

Original Research Article

A study of prescription pattern in the drug therapy of CSOM at a tertiary care hospital in eastern part of India

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ABSTRACT

Background: Chronic suppurative otitis media (CSOM) is a perforated tympanic membrane with persistent drainage from the middle ear (i.e. lasting >6-12 weeks). A prospective study was undertaken to find out the baseline data on the prescribing pattern of drugs in the treatment of chronic suppurative otitis media.

Methods: A cross-sectional observational study was conducted on 125 patients attending ENT OPD and microbiology laboratory of a tertiary care teaching hospital with ear discharge and other symptoms and signs of CSOM.

Results: Unilateral infection is more common 82 (65.6%) than bilateral and mostly affects lower socio-economic conditions 90 (72 %). The single bacterial isolate was seen in 102 (81.6%) cases. The mixed growth (contamination) was observed in 12 (9.6%) cases, The 11 (8.8%) cases were found sterile. Higher sensitivity (75%- 95%) was observed with cefuroxime (76.6%), piperacillin/tazobactam (78.7%), doxycycline (85.1%), amikacin (89.4%), and moxifloxacin (93.6%). It showed 38.3% sensitivity with ampicillin, 55.3% with ciprofloxacin, and 61.7% with macrolides. Levofloxacin (85.1%) was more sensitive than ciprofloxacin.

Conclusions: Evaluation of microbiological pattern and their antibiotic sensitivity pattern in local area become helpful in prescribing empirical antibiotics for successful treatment of otitis media and thus minimizing its complications and emergence of resistant strains.

Keywords: CSOM, Microbiological pattern, Prescription pattern, Antibiotics, Sensitivity

INTRODUCTION

CSOM is defined as a chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent ear discharge or otorrhea through a tympanic membrane perforation.¹ CSOM is initiated by an episode of acute infection. The pathophysiology of CSOM begins with irritation and subsequent inflammation of the middle ear mucosa. The inflammatory response creates mucosal edema. Ongoing inflammation eventually leads to

mucosal ulceration and consequent breakdown of the epithelial lining. The host's attempt at resolving the infection or inflammatory insult manifests as granulation tissue, which can develop into polyps within the middle ear space. The cycle of inflammation, ulceration, infection, and granulation tissue formation may continue, eventually destroying the surrounding bony margins and ultimately leading to the various complications of CSOM.^{2,3}

First 3 weeks of inflammation of otitis media is considered acute, up to 3 months its chronic and in between 3 weeks to 3 months is sub-acute CSOM.⁴ Mostly seen in infant and children with a peak incidence in around 2 years of age.⁵ CSOM at this age can cause conductive hearing loss which ultimately results in delayed development of speech and language in children but it is preventable if treated in time.¹ The source of infection is generally from nasopharynx, adenoid, paranasal sinuses or oropharynx and infection ascends through eustachian tube.⁶

Incidence of CSOM is higher in developing countries and in low social-economic classes.⁷ The organisms mostly causes CSOM are *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and gram negative organisms such as *Proteus spp*, *Klebsiella spp*, *Escherichia coli*, *Haemophilus influenza*, and *Moraxella catarrhalis* as bacteria, *Aspergillus niger* and *Candida spp*. as fungi.^{8,9}

CSOM if not treated properly can land up in a number of complications e.g. from persistent otorrhea, mastoiditis, labyrinthitis, and facial nerve paralysis to serious complications like meningitis, intracranial abscesses, and thrombosis.¹⁰ With the introduction of improved antibiotic therapy the incidence and complications can be prevented. But irrational use of them can result in development of microorganism resistance commonly. So proper use of antibiotic according to culture and sensitivity can improve the line of management. The main aim of study was to observe the pattern of antibiotic use in various microorganism induced CSOM.

METHODS

Study design

A cross sectional, observational study without any type of intervention

Duration of study

The duration of study was six months from January 2016 to June 2016.

Selection of cases

The study was conducted on 125 patients attending ENT OPD and microbiology laboratory of a tertiary care teaching hospital with ear discharge and other symptoms and signs of CSOM.

The ear discharge was collected under aseptic precautions with the help of an aural speculum, before the use of any antibiotics.

Glass smear was prepared aseptically on slide for bacterial differentiation by gram stain examination and direct microscopy of specimen in KOH for fungal examination. Swab was used for bacterial culture on

blood agar and MacConkey's agar, incubated for 24 h at 37°C in CO₂ desiccators, colonies were identified by using colony morphology and standard biochemical tests. After identification, colony was inoculated for their antibiotic sensitivity test was done on Muller Hilton Agar using Kirby-Bauer method. The plates were read out after overnight incubation, by measuring the zone of inhibition around the antibiotic discs (Hi Media Laboratories Private Ltd., Mumbai, India) as per Clinical Laboratory Research Institute (CLSI) standards.

Inclusion criteria

Patients with ear discharge from unilateral or bilateral ears with a history of more than 3 months duration were included. Age between 1 year to 50 years. Patients of both sexes were included.

Exclusion criteria

Patients having ear discharge less than 3 months duration, intact tympanic membrane (otitis externa) and who started antibiotics before sample collection.

Ethical clearance

Before commencement of the work, ethical clearance was obtained from the Institutional Ethics Committee. Written informed consent was taken from subjects.

RESULTS

Out of 125 patients more are below 10 years of age 31 (24.8%), with a male predominance 62 (52%). Unilateral infection is more common 82 (65.6%) than bilateral and mostly effects lower socio-economic conditions 90 (72%). The single bacterial isolate was seen in 102 (81.6%) cases. The mixed growth (contamination) was observed in 12 (9.6%) cases, the 11 (8.8%) cases were found sterile as given in Table 1.

Staphylococcus species was the most predominant organism in 45 (36%), followed by *Pseudomonas aeruginosa* 43 (34.4%), *Klebsiella pneumoniae* 5(4%), *Escherichia coli* 3(2.4%), *Streptococcus pneumoniae* 1 (0.8%), and *Proteus mirabilis* 1 (0.8%). While among three fungal isolates 2 (1.6%) were *Candida species* and 2 (1.6%) was *Aspergillus spp* as presented in Table 2.

Among 45 *Staphylococcus spp* 38 (84.4%), *Staphylococcus aureus* were coagulase positive. Out of 38 coagulase positive 8 (21%) were MRSA positive. Higher sensitivity (75%-95%) was observed with cefuroxime (76.6%), piperacillin/tazobactam (78.7%), doxycycline (85.1%), amikacin (89.4%), and moxifloxacin (93.6%). It showed 38.3% sensitivity with ampicillin, 55.3% with ciprofloxacin, and 61.7% with macrolides. Levofloxacin (85.1%) was more sensitive than ciprofloxacin.

Pseudomonas aeruginosa was 100% sensitive to colistin, meropenem, imipenem, and polymyxin B. Susceptibility pattern of *Pseudomonas aeruginosa* showed 63.4% sensitivity with cephalosporins, 87.8% with aminoglycosides, and 61.0%-68.3% with fluoroquinolones. The other gram-negative (*Escherichia coli*, *Klebsiella pneumoniae*, and *Proteus mirabilis*) bacteria were 70%-80% sensitive with cephalosporins, doxycycline, aminoglycosides, and levofloxacin.

Table 1: Growth pattern of ear swab.

Growth pattern	No	Percentage
Positive culture	102	71.6
No growth	12	9.6
Contamination	11	8.8
Total	125	100

Table 2: Pathogenic organisms causing CSOM.

Pathogenic isolate	No	Percentage
<i>Staphylococcus</i>	45	36
<i>Pseudomonas aeruginosa</i>	43	34.4
<i>Klebsiella pneumoniae</i>	5	4
<i>Escherichia coli</i>	3	2.4
<i>Streptococcus pneumoniae</i>	1	0.8
<i>Proteus mirabilis</i>	1	0.8
<i>Candida species</i>	2	1.6
<i>Aspergillus spp</i>	2	1.6

DISCUSSION

In our study, we found *Staphylococcus* as the most common pathogen followed by *Pseudomonas aeruginosa*. Findings are similar with other studies.¹¹ Some studies showed *Pseudomonas aeruginosa* most common.¹² Males are more commonly affected than female and most prevalent age group is 1-10 years of age. Findings are similar with other studies.¹³⁻¹⁵

Pseudomonas aeruginosa, *Staphylococcus aureus*, *Proteus species*, *Klebsiella pneumoniae*, and *Diphtheroids* are the most common bacteria cultured from chronically draining ears. Anaerobes and fungi may grow concurrently with the aerobes in a symbiotic relationship. The clinical significance of this relationship, although unproven, is theorized to be an increased virulence of the infection. Understanding the microbiology of this disease enables the clinician to create a treatment plan with the greatest efficacy and least morbidity.^{3, 16}

P. aeruginosa is the most commonly recovered organism from the chronically draining ear. Various researchers over the past few decades have recovered pseudomonads from 48-98% of patients with CSOM.³

The diagnosis of CSOM requires a perforated tympanic membrane. These perforations may arise traumatically,

iatrogenically with tube placement, or after an episode of acute otitis media, which decompresses through a tympanic perforation.¹⁶

Staphylococcus shows higher sensitivity (75%-95%) with cefuroxime and resistant to ampicillin in 61% cases.¹⁷ *Pseudomonas aeruginosa* was 100% sensitive to colistin, meropenem, imipenem, and polymyxin B. sensitivity is on downward trend with quinolone group of antibiotics. It may be due to various factors like injurious use, improper doses and development of enzymatic resistance of the bacteria.¹⁸

Therefore, evaluation of microbiological pattern and their antibiotic sensitivity pattern in local area become helpful in prescribing empirical antibiotics for successful treatment of otitis media and thus minimizing its complications and emergence of resistant strains.

CONCLUSION

Middle ear infection of varying degree is one of the common conditions in general practice, particularly in our country. Its importance lies in its chronicity and its dreaded complications. Chronic suppurative otitis media (CSOM) and its complications are among the most common conditions seen by the otologist, pediatrician and the general practitioner. Both gram positive and negative organisms are responsible for infection of the middle ear.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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