

Original article:

Study of etiological factors and sensitivity pattern in CSOM

Paresh Chavan , G D Mahajan , Girija Ghate , Priya Shah , Saniya Khan , Rafella Khan ,
Shivangini Gupta

Department of ENT and Head & Neck Surgery , Dr. D.Y. Patil Medical College, Pune

Corresponding author : Dr. Paresh Chavan

Abstract:

Introduction: Chronic suppurative otitis media (CSOM) is defined as a chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent ear discharges or otorrhoea through a tympanic perforation. The disease usually begins in childhood as a spontaneous tympanic perforation due to an acute infection of the middle ear known as Acute Otitis Media (AOM). The objective of this cross sectional prospective study was to Study of etiological factors and sensitivity pattern in CSOM.

Materials and methods: A total number of 50 patients of paediatric age group (upto 12 years) of both genders presenting with otorrhoea in the OPD of otorhinolaryngology.

Bilateral infection was in 26 (52%) cases, swabs from both the ears were taken, and Unilateral infection was in 24 (48%) cases. A total number of 8 bacterial species and 2 fungal species were isolated from 47 positive cultures. The above table shows that the most common organism isolated was Staphylococcus aureus (MSSA+MRSA) 23(46%), followed by Pseudomonas aeruginosa 11(22%), Proteus species 4(8%), Citrobacter species 3(6%), Aspergillus species 3(6%). Others include Group D streptococci and E.coli in one sample each, as shown in above table.

Conclusion: Maximum incidence was noted during 0-8 years and the incidence decreased as the age advances while Maximum number of the patients were males (56%) than the females (44%). Staphylococcus aureus and Pseudomonas spp. were found to be the common cause of CSOM in our study.

Keywords: CSOM, Staphylococcus aureus

Introduction:

Chronic suppurative otitis media (CSOM) is defined as a chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent ear discharges or otorrhoea through a tympanic perforation. The disease usually begins in childhood as a spontaneous tympanic perforation due to an acute infection of the middle ear known as Acute Otitis Media (AOM) ^{1,3}.

The WHO defines CSOM as “otorrhoea through a perforated tympanic membrane present for at least two weeks”³.

Infants and young children are more susceptible to middle-ear infections as their Eustachian tubes that connect middle ear to throat are smaller, more

horizontal and with a more flaccid cartilage which can impair its opening^{4,5}. This gives direct access to the bacterial infection to reach the middle ear from nose and throat during upper respiratory tract infections which are very common in small children.

Ear discharge is one of the most common complaints of pediatric age-group in ENT OPD especially in low socio economic status and in school going children⁶.

Chronic suppurative otitis media (CSOM) is a major cause of acquired hearing impairment in children, especially in developing countries. CSOM in children is most likely to inhibit language and

cognitive development leading to learning disabilities and poor scholastic performance.

In chronic otitis media, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Proteus mirabilis*, *Klebsiella pneumonia* and *Escherichia coli* found in the skin of the external ear enter into the middle ear through a chronic perforation⁷. The frequency of such bacterial isolates could vary in different geographical areas.

The objective of this cross sectional prospective study was to Study of etiological factors and sensitivity pattern in CSOM.

Materials and methods:

This is an observational cross sectional study carried out in the OPD department of otorhinolaryngology, at a tertiary care hospital. A total number of 50 patients of paediatric age group (upto 12 years) of both genders presenting with otorrhoea in the OPD of otorhinolaryngology.

Inclusion criteria:

- Paediatric patients presenting with ear discharge in OPD of department of otorhinolaryngology at a tertiary care hospital.
- Patients presenting with mucoid/ mucopurulent/ purulent ear discharge either unilateral or bilateral
- Children up to the age of 12 years.
- Willingness of parents. (*format of consent form attached*)

Exclusion criteria:

- Conditions causing otorrhoea due to:
 1. Trauma- Cerebrospinal fluid otorrhoea
 2. Otitis externa
 3. Acute otitis media
 4. Foreign body in ear
- Patients who have taken antibiotic therapy, local or systemic within 2 weeks before presenting to the department

Methodology :

Collection of sample:

According to standard procedures, the ear discharge samples were collected aseptically by using sterile cotton swab containing test tube obtained from microbiology department just before collection. The outer contaminated discharge is cleaned with sterile cotton. Discharge from deep area near tympanic membrane is taken on the sterile swab through a sterile ear speculum to avoid sample contamination, under Bull's eye lamp illumination in ENT OPD.

Transport of sample:

The swab is kept immediately in sterile bottle & sealed with cap & it is properly labelled with name, date and IP/ID number of the patient and the time of collection with a duly filled request form and sent to the microbiology laboratory. (*format of laboratory investigation form attached*)

Processing of sample:

Direct smear examination: Gram's stain was performed by Jensen's modification and then screened under oil immersion to note the various morphological types of bacteria, their number, the presence or absence of inflammatory cells and the number of squamous epithelial cells in the sample.

Aerobic culture: - The swab on reaching the laboratory was inoculated on the following culture media.

- MacConkey agar plate
- Blood agar plate
- Chocolate agar plate and
- Nutrient agar plate to isolate the organisms

The inoculated Blood agar and MacConkey agar plates were incubated aerobically at 37°C for 24 hours. After overnight incubation at 37° C the blood agar and MacConkey agar plates were examined for evidence of growth. The colony characters were studied; smears were stained by

Gram's stain and examined under the 100x objective. After 48 hours incubation the chocolate agar plate was similarly examined and the colonies further processed. The bacterial species then isolated were identified by morphology, cultural characteristics and bio-chemical reactions according to the standard techniques.

Results:

50 clinically diagnosed cases of chronic suppurative otitis media attending otorhinolaryngology outpatient department in a tertiary care hospital were studied. Observations made from the study are as follows.

Age of the subject in study group varies from 0 to 12 years. Out of 50 cases 28 (56%) were males and 22 (44%) were females. The data is summarized as follows (**Table 1**):

Table 1: age-sex wise distribution of the study subjects.

Age group	Male	Female	Total
0 – 4 years	9 (18%)	9 (18%)	18 (36%)
5 – 8 years	11 (22%)	7 (14%)	18 (36%)
9 – 12 years	8 (16%)	6 (12%)	14 (28%)
Total	28 (56%)	22 (44%)	50 (100%)

Chi square (X^2) = 0.461, $p > 0.05$

Table 2: Distribution of ear involved.

Ear	Frequency	Percentage
Bilateral	26	52%
Right	13	26%
Left	11	22%
Total	50	100%

Bilateral infection was in 26 (52%) cases, swabs from both the ears were taken, and Unilateral infection was in 24 (48%) cases. The above table (**Table 2**) shows that bilateral infection is more common than unilateral infection in paediatric age groups.

Table 3: Patients distribution on culture basis

Culture	Frequency	Percentage
Positive	47	94%
Negative	3	6%
Total	50	100%

Table 4: Distribution of organisms in the participants based on culture report

Organism	Frequency	Percentage
Methicillin sensitive staphylococcus aureus (MSSA)	21	42%
Pseudomonas aeruginosa	11	22%
Proteus species	4	8%
Citobacter spp		
Freundii	2	4%
Koseri	1	2%
Klebsiella pneumoniae	2	4%
Methicilin resistant staphylococcus aureus (MRSA)	2	4%
Group 'D' streptococcus	1	2%
E.coli	1	2%
Fungus		
Aspergillus fumigatus	2	4%
Aspergillus niger	1	2%
No growth	3	6%
Total	50	100%

A total number of 8 bacterial species and 2 fungal species were isolated from 47 positive cultures.

The above table shows that the most common organism isolated was Staphylococcus aureus (MSSA+MRSA) 23(46%), followed by Pseudomonas aeruginosa 11(22%), Proteus species 4(8%), Citrobacter species 3(6%), Aspergillus species 3(6%). Others include Group D streptococci and E.coli in one sample each, as shown in above table (Table 4).

Discussion:

In the present study an attempt was made to know the bacteriology of CSOM, with antimicrobial susceptibility testing of the isolates. The results are

compared with the other studies and discussed as follows.

In the present study the maximum number of patients was in the age group of 0-8 years (72%). In the UK, Brooks (1976) reported an incidence of 50% in children aged 5-7 years⁸.

- Higher incidence of otitis media in first decade may be due to abundance of lymphoid tissue in children may obstruct the eustachian tube. Increased risk of respiratory infection
- Decreased immunocompetence.
- Short and relatively straight eustachian tube in infants and young children allows ready access of bacteria to middle ear

Males were more affected (56%) than females (44%) in the present study. Varshney saurabh et al studied 150 patients with CSOM and observed that males (57.3%) were more commonly affected than females (42.7%). This study is correlates with the present study⁹. The male predominance may be because of their more exposed way of life.

In the present study 47 (94%) specimens were positive and 3 (6%) were negative for the culture. A Srivastava et al studied 112 patients with CSOM in 2005. In their study they reported negative culture in 19.7% cases¹⁰. Our study correlates with the above study.

A total number of 8 bacterial species were isolated from 47 culture positive cases.

The most common organism isolated was *Staphylococcus aureus* 21 (42%) followed by *Pseudomonas* spp. 11 (22%), *Proteus* spp. 4(8%) and *Citrobacter freundii* 3 (6%). Others include Methicillin Resistant *Staphylococcus Aureus* and *Klebsiella pneumonia* 2 (4%) specimen each. *Streptococcus* spp. and *E.coli* from 1 specimen each (2%).

References:

- [1] Jahn AF. Chronic otitis media: diagnosis and treatment. *Med Clin North America*, 1991;75 (6): 1277-1291.
- [2] McPherson B, Holborow CA. A study of deafness in West Africa: the Gambian Hearing Health Project. *Int J Pediatr Otorhinolaryngol.*, 1985, 10: 115-135.
- [3] World Health Organization . Prevention of deafness and hearing impairment. Geneva: Report by the Director General; 1986. document A39/14.
- [4] Shire JR, Donegan JO. Cholesteatoma of the external auditory canal and keratosis obturans. *Am J Otol* 1986; 7:361.
- [5] Rao AK, Merenda DM, Wetmore SJ. Diagnosis and management of spontaneous cerebrospinal fluid otorrhoea. *Otol Neurotol* 2005; 26:1171.
- [6] Hannley MT, Denny JC 3rd, Holzer SS. Use of otological antibiotics in treating 3 common ear diseases. *Otolaryngol Head Neck Surg* 2000; 122:934.
- [7] Brook I, Frazier E. Microbial dynamics of persistent purulent otitis media in children. *J Pediatr* 1996;128(2):237-240.
- [8] Scott Brown's Otolaryngology. 6th edition. In: David A. Adams and Michael J. Chinnamond, editors. Oxford: Butterworth-Heinemann 1997; Vol. 6 92 Otolaryngology.
- [9] Varshney Saurabh, Gupta Prathima. Bacteriological Study of CSOM. *Indian Journal of Otolaryngology*. 1999;5(2):87-91.
- [10] A Srivastava et al. *Nepalese Journal of ENT Head and Neck Surgery* 2010;vol 1(2):14-16.

The present study shows that active CSOM in children is mainly due to *Staphylococcus aureus* (42%), followed by *Pseudomonas* spp. 11 (22%), *Proteus* spp. 4(8%). Gh. Ettehad, Rejahi S, Nemmati A, Pirzadeh A, Daryani A (2006) undertook a study on microbial and antibiotic susceptibility patterns from patients with chronic suppurative otitis media in Ardebil revealed that most frequently isolated organism was *Staphylococcus aureus* (31.95%), followed by *Pseudomonas aeruginosa* (26.35%), and *Proteus* species (19.67%)¹⁸. In India, Saini reported that *S. aureus* was the commonest isolate in paediatric patients. My study correlates to the above study.

Conclusion:

Maximum incidence was noted during 0-8 years and the incidence decreased as the age advances while Maximum number of the patients were males (56%) than the females (44%). *Staphylococcus aureus* and *Pseudomonas* spp. were found to be the common cause of CSOM in our study.