



A Study on Etiological Agents and their Antimicrobial susceptibility causing Chronic Suppurative Otitis Media in a Tertiary Care Hospital

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Abstract

Chronic suppurative otitis media (CSOM) is the most common cause of hearing impairment in the developing countries and it is associated with increased incidence of intracranial and extra cranial complications. To isolate, identify and characterize the Bacterial organisms and detect the antibacterial susceptibility pattern of the isolates by using microbiological methods from specimens of clinically proved cases of chronic suppurative otitis media. A total of 245 patients with CSOM were studied. Swabs were collected from each patient and cultured for bacteria and fungus. Standard methods for isolation and identification of bacteria and fungus were followed. Antibiotic susceptibility testing was done by Kirby-Bauer's disc diffusion method. Out of the 245 samples studied for bacterial and fungal isolates, 225 samples showed growth of pathogens, 20 samples did not show any growth, 201 samples showed bacterial growth, The most predominant organism was *Staphylococcus aureus*, 24 samples showed fungal growth, *Aspergillus* sps being the predominant isolate. Antibiotic sensitivity of organism altered over time, with needs for periodic bacteriological examination. *Staphylococcus aureus* being most common organism isolated is highly sensitive to cloxacillin and cephelexin. Patients would be benefited by accurate diagnosis of type of infection and the appropriate drug that will be sensitive for the infection can be administered to them.

Keywords: Chronic Suppurative otitis media, bacterial and fungal isolates, *Staphylococcus aureus*, *Aspergillus* species.

Introduction

Chronic suppurative otitis media (CSOM) is defined as infection of the middle ear three episodes per year that lasts for more than three months and is accompanied by otorrhea and tympanic membrane perforation.

Micro-organisms found in chronic discharge differ from those found in acute suppurative otitis media. The commonest organisms isolated are *Pseudomonas aeruginosa*, *Proteus* species (*P. mirabilis* and *P. vulgaris*) and *Staphylococcus*

aureus. These organisms are most likely to gain access to the middle ear from the external auditory canal through the tympanic membrane defect. Other organisms found less commonly in chronically discharging ears include *Escherichia coli*, *Streptococcus pneumoniae*, Diphtheroids, *Klebsiella* species and the anerobic *Bacteroides* species.

Inspite of the decline in the incidence of acute suppurative otitis media with advent and use of antibiotics, the great frequency of chronic

suppurative otitis media and its poor response to the routinely used antibiotics has prompted the present study. This study is primarily undertaken to determine the bacterial and fungal flora which are prevalent in the middle ear of patients suffering from chronic suppurative otitis media and in vitro susceptibility of different organisms

Materials and Method

This study was done for accurate diagnosis with the type of bacterial infection and the appropriate drug showing sensitivity could be administered to them over a period of one year, 245 samples were collected from patients attending the Department of Otorhinolaryngology, in a Tertiary care hospital. All the Ear swab samples of patients diagnosed with tubotympanic type of CSOM sent by the ENT department were received at the Microbiology Laboratory.

Sample processing

One swab was used for performing gram staining and KOH mount and another swab was used for inoculating the culture media for aerobic bacterial culture. Nutrient agar, 5% Sheep blood agar, Chocolate agar and McConkey agar culture plates were inoculated and incubated for aerobic bacterial culture at 37°C for 18-24 hours. The bacterial growth was identified based on the morphology of the bacterial colonies on culture plates and confirmed using the biochemical reactions as done routinely.

The antibiotic susceptibility testing of the bacterial isolates was performed as per Kirby Bauer's Disc Diffusion method in Mueller Hinton agar using the preferable antibiotics and interpretation was done based on Clinical Laboratory Standards Institute Guidelines (CLSI). Samples were processed for fungal examination using 10% KOH mount and further inoculated on Sabouraud's dextrose agar and chrome agar for isolation of fungus. It was incubated at 27°C and 37°C for 2 – 14 days. The growth was identified based on their morphological and cultural characteristics and microscopic examination was

done using lactophenol blue staining technique. All yeast isolates were subcultured on CHROM agar (HiMedia) and incubated at 37°C for 24 hours and the species were identified by type and colour of the colonies on CHROM agar media where *C. albicans* showed bluish green and *C. tropicalis* showed dark blue gray centre with pink halos. All the moulds were subjected to slide culture method. Colonies were identified according to standard mycological methods and identified as *Aspergillus* species.

Result

Among 245 samples of clinically proven CSOM patients in our study, 225 samples showed growth of pathogens, 20 samples did not show any growth, 201 samples showed bacterial growth and 24 samples showed fungal growth.

Majority $n = 72$ (35.82 %) of the patients were in the age group 11 to 20 years irrespective of sex. In 21 to 30 years age group there were $n=34$ (16.91 %) and in 61-70 years $n=12$ (5.9 %)

201 samples that showed bacterial growth, the most predominant organism $n= 65$ (32.33%) was *Staphylococcus aureus* followed by *Pseudomonas aeruginosa* 58 (28.85 %) as shown in figure no 1. *Staphylococcus aureus* is the commonest organism in our study. *Staphylococcus aureus* isolates were highly sensitive to cloxacillin (93.84%), cephalixin (92.30%), Amikacin (92.30%) as shown in figure no 2.

Pseudomonas aeruginosa was the second highest number in isolation. They were highly sensitive to gentamicin (86.20%), ofloxacin (77.58) and amikacin (77.58%).

Of the 24 fungal culture positive cases, the predominantly isolated fungi were *Aspergillus* species. Among the *Aspergillus*, the predominant species were *Aspergillus niger* (15 isolates) and *Aspergillus flavus* (5 isolates). *Candida albicans* (2 isolates) and *Candida tropicalis* (2 isolates) were the commonly isolated species of *Candida* and *Candida* species as shown in figure no.3 and table no 1.

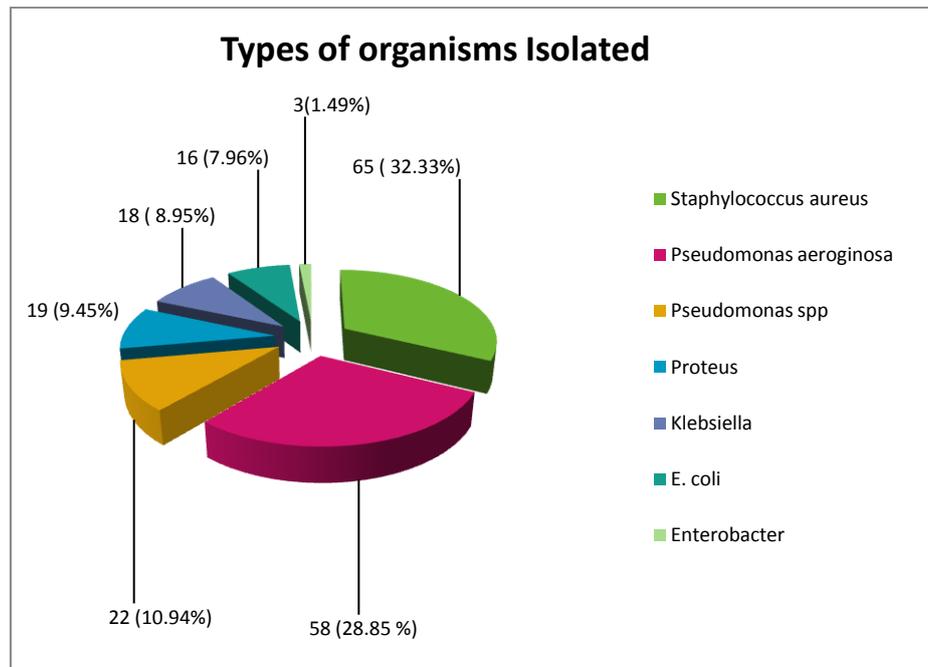


Figure no. 1 Types of organism isolated

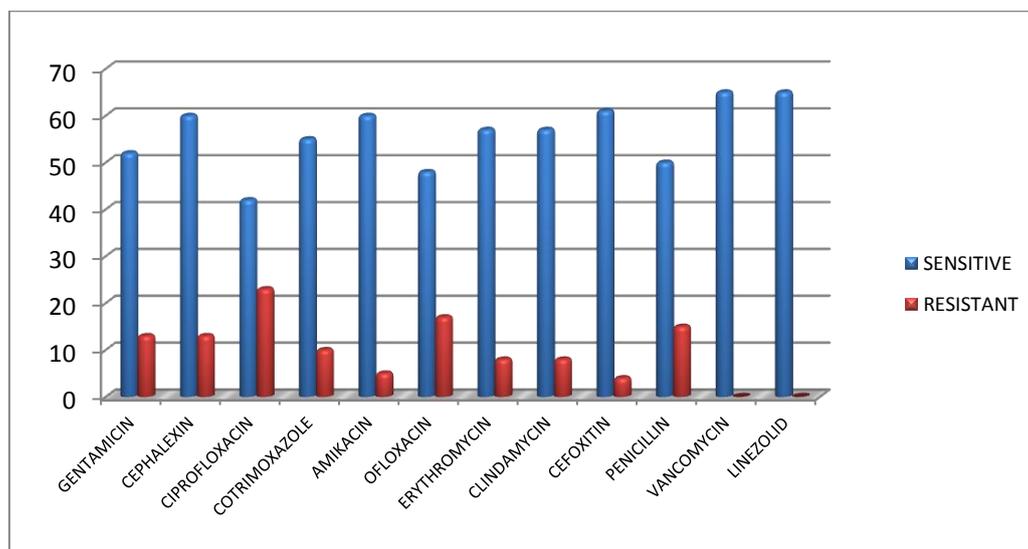


Figure no 2: Antibiotic sensitivity pattern – Staphylococcus aureus

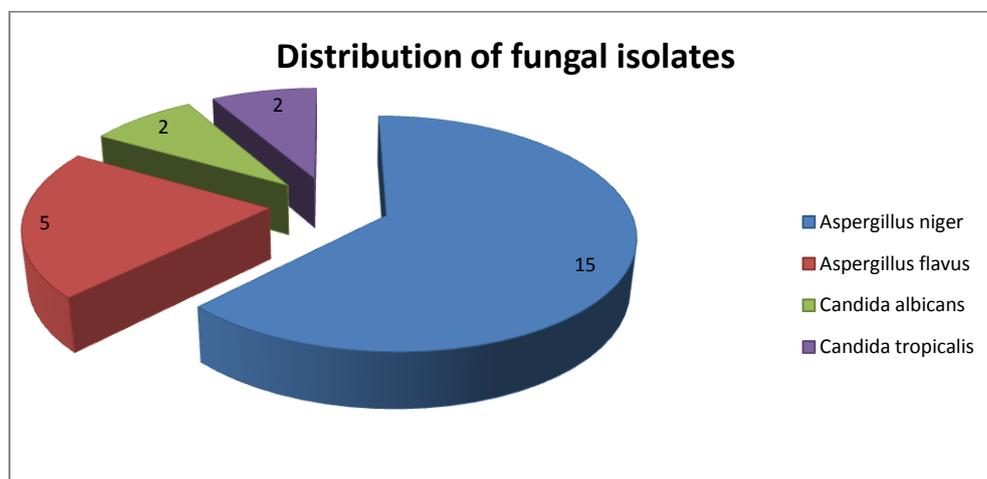


Figure no 3: Distribution of fungal isolates

Table no 1. Distribution of the *Aspergillus* and *Candida* species

Fungal Isolates	Total
<i>Aspergillus niger</i>	15 (62.5%)
<i>Aspergillus flavus</i>	5 (20.8%)
<i>Candida albicans</i>	2 (8.3%)
<i>Candida tropicalis</i>	2 (8.3%)

Discussion

Chronic suppurative otitis media is an important cause of morbidity in very large group of Indian population in the form of preventable hearing loss. In our study the average mean age is 32 years similar to other studies done by Aberg et al⁽¹⁾ reported a mean age of 41 years, Vartiainen et al⁽²⁾ a mean age of 38 years, Alho et al⁽³⁾ a mean age of 42 years and Maharjan M et al⁽⁴⁾ reported a mean age of 34 years.

Study done by Srivastava K.V. et al (1979)⁽⁵⁾, Loy AH et al (2002)⁽⁶⁾, Yeo SG et al (2007)⁽⁷⁾, Nikakhlagh S. et al (2008)⁽⁸⁾, the major organism isolated was *Staphylococcus aureus* followed by *Pseudomonas aeruginosa* which is similar to our study. Study done by Indudharan R. et al (1999)⁽⁹⁾, Khanna V et al (2000)⁽¹⁰⁾, Yang Y et al (2001)⁽¹¹⁾ Sharma S et al (2004)⁽¹²⁾, Vikram B K et al (2008)⁽¹³⁾, Mansoor T. et al (2009)⁽¹⁴⁾, the major organism isolated was *Pseudomonas aeruginosa* followed by *Staphylococcus aureus* which is in contrast to our study. *Staphylococcus aureus* is the commonest organism in our study. *Staphylococcus aureus* isolates were highly sensitive to cloxacillin (93.84%), cephalexin (92.30%), Amikacin (92.30%).

A study conducted in South Korea, reported that in adult patients with chronic suppurative otitis media (CSOM), ciprofloxacin resistant *Pseudomonas aeruginosa* was found. In our study, *Pseudomonas aeruginosa* were found to be sensitive to ciprofloxacin (74.13%) which shows the increasing trend of ciprofloxacin resistant strain in the community.

Among the fungal etiology in CSOM, the most commonly isolated organisms are *Aspergillus* species and *Candida* species (Ibekwe et al., 1997)⁽¹⁵⁾. In our study, *Aspergillus* species

comprised of (83.3%) of the total fungal isolates, whereas (16.6%) of the isolates were *Candida* species. A study by Talwar et al.⁽¹⁶⁾, from India reported higher isolation rate of *Aspergillus* species (60.2%) as compared to *Candida* species (17.6%).

Conclusion

Antibiotic sensitivity of organism altered over time, with needs for periodic bacteriological examination. Pre treatment antibiotic sensitivity test may help in selecting appropriate antibiotics for treatment.

Considering all these factors it is really a challenge for us to upgrade our health care system with National Control Programme to control chronic suppurative otitis media and prevent deafness caused by it.

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