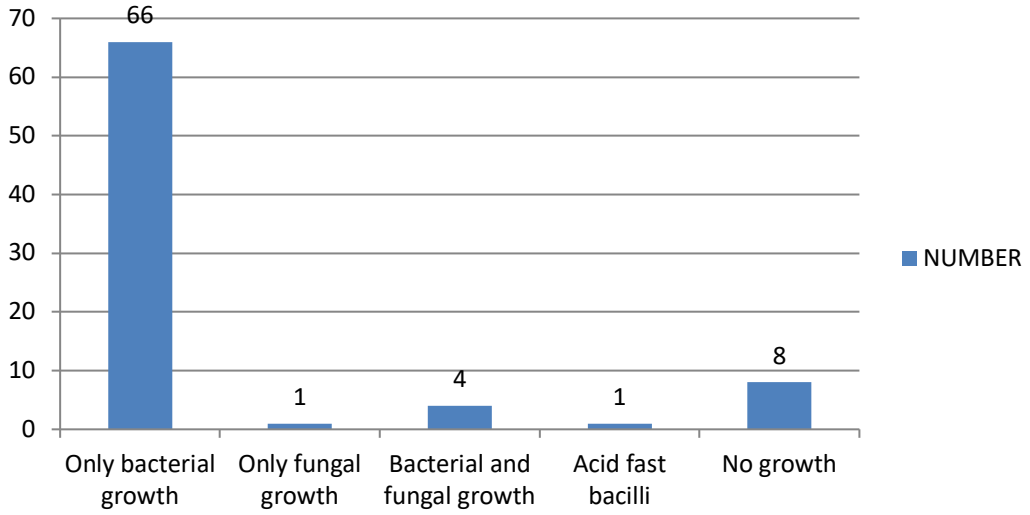

Figure 3: Types of Growth in Aural Swab

In our study, 82.5% patients showed only bacterial growth in aural swab culture, whereas 5 % had both bacterial and fungal growth and 1.25% had only fungal growth. Acid fast bacilli were found in only 1 case, which was later confirmed to be Mycobacterium tuberculosis on CBNAAT. 10% patients showed sterile culture.

Table 2: Distribution of Various Isolates in Aural Swab

Type of Isolate	Total No. of Isolates	Mucosal Com	Squamosal Com
A. Bacterial			
Pseudomonas aeruginosa	33	22(44%)	11(36.6%)
Staphylococcus aureus	11	10(20%)	1(3%)
Streptococcus pnuemoniae	11	7(14%)	4(13.3%)
MRSA	5	1(2%)	4(13.3%)
Proteus mirabilis	5	2(4%)	3(10%)
Escherichia coli	3	2(4%)	1(3%)
Klebsiella pneumoniae	2	0	2(6.7%)
B. Fungal			
Aspergillus niger	4	0	4(13.3%)
Candida albicans	1	0	1(3%)
C. Acid Fast Bacilli	1	1(2%)	0
D. No Growth	8	6(12%)	2(6.7%)

In our study, overall Pseudomonas aeruginosa was the most common isolate from bacterial culture followed by Staphylococcus aureus and Streptococcus pneumonia. Aspergillus niger was the most common isolate from fungal culture followed by Candida albicans. The typical colour of ear discharge was greenish in Pseudomonas, yellowish in Staphylococcus aureus and creamy in candida isolates.

In mucosal COM, Pseudomonas aeruginosa, Staphylococcus aureus, Streptococcus pneumoniae and E. coli were more common isolates. In one case, Mycobacterium tuberculosis was found. No fungus isolated.

In squamosal COM also Pseudomons aeruginosa was the most common isolate. MRSA, Proteus mirabilis and Klebsiella pneumoniae were more common isolates in squamosal compared to mucosal. Fungal isolates were seen only in Squamosal COM cases. Sterile culture was found in 12% of mucosal and 6.7% of squamosal COM cases.

Table 3: Age wise Distribution of Various Isolates

Age group in years	Pseudomonas aeruginosa	Staph. aureus	Strep. pneumoniae	MRSA	Proteus mirabilis	E. coli	Klebsiella pneumoniae	Candida albicans	Aspergillus niger	Sterile culture
<10	3	1	0	0	0	1	0	0	0	1
11-20	13	4	5	0	2	1	0	1	0	2
21-30	12	2	2	1	2	0	2	0	1	1
31-40	4	1	3	3	0	1	0	0	1	2
41-50	1	2	0	0	1	0	0	0	2	0
51-60	0	0	0	1	0	0	0	0	0	1
61-70	0	0	1	0	0	0	0	0	0	1
71-80	0	1	0	0	0	0	0	0	0	0

In our study, Klebsiella pnuemoniae was found only in 21-30 years age group and both the patients presented with brain abscess. MRSA was most commonly found in 31-40 years age group. Candida albicans was found in one patient. Aspergilluis niger was found in 4 patients of 21- 50 age group. Out of those 4 patients, in 2 cases Pseodomonas aeruginosa was isolated and in other 2, Staphylococcus aureus was isolated along with Aspergillus.

Table 4: Antibiotic Sensitivity of Isolates

Organism	Amoxycillin+ Clavulunate	Ceftazidime	Piperacillin + Tazobactam	Erythromycin	Ciprofloxacin	Amikacin
Pseudomonas aeruginosa	-	15	19	-	17	21
Staphylococcus aureus	7	7	8	5	6	10
MRSA	-	2	-	2	-	3
Streptococcus pnuemoniae	5	9	-	7	6	2
Proteus mirabilis	4	3	3	-	1	1
Escherichia coli	1	1	2	-	1	2
Klebsiella pneumoniae	-	1	2	1	1	2

In our study, Amikacin was found to be most sensitive antibiotic even against MRSA followed by Piperacillin+Tazobactam. We use Amoxycillin+clavulanic acid empirically followed by definite antibiotic according to aural swab culture. In patients with sterile swab, mostly Amoxicillin+ clavulanic acid and ciprofloxacin used. In cases of persisting discharge, we use Amikacin.

Discussion

In our study, highest Incidence of CSOM cases was seen in age group 11-20yrs(35%) followed by age group from 21-30yrs(27.5%) which was similar to a study done by Romena Khatun et al., where they showed that mean age distribution was 26.9 ± 15. [1] Years among culture positive CSOM patients [3]. In a study done by Prakash et al., they foundthat CSOM was more prevalent in first and second decade of life and accounted for 51% of the cases. [2] In our study, male preponderance was seen (70%), where as in the study done Prakash et al females were more affected compared to males. [2] In our study, overall Pseudomonas aeruginosa (41.25%) was the most common isolate from bacterial culture followed by Staphylococcus aureus (20%) and

Sreptococcus pneumonia (13.75). Aspergillus Niger (5%) was the most common isolate from fungal culture followed by Candida albicans (1.25%). Acid fast bacilli were found in only 1 case (1.25%).

In a study done by Viswanatha et al Pseudomonas aeruginosa (37.21%) was found to be the most common organism followed by Staphylococcus aureus (27.91%) klebsiella (13.95%), proteus (10.46%), Escherichia coli (4.65%). Also The most commonly found fungi in CSOM are Aspergillus and Candida species, which was in concordance with our study. [5]

In our study, Amikacin was found to be most sensitive antibiotic even against MRSA. Similarly, Amikacin was found to be effective against all the bacteriological species isolated in the study by Prakash et al [2] and Viswanatha et al [5].

Conclusion

To decrease the potential risk of complications and reduce development of resistant strains, evaluation of microbiological pattern and antibiotic sensitivity of isolates is necessary in every case of COM for appropriate treatment. Micribiological study with antibiotic sensitivity may guide us to use empirical antibiotics judiciously and make an institutional protocol.

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