

Microbiologic Profile of Chronic Suppurative Otitis Media in a Tertiary Care Hospital



Microbiology

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ABSTRACT

Chronic Suppurative Otitis Media (CSOM) is a chronic inflammation of the middle ear and mastoid cavity. India is one of the countries with highest CSOM prevalence. Hence, the present study was undertaken to analyse the common presenting symptoms and risk factors and to isolate the aerobic bacterial and fungal pathogens associated with CSOM. The antibiotic susceptibility pattern and ESBL production of the bacterial isolates was also studied. The study included 70 patients of age 0-80 years with discharging ears for more than 3 months who were admitted or visited the ENT outpatient department. Swabs from ear discharge were obtained and streaked in Nutrient, MacConkey and blood agar plates and antibiotic sensitivity testing was done. The most common bacterial isolate was Pseudomonas sps (30.18%) and the most effective antibiotic was Amikacin. ESBL producers accounted for 16.3%. Aspergillus niger and Candida species were the fungi involved. The high rate of multiple drug resistance, particularly to cheap and frequently used antibiotics, raises serious concern.

Introduction

Chronic Suppurative Otitis Media (CSOM) is a chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent otorrhea through a tympanic perforation. It is a massive public health problem, and India is one of the countries with highest CSOM prevalence (> 4 %, WHO 2004). It is a frequent cause of hearing impairment and can occasionally lead to fatal intracranial infection. Typically the disease follows viral infection of the upper respiratory tract, but soon it sets the conditions for the middle ear to be invaded by pyogenic organisms.

Over 50 percent of the cases are caused by bacteria.^[1]The changes in the microbiological flora following the haphazard use of antibiotics have increased the relevance of the reappraisal of the flora in CSOM^[2] and so it is very important for a clinician to know the antibiotic sensitivity pattern to plan for treatment. With treatment the condition resolves completely with full restoration of the functions of the ear. If untreated or improperly treated it can lead to complications like brain abscess, cholesteatoma formation or meningitis which may cause disability or endanger the patient's life.

Hence, the knowledge of microbiology and antibiotic susceptibility of micro-organisms causing the disease is vital for defining the empirical treatment. There are no large scale studies on the same from this region. The present series deals with the study of bacterial and fungal flora in CSOM cases who attended the ENT Department and to detect the antibiotic susceptibility and resistant pattern of the bacterial isolates.

Materials and methods

Study group:

The study included 70 patients who were admitted or visited the outpatient department in the ENT Department of Tirunelveli Medical College Hospital, Tirunelveli with CSOM. All the patients of any age (0-80 years) and either sex who had discharging ears for more than 3 months duration were included in this study after the approval of Institutional Ethics Committee.

Inclusion Criteria

1. Patients with ear discharge for more than 3 months and diagnosed as suffering from CSOM by an ENT surgeon.
2. Patients who are not on any antibiotic treatment for a minimum of 24 hours.

Exclusion Criteria

1. Ear discharge less than 3 months.
2. Patients using topical or systemic antibiotics for more than

a week.

3. Ear discharge with intact tympanic membrane (otitis externa).

A detailed history regarding ear discharge, onset, duration, frequency and associated illness was taken from the patients. Thorough local and systemic examination was performed. Well informed consent was taken from patients/parents explaining the procedure, its risks, and benefits.

Sample collection

Ear discharge was collected under aseptic precautions in clinically diagnosed cases of CSOM. Excess of discharge was mopped out and the external auditory canal cleaned with 70% alcohol to achieve sterile area. Then with two sterile swabs properly labelled for each patient, specimen was collected. Swabs were then transported to Microbiology laboratory.

Isolation and identification of pathogens:

With one swab, inoculation was done on Blood Agar, Nutrient Agar & Mac Conkey Agar. Direct gram staining was also performed to look for the presence of pus cells, epithelial cells and organisms. The culture plates were incubated at 37°C for 24 - 48 hours. After overnight incubation of plates, they were studied for culture characters and smears were stained by Gram stain. The culture isolates were further identified using various biochemical reactions up to genus/species level. The second swab was inoculated on the Sabouraud Dextrose Agar (SDA) and incubated at room temperature for fungal growth. LPCB mount was also made to identify the fungus by its morphology.

Antibiotic sensitivity testing:

Antibiotic sensitivity testing for bacterial isolates was done by the Modified Kirby-Bauer disc diffusion method according to the Clinical and Laboratory Standards Institute (CLSI) guidelines. The antibiotics used for the Gram positive isolates were Erythromycin, Vancomycin, Novobiocin, Clindamycin, Ampicillin, Gentamicin, Amikacin, Septran, Ciprofloxacin and Cefotaxime. The antibiotics used for sensitivity testing of Gram negative isolates were Gentamicin, Amikacin, Ceftazidime, Ceftriaxone, Septran, Cefotaxime, Ciprofloxacin, Doxycycline. (Hi Media, India)

Phenotypic confirmation of ESBL was by done testing the strain against Ceftazidime and Ceftazidime with Clavulanic acid discs. MRSA detection was done by Cefoxitin disc diffusion method.

The fungal isolates were identified by Lacto phenol Cotton Blue

wet mount.

Results

Of the 70 patients of all age groups (0-80 years), 51 belonged to rural areas and the rest 19 belonged to urban area. Among the 70 patients involved in the study, there was a male preponderance of 55.71% and females comprising 44.28%. 7 of the cases were recorded in the age group of below 10 years. Maximum number of patients (21) was in the age group of 21 – 30 years.

Out of the 70 patients, 35 of them had discharge from right ear, 29 from the left and 6 of them had discharge from both the ears. The discharge was either purulent, mucopurulent or blood stained. The patients also presented with other complaints such as pain, fever, mastoiditis, polyps etc. All the patients had discharge for more than three months. 54% of them had discharge for less than or one year and 46% of them had discharge for more than a year with regressions on application of topical antibiotics and recurrences. 88.5% of the cases were without complications and 11.4% were with complications such as mastoiditis, polyps, hard of hearing.

Out of the total 49 positive cultures, about 53 organisms were isolated. Among the total isolates, about 93.8% of them had a single causative agent grown in culture either bacteria or fungi. Among the bacterial isolates, 15 were Gram positive and the rest of them were Gram negative. Among the 53 bacterial isolates, *Pseudomonas aeruginosa* (16) was the most common organism isolated followed by *Staphylococcus species* (15), *Klebsiella species* (11) [Table 1]

The most effective antibiotic against *Pseudomonas aeruginosa* was Amikacin and Ceftriaxone (87.5%) and showed resistance commonly to Cefotaxime, Septran and Doxycycline. The second most predominant isolate was *Staphylococcus species* and was sensitive to Vancomycin, Ciprofloxacin, Clindamycin. About 83.3% of them were Methicillin Resistant *Staphylococcus aureus*. *Klebsiella species* were sensitive to most of the drugs and were resistant to Septran followed by Ceftazidime (85%). About 36.3% of the isolates of *Klebsiella species* were ESBL producers. About 16.3% of the bacterial isolates were ESBL producers belonging to the genus *Klebsiella* and *Escherichia*. They were found to be resistant to most commonly used third generation cephalosporins. [Table 2]

Fungal cultures

Out of the 49 positive cultures, only 3 of them had fungal growth. Among the fungal cultures, *Aspergillus niger* were isolated in 2 and *Candida species* in one culture. *Aspergillus niger* was the sole organism involved in the two cases of CSOM where as *Candida species* was found in association with bacterial organisms.

Discussion

In this study comprising 70 cases, all the patients had symptoms lasting more than three months, mainly the symptoms being, ear discharge, pain in the ear and other signs of inflammation like fever. Hence all the cases belong to the group of CSOM.

Out of the 70 cases studied, 30% was observed in the 20-30 age groups. This finding is contradictory to the work published by other authors Gulati et al [3], Baruah et al [4], who reported a higher incidence in the age group of 0-20 where as Arya and Mohapatra [5] reported the highest incidence among the 11-20 years age group. This may be due to the difference in the prevalence of the disease in different places.

Analysis of the gender incidence in the present study revealed that otitis media was found to be more common in males (55.71%) than in females (44.29%). Bhavan Desi et al [6] also reported a higher preponderance of males.

In the present study unilateral infection was predominant seen in 91.4% of the patients. Right ear was involved in 50% of the cases and the left ear in 41.4%. Bilateral involvement was present only in 8.5%. These findings correspond with the study done by Laxmipathi and Bhaskaran [7], Zahid Suhail et al [8].

The analysis of the bacterial flora in the present study showed a predominance of gram negative bacilli (68%). The highest incidence was that of *Pseudomonas aeruginosa* (31.37%) followed by *Staphylococcus species*. Sharma et al [9] and R Shyamala et al [10] reported the similar results. In contrast, Ojala et al [11] reported the isolation of 10% *Pseudomonas species* and 22% *Staphylococcus aureus* in their study. This difference in the isolation of organisms is due to several factors such as the climate and temperature, age of the patient, geographic distribution and the resistance of the particular strain in that place etc.

In the present study, Amikacin has proved to be the most effective drug for aerobes (41 strains), closely followed by Ciprofloxacin, followed by Gentamicin.

Among the fungal cultures *Aspergillus niger* was the predominant one followed by *Candida species*. In a Singapore study on 90 patients of otitis media, Loy et al [12] found that fungi accounted for 8.8% of the isolates and that the fungal organisms which were commonly isolated were *Aspergillus niger* followed by *Candida species*.

Conclusion

This result shows that the bacteriology and the antibiotic sensitivity pattern of CSOM have been changing from time to time. In the recent times, high rate of multiple drug resistance as well as the high levels of resistance to individual antibiotics is a cause for concern. The present study thus indicated that a regular laboratory examination with a definite search for fungi and bacteria is desirable in all cases of CSOM, since the prolonged use of broad spectrum antibiotics may cause suppression of bacterial flora and the subsequent emergence of fungal flora. It is thereby recommended that the correct management is with an early culture and sensitivity that would control this rapid trend of emerging resistant organisms.

Table 1: Organisms cultured

Organisms	No. of isolates	%
<i>Pseudomonas aeruginosa</i>	16	30.18
<i>Staphylococcus species</i>	15	28.30
<i>Klebsiella species</i>	11	20.75
<i>Escherichia coli</i>	4	7.54
<i>Proteus mirabilis</i>	2	3.77
<i>Citrobacter freundii</i>	2	3.77
<i>Aspergillus niger</i>	2	3.77
<i>Candida species</i>	1	1.88

Table 2: Prevalence of MRSA and ESBL producers

Bacteria	No. of isolates
MRSA	5
MR-CONS	1
ESBL <i>Klebsiella species</i>	4
ESBL <i>Escherichia coli</i>	2

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