



ORIGINAL RESEARCH PAPER

Microbiology

AEROBIC BACTERIOLOGY OF CHRONIC SUPPURATIVE OTITIS MEDIA: A STUDY OF TERTIARY CARE HOSPITAL IN PATNA

KEY WORDS: chronic suppurative otitis media, bacteria , antibiotic resistance

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ABSTRACT

Introduction : Chronic suppurative otitis media (CSOM) is defined as chronic inflammation of middle ear and mastoid cavity that may present with recurrent ear discharges or otorrhoea through a tympanic perforation. CSOM is a disease of multiple aetiologies and is well known for its persistence and recurrence inspite of treatment.
Aims & objectives : 1)To isolate and identify the aerobic bacteria of CSOM. 2) To study antibiotic sensitivity pattern of isolates.
Material & methods : A total of 85 samples were collected from patients with established CSOM (with a history of chronic discharging ear) attending E.N.T OPD of Patna Medical College and Hospital, during 6 months period from January 2018 to June 2018.
Results: Out of 85 samples collected from patients in the study, 59 samples were culture positive. Of the total 59 culture positive cases of aerobic bacteria, *Pseudomonas spp.* were the commonest bacteria isolated. This was followed by *Escherichia coli* and *Staphylococcus aureus*, *Klebsiella spp.*, *Proteus spp.*, *Acinetobacter spp.* and coagulase negative *Staphylococcus spp.*
Discussion & conclusion : Early diagnosis and treatment will be useful to prevent the various complications of chronic suppurative otitis media.

INTRODUCTION :

Chronic suppurative otitis media (CSOM) is defined as chronic inflammation of middle ear and mastoid cavity that may present with recurrent ear discharges or otorrhoea through a tympanic perforation¹. Incidence of this disease is higher in developing countries especially among low socio-economic society because of malnutrition, overcrowding, poor hygiene, inadequate health care, and recurrent upper respiratory tract infection². CSOM is a disease of multiple aetiologies and is well known for its persistence and recurrence inspite of treatment. Accordingly the manifestations of CSOM are extremely variable and there may be any lesion from a small healed deformity of the Tympanic Membrane (TM), to a cholesteatoma infiltrating widely throughout the temporal bone³.

Chronic suppurative otitis media (CSOM) is one of the most common chronic childhood infections worldwide. CSOM most often occurs in the first 5 years of life, and is common in developing countries, in special populations such as children with craniofacial anomalies and in certain racial groups^{4,5}.

CSOM is usually classified into two types, tubotympanic and attico-antral depending on whether the disease process affects the pars tensa or pars flaccida of the tympanic membrane (TM)². Tubotympanic is called as a safe type or benign type as there is no serious complication whereas, attico-antral is called as the unsafe or dangerous type because of associated complication and may be life threatening at times⁶. The microbiological flora of the middle ear varies and depends on the type of otitis media. In the acute form, the major organisms present are *Hemophilus influenzae*, *Streptococcus pneumoniae*, *Pseudomonas aeruginosa* and anaerobic bacteria⁷.

Prevalence of CSOM is more in the developing and underdeveloped countries. It is also common among the poorer sections of the developed world. The incidence is highest among low hygiene populations or with overcrowding and malnutrition. In most cases the disease started in childhood when the eustachian tube was incompetent. More bouts of acute otitis media were seen in infants with many siblings in crowded day care facilities where the mother stopped breast feeding early and parents were smoking. Premature and low birth weight babies in lower socio-economic groups were more vulnerable to CSOM and its attendant handicap and complications in later life. A variety of host factors, genetic disorders like Down syndrome, immune

deficiencies or paresis, ciliary disorders, cleft palate have been implicated in the causation of CSOM⁸.

The treatment of CSOM is controversial and subject to change particularly in the developing countries, the prevalence and antibiogram of these organisms has been reported to vary with time and geographical area as well as continent to continent, probably due to indiscriminate use of the antibiotics⁹. Hence, the periodic update of prevalence and antibiogram of the etiological agents for CSOM would be helpful in therapy and management of patients.

AIMS & OBJECTIVES :

- 1) To isolate and identify the aerobic bacteria of CSOM.
- 2) To study antibiotic sensitivity pattern of isolates

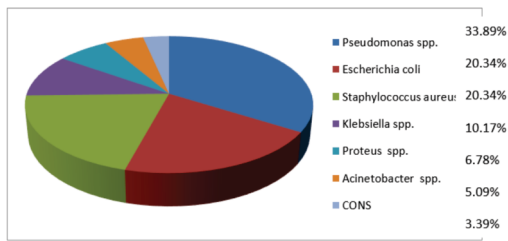
MATERIAL & METHODS :

A total of 85 samples were collected from patients with established CSOM (with a history of chronic discharging ear) attending E.N.T OPD of Patna Medical College and Hospital during 6 months period from January 2018 to June 2018. Two sterile cotton swabs were used to collect ear discharge from CSOM patients. Only those cases were selected who had not taken any treatment either systemic or local in the form of ear drops for the last seven days. Further processing was done in the laboratory of Department of Microbiology, Patna Medical College, Patna. One swab was used for performing Grams' stain and second one for culture. Culture was done on blood agar and MacConkey agar. The organisms were identified by culture characters, morphology, and pigment production, beta hemolysis on blood agar, motility and conventional biochemical tests. Antimicrobial susceptibility test for all isolates was performed on Mueller Hinton agar plate using Kirby Bauer disc diffusion method. Results were interpreted using Clinical Laboratory Standards Institute (CLSI) guidelines.

RESULTS :

Out of 85 samples collected from patients in the study, 59 (69.41 %) samples were culture positive. No growth were seen in 26 samples. Of the total 59 culture positive cases of aerobic bacteria, *Pseudomonas spp.* 20 (33.89%) were the commonest bacteria isolated. This was followed by *Escherichia coli* 12 isolates (20.34%) and *Staphylococcus aureus* 12 isolates (20.34%), *Klebsiella spp.* 6 isolates (10.17%), *Proteus spp.* 4 isolates (6.78%), *Acinetobacter spp.* 3 isolates (5.09%) and coagulase negative *Staphylococcus spp.* 2 isolates (3.39%).

Figure 1 : Distribution of bacterial isolates



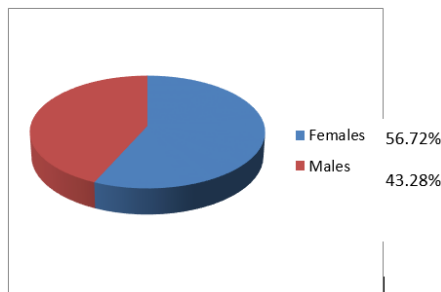
Majority of the patients were of the age group of 11 - 20 years (41.18 %). This was followed by 21-30 years age group (34.12 %). Least number of patients were found in >50 years age group (3.53 %).

Table 1 : Distribution of cases amongst different age groups :

Serial no.	Age group	Number of cases	Percentage distribution (%)
1.	0-10 years	6	7.05
2.	11-20 years	35	41.18
3.	21-30 years	29	34.12
4.	31-40 years	7	8.24
5.	41-50 years	5	5.88
6.	>50 years	3	3.53

Females (56.72%) were more commonly affected than males (43.28%)

Figure 2: Sex distribution



Antibiotic sensitivity was carried out for 59 isolates by Kirby-Bauer disc diffusion method . Most sensitive antibiotic for *Staphylococcus aureus* was clindamycin (84.37%) . This was followed by cotrimoxazole (62.36%), amoxicillin clavulanic acid and cloxacillin.

62.18 % of *Pseudomonas spp.* isolates were found to be sensitive to amikacin and 56.28 % to gentamicin. This was followed by sensitivity to ceftazidime which was 44.13% and ciprofloxacin were sensitive in 37.61% of isolates. 82 % of the *E. coli* isolates showed sensitivity to amikacin , 60% to ciprofloxacin 56 % to gentamicin, 42% to ceftazidime and 36% to cotrimoxazole . In case of *Klebsiella spp.* , sensitivity to ciprofloxacin and gentamicin were 46% and to amikacin was 34%. All the *Acinetobacter* isolates were sensitive to ceftazidime . In case of *Proteus spp.* , 75% were sensitive to ciprofloxacin , 68% to gentamicin and 62% to ceftazidime and 56% were sensitive to amikacin.

DISCUSSION :

CSOM is a major public-health problem, and India is one of the countries with high-prevalence where urgent attention is needed¹. It's a persistent disease with great risk of irreversible complications. CSOM is an important cause of preventable hearing loss particularly in the developing world¹⁰ and a reason of serious concern, particularly in children, because it may have long-term effects on early communication, language development, auditory processing, educational process, and physiological and cognitive development¹. Various risk factors have been quoted in the literature for the development of CSOM including frequent upper

respiratory tract infections, nasal disease, inadequate antibiotic treatment, poor living conditions with poor nutrition and hygiene. These risk factors probably favour the development of CSOM by weakening the immunological defences, increasing the inoculum and encouraging early infection¹⁰. The recurrent episodes of otorrhoea and mucosal changes are characterised by osteoneogenesis, bony erosions and osteitis in the temporal bone and ossicles¹¹. The sequelae of otitis media, including chronic perforation of the tympanic membrane, ossicular erosion, labyrinthine erosion and tympanosclerosis contribute to hearing loss¹².

The frequency of *Staphylococcus aureus* in the middle ear infections can be attributed to their ubiquitous nature and high carriage of resistant strains in the external auditory canal and upper respiratory tract. The organisms like *Pseudomonas spp.* and *Proteus spp.* are considered mostly as secondary invaders from external auditory canal gaining access to the middle ear via a defect in tympanic membrane resulting from an acute episode of otitis media. Organisms like *E. coli* and *Klebsiella spp.* become opportunistic pathogens in the middle ear when resistance is low. Although coagulase negative *Staphylococcus spp.* are generally considered as non-pathogenic, their association in some cases can be attributed to the extreme lowering of resistance in middle ear due to invasion by other organisms. Under these circumstances they assume pathogenic role either singly or more often in combination with other organisms¹³.

CONCLUSION :

CSOM like other chronic disease can limit an individual's employability and quality of life. Experts declare that when prevalence of CSOM is > 3% it must be targeted as a high-priority disease¹. The wide spread use of antibiotics has precipitated the emergence of multiple resistant strains of bacteria which can produce both primary and post operative infections. This is also due to indiscriminate use of antibiotics. The purpose of continuing medical therapy for CSOM would be to prepare the ear by reducing the bacterial load before surgery and improving the graft uptake and stability of middle ear function postsurgery¹. Early diagnosis and treatment will be useful to prevent the various complications of chronic suppurative otitis media.

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