



PREVALENCE AND ANTIBIOTIC SUSCEPTIBILITY PATTERN OF BACTERIAL ISOLATES FROM EAR INFECTIONS IN A TERTIARY CARE HOSPITAL

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ABSTRACT

Introduction: Ear Infection linked with frequent antibiotic prescription, severe disability and hearing impairment is a major public health threat. Bacteria can spread to adjacent structures leading to complications like mastoiditis, labyrinthitis, facial nerve palsy, intracranial abscess and thrombosis. The study was designed to determine the microbial profile and antibiogram of ear infections at our institute.

Material And Methods: A cross-sectional study was conducted over a period of 6 months in a tertiary care teaching hospital. A total of 367 ear infections were screened. The bacterial identification and antibiotic susceptibility testing was done by standard microbiological techniques

Statistical Analysis: The data were entered in a Microsoft Excel sheet and analyzed using SPSS software version 16.0. The data were expressed as percentages and proportions.

Results: A total of 367 ear infections were received during the 6 months period. Among the samples received, 231(62.9%) had pathogenic infection, 87(23.7%) were sterile and 49(13.4%) were contaminants. Eleven samples had polymicrobial infection and 220 had monomicrobial infection. The commonest bacterial pathogen was Pseudomonas species 147(63.6%) followed by Staphylococcus aureus 37(16%). Among the Pseudomonas isolates, 129(87.8%) were sensitive to meropenem, 82(55.8%) to amikacin and 50(34%) were sensitive to ciprofloxacin

Discussion And Conclusion: The present study highlights the prevalence of 62.9% ear infection in our hospital setup. The commonest bacterial pathogen was Pseudomonas species and sensitive to meropenem. Treatment of ear infections needs to be guided by antibiotic susceptibility testing of the isolates.

KEYWORDS : ear discharge, bacterial profile, Pseudomonas

INTRODUCTION:

Ear discharge can occur due to external auditory meatus (otitis externa) and middle ear infection (otitis media).¹ World wide data suggests that around 65-300 million people suffer from ear infections during a year.² Ear infection accounts for 60% of deafness and can cause permanent perforation.¹

Otitis media is a common problem and a preventable cause of hearing loss encountered in developing countries.^{2,3} Highest prevalence of ear infection are in developing regions of south east Asia and sub-Saharan Africa.³ Children are more susceptible to ear infections due to their shorter eustachian tube, access of pathogens from their nasopharynx and adenoids.²

Complications due to ear infections can be mastoiditis, meningitis, chronic otitis media, brain abscess, facial nerve palsy, thrombosis and sepsis.^{2,4} Treatment needs to be started at the earliest to prevent such complications. Empirical treatment is usually started based on the bacteriological profile in the locality.⁴ However, antibiotics have reduced the incidence of complications but have led to antibiotic resistant bugs.¹

Hence this study was designed to determine the microbial profile and antibiogram of ear infections at our institute.

MATERIAL AND METHODS:

Study Design And Study Period:

A retrospective cross-sectional study was conducted on ear discharges of patients for a period of 6 months in a tertiary care teaching hospital, Haryana.

Study Participants And Data Collection:

Patients presenting with ear discharge to ENT outpatient and

inpatient were included in the study. Demographic profile, microbiological report of the sample and the antibiotic susceptibility pattern was collected from laboratory reporting data.

Isolation, identification, and antibiotic susceptibility pattern: Ear discharge swabs were collected from the patient and transported to the lab immediately. From the swab gram stain was performed and the other swab was inoculated onto blood agar and Mac Conkey's agar. The plates were incubated at 37°C. Growth was identified by colony morphology, and appropriate biochemical reactions. The antibiotic susceptibility pattern was done by Kirby Bauer disc diffusion method as per CLSI guidelines.⁵

RESULTS:

A total of 367 ear discharges were received during the 6 months period, of which 87% were from outpatients and 13% were from inpatients. Around 50% of the patients were in the age group of 11 to 30 years.

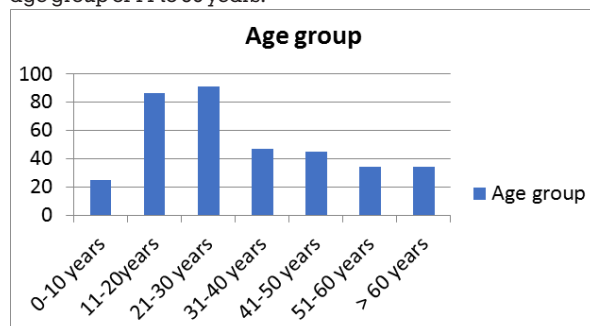


Figure 1 depicts the age group of patients presenting with ear discharge.

Among the samples received, 231(62.9%) had pathogenic infection, 87(23.7%) were sterile and 49(13.4%) were contaminants. Eleven samples had polymicrobial infection and 220 had monomicrobial infection. Table 1 shows the various bacteria isolated from the samples along with their percentages. The commonest bacterial pathogen was *Pseudomonas* species 147(63.6%) followed by *Staphylococcus aureus* 37(16%).

The antimicrobial susceptibility pattern of the isolates was done and table 2 depicts the antibiotic pattern of the common isolates. Among the *Pseudomonas* isolates, 129(87.8%) were sensitive to meropenem, 82(55.8%) to amikacin and 50(34%) were sensitive to ciprofloxacin. Of the *Staphylococcus aureus* isolates, all the isolates were sensitive to doxycycline and linezolid and 83.8% were susceptible to gentamicin and trimethoprim/sulfamethoxazole.

Table 1: Various Bacterial Isolates And Their Percentages

Organism isolated	Number of the isolates	Percentage of isolates (%)
<i>Pseudomonas</i> species	147	64
<i>S.aureus</i>	37	16
<i>Enterobacter</i> spp	10	4
<i>Escherichia coli</i>	14	6
<i>Proteus mirabilis</i>	5	2
CONS	9	4
<i>Citrobacter</i> spp	2	1
<i>Acinetobacter</i> spp	5	2

Table 2: The Antimicrobial Susceptibility Pattern Of *Pseudomonas Aeruginosa*, *Staphylococcus Aureus* And *Enterobacteriaceae*

<i>Pseudomonas</i> species N=147		<i>Staphylococcus aureus</i> N=37		<i>Enterobacteriaceae</i> N=39	
Antibiotic	Number sensitive (%)	Antibiotic	Number sensitive (%)	Antibiotic	Number sensitive (%)
Ciprofloxacin	50 (34%)	Erythromycin	24 (64.9%)	Ciprofloxacin	24 (61.5%)
Amikacin	82 (55.8%)	Gentamicin	31 (83.8%)	Amikacin	36 (92.3%)
Piperacillin + tazobactam	59 (40.1%)	Amoxicillin + clavulanic acid	25 (67.6%)	Amoxicillin + clavulanic acid	25 (64.1%)
Cefepime	11(7.5%)	Trimethoprim + sulfamethoxazole	31(83.8%)	Trimethoprim + sulfamethoxazole	23(59%)
Meropenem	129 (87.8%)	Doxycycline	37 (100%)	Doxycycline	12 (30.8%)
Imipenem	62(42.2%)	Linezolid	37(100%)	Imipenem	28(71.8%)

DISCUSSION:

Ear infection, a treatable cause of hearing loss, is associated with ear discharge, deafness, itching, pain and fever.⁶ Epidemiological risk factors like age, sex, socioeconomic status, cultural factors, poor sanitation have a huge role in these infections.⁷ Ear infections if left untreated leads to impaired speech, language development, poor school performance, economic burden, distress to the patient and decreased quality of life.^{3,8}

The present study showed 62.9% prevalence of bacterial ear infections in our hospital. The study highlights that *Pseudomonas aeruginosa* (63.6%) and *Staphylococcus aureus* (16%) were the most common isolates. The prevalence of bacterial infections in our study is concordant with study conducted by Oguntibiju et al.⁷ However few studies have shown a high prevalence of more than 80%.^{2,3,9}

In our study 50% of patients were in age group of 11-30. Study conducted by Yousuf et al among Kashmir patients showed 60% of them were in the same age group.⁹ Eleven samples had polymicrobial infection and 220 had monomicrobial infection in our study, similar to other studies.^{6,10}

Prevalence and antibiotic sensitivity of *Pseudomonas aeruginosa* in our study compared to other studies. (table 3)

Table 3: Prevalence And Antibiotic Sensitivity Of *Pseudomonas Aeruginosa* In Our Study Compared To Other Studies

studies	Prevalence (%)	Antibiotics (sensitivity)			
		ciprofloxacin	amikacin	Piperacillin-tazobactam	cefepime
Our study	63.6	34	56	40	8
Hailu et al ²	30	92	95	-	-
Denboba et al ³	17	90	-	-	-
Yousuf et al ⁹	16	48	16	72	-
Agrawal et al ¹⁰	33	68	83	85	-
Arif et al ⁶	34	96	90	-	-
Gorems et al ⁸	18	79	70	-	36
Nisarta et al ¹	44	70	72	65	-
Mane et al ¹¹	39	14	14	-	-

In our study *Pseudomonas aeruginosa* was 63.6% compared to 16-40% in other studies.^{1-3,6,8-11} Ciprofloxacin was a good topical antibiotic in other studies however in our study amikacin was a better drug.^{1-3,6,8-11}

Various studies have been conducted showing difference in prevalence and antibiogram of *Staphylococcus aureus*. (table 4)

Table 4: Prevalence And Antibiotic Sensitivity Of *Staphylococcus Aureus* In Our Study Compared To Other Studies

studies	Prevalence (%)	Antibiotics (sensitivity)			
		erythromycin	gentamicin	Amoxicillin-clavulanic acid	Trimethoprim sulfamethoxazole
Our study	16	65	84	68	86
Hailu et al ²	27	86	-	-	77
Denboba et al ³	24	68	-	-	70
Yousuf et al ⁹	40	-	72	12	-
Wasihun et al ¹²	28	61	59	40	33
Arif et al ⁶	18	75	93	100	87
Gorems et al ⁸	51	42	77	66	20

In our study *Staphylococcus aureus* prevalence is 16% which is similar to study conducted by Arif et al.⁶ Gentamicin and trimethoprim-sulfamethoxazole are good treatment options.^{2,3,6}

CONCLUSION:

The present study highlights the prevalence of 62.9% ear infection in our hospital setup. The commonest bacterial pathogens were *Pseudomonas* species and *Staphylococcus aureus*. Treatment of ear infections need to be guided by antibiotic susceptibility testing of the isolates. Irrational, improper and indiscriminate use of antibiotics leads to drug resistant isolates.

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