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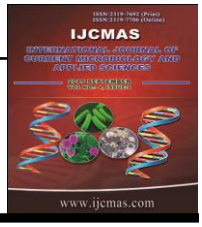

Original Research Article

Study of Microbiological Profile and their Antibiogram in Patients with Chronic Suppurative Otitis Media

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Keywords

Chronic suppurative otitis media, CSOM, *Pseudomonas aeruginosa*, Otomycosis

A B S T R A C T

Chronic suppurative otitis media (CSOM) is the infection of middle ear that lasts for more than 3 months. The infection may extend to cranium causing serious complications. CSOM may be caused by bacteria or fungi. 200 ear samples were studied. Three samples collected, one for direct Gram's stain & KOH mount, second for bacterial culture & third for fungal culture. All samples were processed following standard bacteriological procedures.82% of samples showed growth to various organisms. Early age group was most commonly affected. *Pseudomonas aeruginosa* is the most common causative agent followed by *Staphylococcus aureus*, *Klebsiella*, *E. coli* and *Proteus*. The commonly used antibiotics like aminoglycosides, quinolones & cephalosporins have shown moderate resistance ranging from 40 to 65%. *Aspergillus* species was the most common fungi causing otomycosis. The early blind treatment of cases without sensitivity pattern leads to development of drug resistance. Not only does microbiological diagnosis ensure prompt and effective treatment to avoid complications, it also gives a comprehensive picture of local flora and sensitive antibiotics.

Introduction

Chronic suppurative otitis media (CSOM) is defined as infection of the middle ear cleft that lasts for more than 3 months and is accompanied by otorrhea and tympanic membrane perforation (Agrawal *et al.*, 2013; Rao and Reddy, 1994). CSOM is a destructive disease with irreversible sequelae and can proceed to serious intra and or extra cranial complications (Poorey and Arati Iyer, 2002). The organisms isolated in CSOM can be aerobes, anaerobes, mixed or fungi (Brook, 2003). 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 infection (Kumar and Seth, 2011). Sources of infection in otitis media is mainly dependent on the route by which

infection reaches the middle ear and the chief route by which this occurs is through auditory tube (Healy and Teele, 1977; Daly, 1997).

The present study was aimed to find the microorganisms, mainly aerobic bacteria and fungi causing CSOM and find their antimicrobial susceptibility pattern to provide a guideline for empirical antibiotic therapy.

Materials and Methods

We conducted a study of consecutive 200 cases of clinically diagnosed CSOM seen in the ENT outpatient department of a tertiary care centre, Basaweshwara, teaching & general hospital during 1 year period from Jan 2013 to Dec 2013. Patients having ear discharge with signs and symptoms of chronic suppurative otitis media were the subjects. Patients with prior antibiotic therapy were excluded from the study. Three sterile cotton swabs were collected.

The first swab was used to make a Gram's stain examination and direct microscopy of specimen in KOH for fungal examination. The second swab was used for the bacterial culture on blood agar, MacConkey's agar and Chocolate agar which were then incubated for 24–72 hours at 37°C in CO2 incubator. The isolates were then identified by using colony morphology and standard biochemical tests. The antibiotic sensitivity test was done on Muller Hinton Agar using Kirby‑Bauer method as per Clinical Laboratory Research Institute (CLSI) standards (CLSI, 2011).

All dehydrated media, reagents and antibiotic discs were procured from Hi‑media Laboratories Pvt. Ltd., Mumbai, India. Third swab was used for mycological culture and was inoculated on two slants of Sabouraud dextrose agar with chloramphenicol and were then incubated at 25°C and 37°C. The slants were later examined for colony morphology and further studied by Gram's staining and LPCB mount.

Results and Discussion

Out of total 200 ear swabs processed microbial growth was seen in 164 (82%) samples while 36 (18%) samples showed no growth. Forty-seven (24%) samples showed polymicrobial growth. Their ages ranged from 5 months to 79 years. The peak incidence of CSOM was observed in age group between 0 and 20 years (56%). Males (53.92%) were more commonly affected than females (46.08%).

Totally 211 isolates were identified including polymicrobial samples, of which 198(93.8%) were aerobic bacteria and 13(6.2%) fungal isolates.

Predominant aerobic bacteria causing CSOM was *Pseudomonas aeruginosa* 96(48.5%) followed by *Staphylococcus aureus* 73(36.8%), *Klebsiella* 16(8%), *E. coli* 11(5.5%) and *Proteus mirabilis* 2(1%).

Aspergillus niger (46%) was the most common fungus causing CSOM followed by *Aspergillus fumigates* (30.7%) and *Candida* species (23%).

Results of sensitivity testing are depicted in table 5. Among *Pseudomonas aeruginosa*, meropenem has the highest susceptibility rate (100%) followed by amikacin(75%), ceftriaxone (74%), cefuroxime (71%), gentamicin (68%) and amox-clav (51%). Among *S. aureus*, vancomycin has the highest susceptibility rate (100%), followed by amox-clav (71%) and amikacin (70%).

CSOM is one of the major health problems, and India being one of the countries with highest CSOM prevalence (>4%) requires immediate attention (Acuin, 2004).

Of the 200 ear samples studied, 164 were positive indicating culture growth in 82% samples. Around 24% of samples were polymicrobial. In our study, 10.4% of the cultures did not yield any microbial growth which is compatible with the findings in other reports in which negative cultures were also documented (Mozafari Nia *et al.*, 2011; Dayasena *et al.*, 2011). Such negative cultures may have been result of the modification of bacterial flora in the affected ears by prior empirical antibiotic therapy. CSOM was more prevalent in first and second decade of life and accounted for 51% of the cases. This finding corroborates well with the observations made by other researchers (Shyamala and Reddy, 20112; Gulati *et al.*, 1969).

Table.1 age wise distribution of CSOM patients

Age group	No. of patients (200)	Percentage
0-10 years	63	32.5%
11-20 years	36	18%
21-30 years	24	12%
31-40years	17	8.5%
41-50 years	18	9%
51-60 years	20	10%
>60 years	22	11%

Table.2 Type of isolates

Organism	No of isolates(211)	percentage
Bacterial	198	93.8%
Fungal	13	6.2%

Table.3 List of aerobic bacteria isolated

Isolate	No.of isolate (198)	percentage
Pseudomonas aeruginosa	96	48.5%
Staphylococcus aureus	73	36.8%
Klebsiella	16	8.0%
E.coli	11	5.5%
Proteus mirabilis	02	1%

Table.4 various Fungi isolated

Fungi	No of isolates	Percentage
Aspergillus niger	06	46.1%
Aspergillus fumigatus	04	30.7%
Candida species	03	23.0%

Table.5 Antibiogram of isolates

Antibiotic	Pseudomonas	Staphylococcus	*Klebsiella*	*E.coli*	proteus
Ampicillin	00%	03%	00%	00%	00%
Amox- clav	51%	71%	37%	54%	100%
Cefazolin	47%	63%	50%	63%	50%
Cefuroxime	71%	63%	56%	72%	100%
Ceftriaxone	74%	63%	56%	72%	100%
Ciprofloxacin	51%	57%	31%	72%	50%
Gentamicin	68%	57%	50%	63%	50%
Amikacin	75%	70%	70%	90%	100%
Meropenem	100%	-	100%	100%	100%
Vancomycin	-	100%	-	-	-

The results of this study showed that *Pseudomonas aeruginosa* was the most common aerobic isolate in CSOM followed by *Staphylococcus aureus* which is in agreement with the reports of some other studies done in different parts of the world (Deb and Ray, 2012; Maji *et al.,* 2007). The other organisms isolated were *Klebsiella*, *E. coli* and *Proteus*. Meropenem was the best antibiotic against *Pseudomonas* with 100% sensitivity followed by amikacin and ceftriaxone. All *Staphylococcus* isolates were sensitive to vancomycin. However moderate degree of resistance (40–60%) was noted for cephalosporins & fluoroquinolones in all organisms. Fungal infections of the middle‑ear are common as moist pus hastens growth of fungi, the secondary invader. The rate of fungal infections was found to be around 6%. The most commonly found fungi in our study were *Aspergillus* species followed by *Candida* species.

In conclusion, chronic suppurative otitis media is one of the common infections in age group of 0–20 years. *Pseudomonas aeruginosa* and *Staphylococcus aureus* were found to be the common causes of CSOM in the present study. These organisms were found to be moderately susceptible to the routinely used topical drugs such as quinolones and aminoglycosides. *Aspergillus* was the most common fungus causing of CSOM. Early microbiological diagnosis of CSOM ensures prompt and effective treatment to avoid complications.

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