

A STUDY ON MICROBIAL FLORA PRESENT IN THE EAR OF INFECTED PERSONS

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ABSTRACT

Introduction: Otitis media has a multifactorial etiology, which follows acute ear infection and leads to deafness. The present study was conducted to isolate and characterize the microbial flora from ear swabs and antibiotic susceptibility pattern of the isolates. **Methods:** 45 Ear swabs were collected and processed as per standard procedures. **Results:** The organisms isolated were *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Klebsiella spp.*, *Proteus spp.*, and *Serratia* and they showed variable susceptibility patterns. The fungi isolated were *Aspergillus flavus* and *Aspergillus niger*. **Conclusion:** Based on the present work the ear infection is mainly associated with *Staphylococcus aureus*, *Pseudomonas aeruginosa* in higher amount. The result obtained by antibiotic sensitivity testing conclude that the topical ear drop such as Ciprofloxacin, Gentamycin & Chloramphenicol is found to be effective for isolates.

KEYWORDS: Antibiotic, Otitis media, middle ear infection, susceptibility.

INTRODUCTION

Hearing loss is relatively common in human population and is caused by multiple factors. The incidence of hearing disability is 2-3 per 1000 live births in India and 1 per 1000 babies is profoundly deaf at birth or in the prelingual childhood period. Approximately 50% of the cases are thought to be due to genetic factors, upto 40% due to environmental factors and remaining are due to unknown causes. Otitis media is one the major etiological factors of congenital conductive hearing loss.^[1] The infection in the outer ear is commonly referred as otitis externa. The infection in the middle ear is called as otitis media. Acute otitis media is an infection in middle ear, which is located behind the eardrum. There is a tube called Eustachian tube, that connects the middle ear to the nose. This tube helps to drain extra fluid from the middle ear. When the child has a cold, swelling in the nose may impede drainage.^[2]

Acute otitis media is usually a complication of an acute viral upper respiratory infection. Numerous large studies have documented the bacterial pathogens associated with the diagnosis of acute otitis media and in some cases, otitis media externa the organisms are *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Moraxella catarrhalis* are consistently isolated with acute otitis media.^[3]

Chronic suppurative otitis media (CSOM) is a commonly encountered infection of the middle ear. The patients had

perforated tympanic membranes with active purulent discharge. There with equal distribution between sexes.^[4]

The principle bacteriological organism in chronic suppurative otitis media are beta haemolytic *Streptococci*, *Pseudomonas aeruginosa*, *Citrobacter*, *E.coli* and *Staphylococcus aureus*. *Pseudomonas aeruginosa* forms a biofilm in the middle ear, mucosal surface of the infected ear in chronic suppurative otitis media.^[1]

Hence, the importance of knowledge of the local pattern of infective organisms and their susceptibility pattern is essential to enable an efficacious treatment of this disorder.^[5] Keeping in view the widespread use of antibiotics in the community and the high rate of resistance to antibiotics, this study was undertaken to identify the microbial profile and their antibiogram in otitis media.

AIMS AND OBJECTIVES

To isolate and identify the microorganisms from ear infection.

- Collection of ear swabs
- Isolation of organism
- Identification of fungal and bacterial species
- Antibiogram for isolates

MATERIALS AND METHODS

Specimen collection and sample size

The study population consisted of 45 patients (15 males and 30 females) between the ages of 0 and 60 years, visiting the clinic for the first time with cases of middle ear infection/or acute otitis media or any complaints of ear problems. Randomized sampling design was employed. Total of 45 samples of aural discharge were collected with sterilized cotton swabs with the help of the attending physician. All clinical samples were transported in a Stuart transport medium to the microbiology laboratory of the Department of Microbiology Madura College, Madurai within 1 h of collection.

Isolation and identification of bacteria

Collected swabs were plated on MacConkey agar, Blood agar Nutrient agar, Cetramide agar and Sabourauds dextrose agar plates. MacConkey agar and Blood agar were incubated aerobically. Isolates were identified by colony morphology, gram staining reaction, catalase test, coagulase test, oxidase test, triple Sugar Iron agar (TSI), citrate utilization test, urease test, motility indole and methyl-Red Vogues Proskauer test (MR-VP) with glucose fermentation test,

Antimicrobial susceptibility testing

Antibiotic sensitivity test was performed by Kirby–Bauer disc diffusion method. The discs used were gentamycin, ciprofloxacin, ampicillin, penicillin and chloramphenicol. The plates were then incubated at 37°C overnight. The diameter of the zone of inhibition around each of the discs was measured. The results were interpreted as “sensitive,” “moderately sensitive,” or “resistant” to different drugs by comparing the diameters in the interpretation table.

RESULTS

Out of 45 samples processed, the growth was observed in 40 samples. While 5 sample did not show any growth (Table 1). Among 40 positive samples, 24 samples (55.3%) showed mixed growth.

Table 1: Bacteria isolated.

S.No	Variables	Total
1	Sample size	45
2	Positive	40
3	Negative	5

Table 6: Mixed growth (Bacteria).

Samples	Bacteria isolated	No. of. Isolates	%
24	<i>Staphylococcus aureus</i> + <i>Pseudomonas aeruginosa</i>	10	41.6
	<i>Staphylococcus aureus</i> + <i>E.coli</i>	8	33.3
	<i>Pseudomonas aeruginosa</i> + <i>Klebsiella spp.</i>	5	20.8
	<i>Staphylococcus aureus</i> + <i>Serratia</i> .	1	4.16

Among age distribution, the collected samples were tabulated. Out of 15 samples (33.3%), 12 cases was positive whereas 28 cases were positive from 30 female samples (Table 2 & 3).

Table 2: Age range of patients.

S. No.	Age group	Male	Female
1	> 10	8	12
2	11-20	-	10
3	21-30	2	5
4	31-40	3	1
5	41-50	1	1
6	51-60	1	1

Table 3: Positive isolates from Male & Female.

Gender	Sample collection	Positive
Male	15	12
Female	30	28

Remaining 16 samples (35.5%) showed single type of growth (Table 4). Based on the pure isolates the predominating organism was found to be *Staphylococcus aureus* (5) 31.2% followed by *Pseudomonas aeruginosa* 4 (25%), *E.coli* 3 (18.75%), *Klebsiella* (1) 6.25% (Table.5).

Table 4: Type of Bacterial growth.

Samples	Growth	No. of Isolates	%
45	Single	16	35.5
	Mixed	24	53.3
	No.of growth	5	22.2

Table 5: Pure growth (Bacteria).

Samples	Pure growth (Bacteria)	No. of. Isolates	%
16	<i>Staphylococcus aureus</i>	5	31.2
	<i>Pseudomonas aeruginosa</i>	4	25
	<i>E. coli</i>	3	18.75
	<i>Klebsiella spp.</i>	1	6.25

Among mixed isolate from 24 samples, *Staphylococcus aureus* and *Pseudomonas aeruginosa* combination was found in 10 isolates (41.6%) followed by *Staphylococcus aureus* and *E.coli* in 8 samples (33.3%), *Pseudomonas aeruginosa* and *klebsiella spp.* 5 (20.8), *Staphylococcus aureus* and *Serratia* was found in 1 sample (4.16%) respectively (Table 6).

Based on the fungal isolates 3 samples were positive among which *Aspergillus niger* was observed in (2) and *Aspergillus flavus* (1) 6.5% (Table 7). The isolates were subjected to antibiotic sensitivity test among which *Staphylococcus aureus* was sensitive to Chloramphenicol and Gentamycin. It was resistant to Ampicillin, Ciprofloxacin and Penicillin. *Pseudomonas aeruginosa* was sensitive to Ciprofloxacin, Chloramphenicol. It was resistant to Ampicillin, Penicillin and Gentamycin. *Klebsiella* was sensitive to Ciprofloxacin, Chloramphenicol, Gentamycin. It was resistant to Ampicillin and Penicillin. *E.coli* was sensitive to

ciprofloxacin, chloramphenicol. It was resistant to Ampicillin, Penicillin and Gentamycin. *Serratia* was sensitive to ciprofloxacin, chloramphenicol and Gentamycin. It was resistant to Ampicillin and Penicillin (Table 8).

Table 7: Fungi isolated.

S. No.	Fungi isolated	No. of Isolates	%
1	<i>Aspergillus niger</i>	2	12.5
2	<i>Aspergillus flavus</i>	1	6.5

Table 8: Antibiotic sensitivity test.

Antibiotics	<i>S. aureus</i>	<i>P.aeruginosa</i>	<i>Klebsiella spp.</i>	<i>E.coli</i>	<i>Serratia</i>
Ampicillin	R	R	R	R	R
Ciprofloxacin	R	S	S	S	S
Chloramphenicol	S	S	S	S	S
Penicillin	R	R	R	R	R
Gentamycin	S	R	S	R	S

DISCUSSION

Out of 45 samples from infected persons 40 samples showed growth. Where as remaining 5 samples showed no growth. In the present study the predominating organism was found to be *Staphylococcus aureus* (53.3%) and *Pseudomonas aeruginosa* species (42.2%). Based on pure culture isolates, *Staphylococcus aureus*, *Pseudomonas spp.*, *Klebsiella sp.* and *E.coli* was found to be predominant.

Among sex distribution, the percentage level for positive cases was equal. Incidence of ear infection by gram negative organism was found to be higher when compared with gram positive organism.

Fungi were also isolated from ear swabs. Among which *Aspergillus niger* and *Aspergillus flavus* was found to have important role in ear infection. The antimicrobial sensitivity of bacteria were tested in which Ciprofloxacin, Chloramphenicol and Gentamycin were found to be sensitive, commonly used as topical ear drops. Whereas all the isolates exhibit resistant to Ampicillin and Penicillin antibiotics.

CONCLUSION

From 45 patients enrolled in the study 40 cases were positive and remaining 5 cases is negative for growth. Out of 30 samples from female 28 (66.6%) were positive. In case of male out of 15 samples 12 cases (33.3%) were positive. The infection was found to be equally distributed among both sexes. The incidence of infection is highly associated with gram negative group of organisms and in positive group staphylococcus aureus was found to be predominant. The predominant organisms were *Staphylococcus aureus* (53.3%), *Pseudomonas aeruginosa* (42.2%) followed by *E.coli* (24.4%) and *Klebsiella* (17.7%). Two fungal species

were identified from 3 samples which include *Aspergillus niger* (12.5%), *Aspergillus flavus* (6.5%). Based on the antibiotic sensitivity test Ciprofloxacin, Chloramphenicol and Gentamycin were found to be sensitive, whereas all the isolates develop resistant to Ampicillin and Penicillin antibiotics.

Based on the present work the ear infection is mainly associated with *Staphylococcus aureus*, *Pseudomonas aeruginosa* in higher amount. The result obtained by antibiotic sensitivity testing conclude that the topical ear drop such as Ciprofloxacin, Gentamycin & Chloramphenicol is found to be effective for isolates.

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