Original Research Article

Bacteriological and mycological study of chronic suppurative otitis media

Sanjivani V Mundhe[1], Asha P Pichare[2*], Alka Lamture[3]

[1]Assistant Professor, [2]Professor and HOD, [3]Professor, Department of Microbiology, MIMSR Medical College, Latur, Maharashtra, INDIA.
Email: sanjutandle@yahoo.com

Abstract

Background: Chronic suppurative otitis media (CSOM) is an inflammation of the middle ear and mastoid mucosa with perforation of tympanic membrane. CSOM disease of developing countries. CSOM results because of illiteracy, poverty and poor hygiene. Haphazard use of antibiotics and increasing use of newer one has led to persistent change in microbial flora. The aim of this study is to determine the incidence of CSOM and its causative agents. **Methods:** Ear discharge from 150 patients attending ENT OPD of Yashavantrao Chavhan rural hospital Latur, suffering from CSOM and diagnosed by ENT surgeon was taken. Samples were processed in microbiology department for both bacteria and fungi using standard operating protocol. Antibiotic susceptibility testing was performed for all bacterial isolates by Kirby Bauer disc diffusion method and the result were interpreted according to clinical and laboratory standard institute (CLSI) guideline. **Results:** Out of 150 patients, 80 were male and 70 female patients. Highest incidence of CSOM was observed between 11-20 years of age group. One hundred and fifty three ear swabs were collected from 150 cases (3 cases of Bilateral CSOM) and examined. On culture they yielded 186 isolates, out of which 150 (80.64%) were bacterial and 36(19.36%) were fungal, the first commonest isolate was Staphylococcus aureus 59 (31.72%) followed by Pseudomonasaeruginosa. 50(26.88%), Klebsiella spp. 21(11.29%), Coagulase negative Staphylococci (CONS) 6(3.23%). Among fungal isolates the commonest isolate was Aspergillus niger 15 (8.06%), followed by Candida albicans 9 (4.84%), Aspergillus fumigatus 5(2.69%), Aspergillus flavus 3 (1.61%), Mucor 2 (1.07%), The first commonest isolate S. aureus 59 (31.72%) showed highest sensitivity to linezolid 59 (100%) followed by gentamicin 49 (83.05%), Pseudomonas aeruginosa was found sensitive to imipenem 88% followed by klebsiellaspp and proteus were found sensitive to imipenem 96.96 %. **Conclusion:** S. aureus was the most predominant organism followed by Peudomonas the drug of choice was Levofloxacin and Gentamicin.

Key Word: Chronic suppurative otitis media, bacteria, fungi, antibiotics

***Address for Correspondence:**
Dr. Asha P Pichare, Professor and HOD, Department of Microbiology, MIMSR Medical College, Latur, Maharashtra, INDIA.
Email: sanjutandle@yahoo.com

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INTRODUCTION

Chronic suppurative otitis media (CSOM) is defined as persistent or intermittent infected discharge of more than three months duration through the perforated tympanic membrane by bacteria, fungi or viruses resulting in inflammation of mucosal lining that often results in partial or total loss of the tympanic membrane and ossicles[1] The disease remains an important global public health problem leading to hearing impairment, which may have serious long term effects on language, auditory and cognitive development and educational progress and is a nuisance both for the surgeon as well as for the patient.[2] Risk factors are poor hygiene, young age, poor nutrition, exposure to cigarette and wood burning smoke, eustachian tube dysfunction, inadequate healthcare and poverty.[3] CSOM usually results from bacterial and fungal causes .The most common organisms isolated among aerobes are *Pseudomonas aeuroginosa*, *Staphylococcus aureus* , *Proteus* spp., *Klebsiella* spp. *Aspergillus* spp., and *Candida* spp are the most common fungal causes. These organisms vary in various geographical areas.[4] Many authors have focused their attention on bacterial

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causes of CSOM, but little is known about mycological aspect of these, the importance of which has been increasing in the recent years because of widespread use of broad spectrum antibiotics, corticosteroids, cytotoxic chemotherapy and an increase in number of immunodeficiency conditions.[5] Following the advent of sophisticated synthetic antibiotics, the microbial flora is changing constantly this requires a study of the flora in CSOM and their antibiotic sensitivity pattern before starting antibiotics. This study will help to reduce the CNS complications of CSOM, to diagnose fungal infections *and* to plan a antibiogram for the treatment of bacterial CSOM patients. It will also avoid unnecessary use of antibiotics which is one of the threats for emergence of antibiotic resistance.

METHODS

This prospective study period was carried out from Jan 2013 to August 2014 at depatment of microbiology in MIMSR medical college LATUR. Ear discharge from 150 patients attending ENT OPD suffering from CSOM and diagnosed by ENT surgeon was taken. Clinical and demographical data was collected by using performed questionnaire which included patients age, sex, residential area, period of illness, medications received, ear involved and hearing status. The discharge was collected under all aseptic precautions. The external ear canal was wiped with sterile cotton swab and then with 70% alcohol and allowed to dry. Using sterile auditory speculum a sterile cotton swabs stick was introduced into the middle ear, the stick was rotated and removed with precaution so as not to touch with external ear canal or any other part of skin. The cotton swab stick was put in to its container. Two specimens were collected from single ear in such manner. One for bacteriological examination and another for mycological examination. Specimen was labeled and taken immediately to laboratory for processing.[6-7] In the laboratory, the ear discharges were collected and examined microscopically (in 10% potassium hydroxide) for the presence of epithelial cells, pus cells, budding yeast cells, fungal hyphae and spores, etc7 Samples were inoculated into blood agar (BA), MacConkey agar (MA) and Chocolate agar (CA) for isolation of aerobic bacteria and incubated aerobically at 37°c for 24 hours. For isolation of fungi, samples were inoculated into two sabouraud dextrose agar (SDA); one incubated at 25°c and other incubated at 37°c for upto 7 days Antibiotic susceptibility testing of bacterial isolates was performed on muller hinton agar (MHA) by Kirby Bauer disc diffusion method using CLSI guideline[7,8,9]

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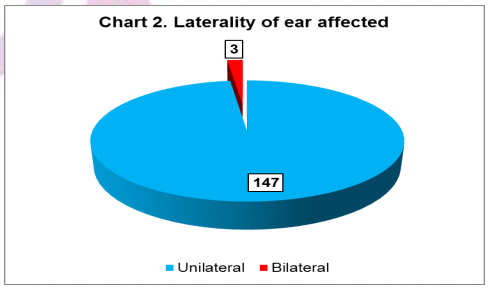
RESULTS

One hundred and fifty three ear swabs were collected from 150 cases (3 cases of Bilateral CSOM) and examined. On culture they yielded 186 isolates, out of which 150 (80.64%) were bacterial and 36(19.36%) were fungal, 80 (53.33%) were male and 70 (46.67%) were female cases. Males were more commonly affected than females.

Table 1: Age wise distribution of cases

Sr. No.	Age Group	No. of cases	Percentage
•	0-10 years	16	10.67
•	11-20 years	46	30.67
•	21-30 years	39	26
•	31-40 years	23	15.33
•	41-50 years	08	5.33
•	51-60 years	13	8.87
•	>61 years	05	3.33
Total		**150**	**100**

Maximum number of cases of CSOM were observed in the age group 11-20 years i.e. 46 (30.67%), followed by 39 (26%) in the age group 21-30. (Table-1)



Out of 150 cases, unilateral infection was present in 147 (98%) and bilateral involvement was in 3 (2%). Unilateral involvement was more common than bilateral. (Chart- 2) Maximum number of casesin rainy season i.e.71 (47.33%) were observed during July- October, while 52 (34.67%) cases were in November-February followed by 27 (18%) in March- June. (Table – 2)

Table 2: Season wise distribution of cases

Sr. No.	Month	Number of cases	Percentage
1	March – June	27	18
2	July – October	71	47.33
3	November-February	52	34.67
	Total	**150**	**100**

The pure bacterial isolates were observed in 109 (72.66%) while pure fungal isolates were observed in o5 (3.34%) of cases and mixed culture of bacteria and fungus were observed in 31 (20.66%) of cases.

Table 3: Frequency of bacterial and fungal isolates (n=186)

Sr. No.	Isolate	Number of isolates	Percentage
1	*Staphylococcus aureus*	59	31.72
2	CONS	06	3.23
3	*Pseudomonas aeruginosa*	50	26.88
4	*Klebsiella* spp	21	11.29
5	*Proteus mirabilis*	04	2.15
6	*Escherichia coli*	03	1.61
7	*Acinetobacter*spp	03	1.61
8	*Enterococcus* spp	02	1.08
9	*Citrobacter*spp	02	1.08
10	*Aspergillus niger*	15	8.06
11	*Aspergillus fumigates*	05	2.69
12	*Aspergillus flavus*	03	1.61
13	*Aspergillus terrus*	01	0.54
14	*Candida albicans*	09	4.84
15	*Candia tropicalis*	01	0.54
16	*Mucor*	02	1.07
	Total	**186**	**100**

A total number of 186 either bacterial or fungal agents were isolated from 150 cases. Out of 186 isolates, 150 were bacterial and 36 were fungal, Among bacterial isolates the first commonest isolate was *Staphylococcus aureus* 59 (31.72%) followed by *Pseudomonasaeruginosa*. 50 (26.88%), *Klebsiella* spp.21 (11.29%), Coagulase negative Staphylococci (CONS) 6 (3.23%), *Proteus mirabilis* 4 (2.15%), *Escherichia coli* 3 (1.61%), *Acinetobacter* spp. 3(1.37%), *Enterococcus* spp 2 (1.08%) and *Citrobacter* spp 2 (1.08%) (Table-3). Among fungal isolates the commonest isolate was *Aspergillus niger* 15 (8.06%), followed by Candida albicans 9 (4.84%), *Aspergillus fumigatus* 5(2.69%), *Aspergillus flavus* 3 (1.61%), *Mucor* 2 (1.07%), *Aspergillus terrus*1(0.54%) and *Candida tropicalis* 1 (0.54%) (Table-3).The first commonest isolate *S. aureus* 59 (31.72%) showed highest sensitivity to linezolid 59 (100%) followed by gentamicin 49 (83.05%), Levofloxacin 84 (75%).Proportion of MRSA in present study was 30 (50%), and they were 100% sensitive to linezolid followed by levofloxacin 30 (90%) Gentamicin 25(83.34%). The Second commonest isolate *P.aeruginosa* i.e. 50 (26.88%) revealed highest sensitivity to imipenem and piperacillin 44(88%) followed by Levofloxacin and aztreonam 35(70%) each, gentamicin 34(68%) Third isolate was *Klebsiella* spp 21(14%) showed highest sensitivity to imipenem 20(95.23%), followed by gentamicin, amikacin and Levofloxacin 19 (90.47%) each piperacillin and aztreonam 18(85.71%.) each .

DISCUSSION

An attempt was made to find out the aerobic bacterial and fungal causes of CSOM with antimicrobial susceptibility testing of bacterial isolates. Present study observed more cases of CSOM in males 53.33% (80) than females 46.67% (70). This is comparable with Rejitha *et al.*[10] , Gaur *et al.*[11], Shazia *et al*[12]., who have also reported higher percentages in males than females . While Prakash *et al.*[13] andSaraswati *et al.*[14]have reported more cases in females as compared to males. The predominant cause of disease in males could be due to their outdoor working habits exposing them to contamination and contagion. In the present study the maximum number of cases were found in age group 11-20 yrs 46(30.67%) followed by age group 21-30yrs 39 (26%). This findings was comparable with the studies of Prakash R *et al.*[15] (2013), Agrawal *et al.*[16] (2012), Bansal *et al.*[17](2012) . The basis for delayed presentation of CSOM in our study may be due to ignorance of and/or the economic restraints on the patient with regards to their seeking health services at an early stage of complaint. Regarding sesonal distribution, maximum number of cases 71 (47.33%) were observed during July- October that was in rainy season. Similar findings were noted by Maji *et al.*[18](2007). More number of cases in rainy season may be due to humidity and effect of temperature. Present study found that gram positive isolates showed higher sensitivity to linezolid 100% similar finding were reported by Shetty *et al.* [19], followed by Proportion of levofloxacin showed 84.7% sensitivity, This is in correlation with Agrawal *et al.*[16], while Shetty *et al.*[19] found it lower and Gentamicin was found sensitive in 83.05% cases in our study. Comparable result was reported by Ashish *et al.*[20], while lower sensitivity was reported by Chaudhary *et al.*[21]. Pseudomonas was observed sensitive to imipenem and piperacillin 88% similar findings observed in Agrawal *et al.*[16] 2013, Shetty

et al.[19] 2013 followed by Levofloxacin sensitivity was75% in present study this is similar to Shetty *et al*[19].while Agrawal *et al.*[16] and Moorthy *et al*.[22] found it less and gentamicin sensitive in 68% of the cases. This is in correlation with Shetty *et al*[19].and Ashish *et al.*[20].Antibiotic sensitivity profile of bacterial etiologic agent irrespective of their gram reaction showed higher sensitivity to levofloxacin and gentamicin .Which suggest that these antibiotics can be used for empirical treatment. Regular laboratory examination with a definite search for fungal and bacterial etiology is desirable in all cases of CS Careful selection of antibiotic guided by culture and sensitivity will prevent development of drug resistance and administration of unwanted antibiotics. Variability in the antibiotic susceptibility pattern has been observed by many workers which possibly reflect the different antibiotic policies and protocols being used in different hospital settings and differences in the geographical locations from where these isolates have been isolated.

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