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Original Research Article

Aerobic Bacteriology of Chronic Suppurative Otitis Media in Rajsamand District of Rajasthan

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ABSTRACT

Objective: The objective of our study was to examine the aerobic bacteriological profile and antibiotic sensitivity pattern to locally available antibiotics in chronic suppurative otitis media (CSOM) in Rajsamand district of Rajasthan state in India.
Materials and methods: This prospective study was conducted in the department of otorhinolaryngology, Ananta Institute of Medical Sciences, Rajsamand for a period of one year from February 2017 to February 2018. Aural swabs were taken on the first day of attendance of the patients to ENT OPD before any local medication was given to the patient, using sterile cotton wool swabs and sterile ear specula and sent for culture and sensitivity.
Results: A total of 150 cases of CSOM were selected for the study out of which 109 cases were of unilateral CSOM and 41 cases were having bilateral disease. Thus, a total of 191 swabs were taken for analysis. Out of 191 swabs processed, microbial growth was seen in 176 samples while 15 samples showed no growth. 121 (68.75%) samples showed mono-microbial growth while 55 (31.25%) samples showed poly-microbial growth. The peak incidence of CSOM was found in the age group 31-45 years (34.66%) followed by age group 16-30 years (27.33%). Females (62%) were more commonly affected than males (38%) and the female: male ratio was 1.6:1. *Pseudomonas aeruginosa (38.63%) was the most commonly isolated bacterial pathogen followed by staphylococcus aureus (35.22%) and klebsiella sp. (10.22%).*
Conclusion: A thorough and precise knowledge of the etiological agents causing CSOM and their antimicrobial susceptibility is of essential importance for an effective and efficient treatment and thus in further prevention of both complications and development of antibiotic resistance which is becoming more common now a days.

Keywords: Chronic suppurative otitis media, antibiotic resistance, staphylococcus aureus, Amikacin

INTRODUCTION

Chronic suppurative otitis media (CSOM) is a major problem globally since prehistoric times with higher incidence in developing countries because of poor socio-economic status and lack of health education. [1]

CSOM is a long standing infection of a part or whole of the middle ear cleft. Clinically, CSOM is divided into two major types: Tubotympanic CSOM i.e. 'Safe' or 'Benign' type of CSOM and Atticoantral i.e. 'unsafe' or 'dangerous' type of CSOM. [2]

CSOM is found to be the single major cause for conductive deafness (66.3%) and it is also responsible for 1.5% of speech disorders. [3]

The indiscriminate, haphazard and half hearted use of antibiotics and poor follow up of the patients have resulted in persistent changes in the bacteriological pattern of the disease, the advent of new antimicrobials, anti-inflammatory and anti-histamine agents make an evaluation of bacterial flora of CSOM important. [4]

The objective of our study was to examine the bacteriological profile and antibiotic sensitivity pattern to locally available antibiotics in CSOM.

MATERIALS AND METHODS

This prospective study was conducted in the department of otorhinolaryngology, Ananta Institute of Medical Sciences, Rajsamand for a period of one year from February 2017 to February 2018.

Aural swabs were taken on the first day of attendance of the patients to ENT OPD before any local medication was given to the patient, using sterile cotton wool swabs and sterile ear specula. The collected samples were enclosed in airtight plastic tubing and then transported to the microbiology test laboratory. The samples were always taken before cleaning/suctioning the ear canals of the excess purulent exudates. Samples from bilaterally discharging ears were collected separately. The material was inoculated on Sheep Blood agar, Mac Conkey's agar, Chocolate agar, Robertson's Cooked meat broth for aerobic and anaerobic bacteria. The swabs were incubated for 48 hr and 72hr. Organisms were identified using standard procedures. [5] Antimicrobial sensitivity testing for aerobic isolates was carried out by Kirby Bauer disc diffusion method on Muller Hinton agar. Results were interpreted in accordance with central laboratory standards institute guide-lines. [6]

RESULTS

A total of 150 cases of CSOM were selected for the study out of which 109 cases were of unilateral CSOM and 41 cases were having bilateral disease. Thus, a total of 191 swabs were taken for analysis.

Out of 191 swabs processed, microbial growth was seen in 176 samples while 15 samples showed no growth. 121 (68.75%) samples showed mono-microbial growth while 55 (31.25%) samples showed poly-microbial growth.

In present study, age of the patients ranges from 10 months to 73 years. The peak incidence of CSOM was found in the age group 31-45 years (34.66%) followed by age group 16-30 years (27.33%). Females (62%) were more commonly affected than males (38%) and the female: male ratio was 1.6:1. (table.1)

Microbiological profile of isolates from patients of CSOM and their antibiotic sensitivity pattern is depicted in table.2 and table.3 respectively.

Table.1 Age wise distribution of patients with CSOM

S.No.	Age-group (years)	Number	Unilateral	Bilateral	Mono-microbial	Poly-microbial	Sterile	Total
1.	0-15	23	11	12	22	9	4	35
2.	16-30	41	34	7	33	12	3	48
3.	31-45	52	44	8	38	17	5	60
4.	46-60	20	12	8	14	13	1	28
5.	61-75	14	8	6	14	4	2	20
	Total	150	109	41	121	55	15	191

Table.2 microbiological profile of aerobic isolates from patients of CSOM

S.No.	Type of organism	Number of samples	Percentage
1.	Pseudomonas aeruginosa	68	38.63
2.	Staphylococcus aureus	62	35.22
3.	Klebsiella sp.	18	10.22
4.	Proteus mirabilis	17	09.65
5.	E.coli	8	04.54
6.	Enterococcus faecalis	3	01.70
	Total	176	100

Table.3 Antibiotic sensitivity pattern of organism isolated in present study

S.No.	Antibiotic	Pseudomonas sp.	Staph. Aureus	Klebsiella sp.	Proteus mirabilis	E. coli	Enterococcus faecalis
1.	Ampicillin	0	11 (17.74%)	0	0	0	0
2.	Cloxacillin	0	18 (27.41%)	0	0	0	0
3.	Amoxicillin + clavulanate	0	48 (77.41%)	0	0	0	0
4.	Amikacin	59 (86.76%)	38 (61.29%)	8 (44.44%)	7 (41.17%)	4(50%)	0
5.	Gentamicin	47 (69.11%)	39 (62.90%)	2 (11.11%)	3 (17.64%)	0	0
6.	Netilmicin	48 (70.58%)	42 (67.74%)	0	1(5.88%)	2(25%)	0
7.	Vancomycin	64 (94.11%)	47 (75.80%)	7 (38.88%)	3 (17.64%)	3(37.5%)	0
8.	Ciprofloxacin	38 (55.88%)	22 (35.48%)	6 (33.33%)	3 (17.64%)	3(37.5%)	1 (33.33%)
9.	Levofloxacin	30 (44.11%)	15 (24.19%)	4 (22.22%)	2 (11.76%)	1(12.5%)	1 (33.33%)
10.	Ceftriaxone	41 (60.29%)	44 (70.96%)	2 (11.11%)	8 (47.05%)	4(50%)	2 (66.66%)
11.	Cefotaxime	27 (39.70%)	26 (41.93%)	1(5.55%)	8 (47.05%)	3(37.5%)	0
12.	Ceftazidime	51(75%)	44 (70.96%)	1(5.55%)	9 (52.94%)	0	0
13.	Piperacillin+ Tazobactam	51(75%)	55 (88.70%)	6 (33.33%)	6 (35.29%)	5(62.5%)	1 (33.33%)

DISCUSSION

CSOM is a long standing infection of a part or whole of the middle ear cleft. Clinically, CSOM is divided into two major types: Tubotympanic CSOM i.e. 'Safe' or 'Benign' type of CSOM and Atticoantral i.e. 'unsafe' or 'dangerous' type of CSOM. [2]

The definitive treatment of CSOM is by surgery (tympanoplasty and/or mastoidectomy), nevertheless, initial treatment by ear toilet and ototopical agents is necessary to prepare the ear for surgery. The selection of local or systemic antibiotic for therapy depends greatly on the type of the organism isolated in such cases.

In present study, microbial growth was seen in 176 (92.14%) samples out of 191 swabs used. 15 samples (7.8%) showed no growth. The culture results are found correlated with previous studies. [7-11] Negative cultures can be attributed to Non-bacterial growth, Anaerobic growth, Prior-antibiotic therapy and/ or Presence of antimicrobial enzymes i.e. lysozyme alone or in combination with immunoglobulins that suppress the bacterial growth. [4,10]

121 (68.75%) samples showed mono-microbial growth while 55 (31.25%) samples showed poly-microbial growth. Our study is correlated with Rama Rao et al. (1980) [3] found equal incidence of mixed and pure culture and Baruah et al. (1972) found predominance of mixed culture. [12]

In present study, most commonly affected age group was 31-45 years (34.66%) followed by age group 16-30 years (27.33%). In most of the earlier studies, the most commonly affected age group is 0-30 years. [13-18] The reason for high prevalence in higher age group in present study may be because of low socioeconomic status and poor awareness of the patients in villages near the hospital.

In the present study, Pseudomonas aeruginosa (38.63%) was the most commonly isolated bacterial pathogen followed by staphylococcus aureus (35.22%) and klebsiella sp. (10.22%).

Pseudomonas is the predominant cause of CSOM in tropical region does not usually inhabit the upper respiratory tract, its presence in the middle-ear cannot be ascribed to an invasion through eustachian tube and it should be considered as secondary invader gaining access to the middle-ear via tympanic membrane perforation. [19] Proteus mirabilis was seen in 9.65%% of the cases and Escherichia coli were isolated from 4.5% cases, and these findings were similar to the reports in earlier studies. [16,18]

In the present study the most effective antibiotic against Pseudomonas aeruginosa was found to be Vancomycin (94.11%) followed by amikacin (86.76%), piperacillin+Tazobactam, ceftazidime, netilmicin, Gentamicin, ceftriaxone and ciprofloxacin. This finding was corroborated by studies of numerous other authors. [13,18,19]

Staphylococcus aureus was found to be the second most common organism in the present study. The antimicrobial susceptibility pattern of Staphylococcus

aureus revealed highest sensitivity to piperacillin+tazobactam (88.70%) followed by amoxicillin+ clavulanate (77.41%), Vancomycin (75.80%), ceftriaxone & ceftazidime (70.96%), Netilmicin (67.74%) and Amikacin (61.29%) and least sensitivity to quinolones. In case of Klebsiella sp, Proteus, E.coli and Enterococcus faecalis-ceftriaxone, Amikacin and piperacillin with Tazobactam were found to be equally effective. These findings are in accordance with previous study done by Gulati et al (1997). [20]

CONCLUSION

A thorough and precise knowledge of the etiological agents causing CSOM and their antimicrobial susceptibility is of essential importance for an effective and efficient treatment and thus in further prevention of both complications and development of antibiotic resistance which is becoming more common now a days.

Conflict of interest:

No conflicts of interest exist for these authors. No relevant financial relationship exists between the authors and procedures or products used in this manuscript.

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