

A Hospital Based Prospective Assessment of the Infective Profile of Patients with Ear Infections

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Abstract

Aim: The aim of the present study was to assess the infective profile of patients with ear infections in lower Bihar region.

Material & Methods: The study was conducted as a prospective study in the Department of ENT, SKMCH, Muzaffarpur, Bihar, India for the period of 10 months. During this period, 200 patients with ear infections/ear discharge were included in the study.

Results: 23% patients were aged 0-20 years. 35% patients were in the age group 21-40 years, 25% patients were in the age group 41-60 years, 15% patients were in the age group 61-80 years and 2% patients were in the age group 81- 100 years. 48% patients were diagnosed as acute suppurative otitis media (ASOM), 50% patients were diagnosed as CSOM and 2% patients were diagnosed as external auditory canal furunculosis (EAC furunculosis). *Acinetobacter baumani* was present in 1% patient, *Burkholderia cepacia* in 2% patients, *Enterobacter cloacae* was present in 1% patient, *Escherichia coli* in 6% patients, *Klebsiella pneumoniae* in 4% patients, mould in 11% patients, *Proteus mirabilis* in 1% patient, *Providential rettgeri* in 1% patient, *Pseudomonas aeruginosa* in 24% patients, *Staphylococcus aureus* in 34% patients, *Staphylococcus epidermidis* in 6% patients, *staphylococcus hemolyticus* in 1% patient, *Staphylococcus saprophyticus* in 1% patient, *Staphylococcus xylosus* in 1% patient and no growth seen in 6% patients. Gram positive organisms are detected in 43%, Gram negative organisms detected in 40%, fungal infection detected in 11% and no organism detected in 6% of the aural swab samples.

Conclusion: The present study concluded that, ear infection is a major health problem in developing countries and *Staphylococcus aureus* was the commonest infective organism detected.

Keywords: Ear infection, Infective organisms, Ear swab, Aural discharge.

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Introduction

Ear discharge is one of the most common clinical presentations to Ear, Nose and Throat clinics in the tropics and the subtropics. In India, ear infections are wide spread due to poor socioeconomic status, overcrowding, low hygiene and

malnutrition. These infections may be of bacterial, fungal or viral origin of the external or middle ear and are common in children and adults. This infection causes inflammation which further leads to various symptoms such as ear ache, ear

discharge decreased hearing itching and fever etc. [1] Ear infection can be classified in different ways depending on the duration of illness, and the type of clinical manifestation the patient is having or otoscopic findings. [2] Various types of ear infections are acute suppurative otitis media (ASOM), chronic suppurative otitis media (CSOM), otomycosis, otitis external, external auditory canal furunculosis etc. Bacterial infection of the middle ear causes acute otitis media, which often results in a small perforation through which purulent material discharges. These perforations heal spontaneously in a short time unless complicating factors coexist. [3] Acute otitis media may result in persistent otitis media with effusion, which is now recognized as the leading cause of childhood hearing loss. [4]

Although ear infection can be a self-limiting, if left untreated, it can cause serious complications such as recurrent acute otitis media, persistence of middle ear effusion, hearing impairment, mastoiditis, meningitis, chronic otitis media, brain abscess and sepsis. The most common bacteria isolated in several studies were as follows: *P. aeruginosa*, *S. aureus*, and *P. mirabilis*. [5-7] Although most of these organisms are sensitive to most common antimicrobial agents used, resistance of bacterial isolates to these agents becomes an alarming global health problem. Early, prompt and effective treatment of ear infection will significantly reduce both short- and long-term complications associated with ear infection and can also improve the quality of life of patients with ear infection.

Hence the present study was conducted with the aim to study the infective profile of patients with ear infections in lower Bihar region.

Material & Methods

The study was conducted as a prospective study in the Department of ENT, Skmch,

Muzaffarpur, Bihar, India for the period of 10 months. During this period, 200 patients with ear infections/ear discharge were included in the study. Study population Study group include general population presenting in outpatient department of ENT, Skmch, Muzaffarpur, India fulfilling inclusion and exclusion criteria in both sexes as given below.

Inclusion criteria

- Patients with complaints of unilateral or bilateral ear discharge, patients giving consent for study, patients below age 10 years, patients above the age of 1 year.

Exclusion criteria

- Age 5 years - 80 years.
- Patients with outer ear defects such as complete stenosis or atresia of external auditory canal.

Methodology

The enrolled patients are explained about the complete study procedure in their language. Detailed history obtained from study participants regarding ear discharge, unilateral or bilateral involvement, duration of ear discharge, ear discharge, earache, decreased hearing, tinnitus, hearing loss, previous surgical procedures. Clinical examination of patient is done including general physical examination and systemic examination for assessing the general condition of participants. A thorough ENT examination is done including ear examination, throat examination, nasal examination. Aural discharge samples collected through a sterile culture sensitivity tube and sent to microbiological lab in the SKMCH, and culture sensitivity reports collected from the patients during follow up visits.

Statistical analysis

Data were entered in Microsoft Excel sheet. The continuous variables were presented using mean or median. For

categorical variables proportions were used. The statistical analysis was done

using Epi Info v7 software.

Results

Table 1: Age distribution and Frequency distribution of the patients presenting with ear discharge according to diagnosis

Age group (years)	Frequency	Percentage (%)
0-20	46	23
21-40	70	35
41-60	50	25
61-80	30	15
81-100	4	2
Total	200	100
Diagnosis		
ASOM	96	48
CSOM	100	50
EAC furunculosis	4	2

23% patients were aged 0-20 years. 35% patients were in the age group 21-40 years, 25% patients were in the age group 41-60 years, 15% patients were in the age group 61-80 years and 2% patients were in the age group 81- 100 years. 48% patients

were diagnosed as acute suppurative otitis media (ASOM), 50% patients were diagnosed as CSOM and 2% patients were diagnosed as external auditory canal furunculosis (EAC furunculosis).

Table 2: Frequency distribution of infective organisms in the patients presenting with ear discharge

Infective organism	Frequency	Percentage
<i>Acinetobacter baumani</i>	2	1
<i>Burkholderia cepacia</i>	4	2
<i>Enterobacter cloacae</i>	2	1
<i>Escherichia coli</i>	12	6
<i>Klebsiella pneumoniae</i>	8	4
Mould	22	11
<i>Proteus mirabilis</i>	2	1
<i>Providentia rettgeri</i>	2	1
<i>Pseudomonas aeruginosa</i>	48	24
<i>Staphylococcus aureus</i>	68	34
<i>Staphylococcus epidermidis</i>	12	6
<i>Staphylococcus hemolyticus</i>	2	1
<i>Staphylococcus xylosum</i>	2	1
<i>Staphylococcus saprophyticus</i>	2	1
No growth seen	12	6

Acinetobacter baumani was present in 1% patient, *Burkholderia cepacia* in 2% patients, *Enterobacter cloacae* was present in 1% patient, *Escherichia coli* in 6% patients, *Klebsiella pneumoniae* in 4% patients, mould in 11% patients, *Proteus mirabilis* in 1% patient, *Providentia*

rettgeri in 1% patient, *Pseudomonas aeruginosa* in 24% patients, *Staphylococcus aureus* in 34% patients, *Staphylococcus epidermidis* in 6% patients, *staphylococcus hemolyticus* in 1% patient, *Staphylococcus saprophyticus* in 1% patient, *Staphylococcus xylosum* in

1% patient and no growth seen in 6% patients.

Table 3: Frequency distribution of infective organisms on the basis of Gram staining in the patients presenting with ear discharge

Gram positive organisms (%)	Gram negative organisms(%)
<i>Staphylococcus aureus</i> (34)	<i>Pseudomonas aeruginosa</i> (24)
<i>Staphylococcus epidermidis</i> (6)	<i>Klebsiella pneumoniae</i> (4)
<i>Staphylococcus hemolyticus</i> (1)	<i>Escherichia coli</i> (6)
<i>Staphylococcus saprophyticus</i> (1)	<i>Enterobacter cloacae</i> (1)
<i>Staphylococcus xylosum</i> (1)	<i>Burkholderia cepacia</i> (2)
	<i>Acinetobacter baumannii</i> (1)
	<i>Proteus mirabilis</i> (1)
	<i>Providentia rettgeri</i> (1)
Total: 86 (43)	Total: 80 (40)
Fungal (Mould): 22 (11)	
No growth seen: 12 (6)	

Gram positive organisms are detected in 43%, Gram negative organisms detected in 40%, fungal infection detected in 11% and no organism detected in 6% of the aural swab samples.

Discussion

Infection of the ear is a common health problem in both children and adults worldwide. [8] This accounts for a major health and economic problems, especially in the developing countries where resources for diagnosis and treatments are limited. [9] Ear infection can be classified in different ways depending on the duration of illness, and the type of clinical manifestation the patient is having or otoscopic findings. [10] It can be acute or chronic and includes otitis externa (OE) which is an infection of the external auditory canal and otitis media (OM) which is an infection of the middle ear. [11] An ear infection affects about 65–330 million people worldwide, and about 60% of them suffer from significant hearing loss. [12]

Although ear infection can be a self-limiting, if left untreated, it can cause serious complications such as recurrent acute otitis media, persistence of middle ear effusion, hearing impairment, mastoiditis, meningitis, chronic otitis media, brain abscess and sepsis.

The most common bacteria isolated in several studies were as follows: *P. aeruginosa*, *S. aureus*, and *P. mirabilis*. [13-15] One study from Hail University showed that *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Moraxella catarrhalis*, *S. aureus*, and *Streptococcus pyogenes* are the most common organisms associated with acute otitis media and could occur after an episode of viral upper respiratory tract infection. [16] Although most of these organisms are sensitive to most common antimicrobial agents used, resistance of bacterial isolates to these agents becomes an alarming global health problem. [17]

The aim of the present study was to assess the infective profile of patients with ear infections in lower Bihar region. Dilshad et al studied the bacteriological profile and its antibiotic susceptibility pattern of ear infection in patients attending tertiary care hospital and the antimicrobial resistance pattern of the above isolates. [18] 23% patients were aged 0-20 years. 35% patients were in the age group 21-40 years, 25% patients were in the age group 41-60 years, 15% patients were in the age group 61-80 years and 2% patients were in the age group 81- 100 years. 48% patients were diagnosed as acute suppurative otitis media (ASOM), 50% patients were diagnosed as CSOM and 2% patients were

diagnosed as external auditory canal furunculosis (EAC furunculosis). *Acinetobacter baumani* was present in 1% patient, *Burkholderia cepacia* in 2% patients, *Enterobacter cloacae* was present in 1% patient, *Escherichia coli* in 6% patients, *Klebsiella pneumoniae* in 4% patients, mould in 11% patients, *Proteus mirabilis* in 1% patient, *Providentia rettgeri* in 1% patient, *Pseudomonas aeruginosa* in 24% patients, *Staphylococcus aureus* in 34% patients, *Staphylococcus epidermidis* in 6% patients, *Staphylococcus hemolyticus* in 1% patient, *Staphylococcus saprophyticus* in 1% patient and no growth seen in 6% patients. Hailu et al studied bacterial etiologic agents and their antimicrobial susceptibility patterns among patients of all age groups referred to Bahir Dar Regional Health Research Laboratory Center. [19]

Gram positive organisms are detected in 43%, Gram negative organisms detected in 40%, fungal infection detected in 11% and no organism detected in 6% of the aural swab samples. Rakhee et al while studying aerobic microbiological or bacteriological profile of ear discharge and variations in sensitivity pattern to treat the patients efficiently, a total of 71 patients who had discharging ear infection were included in this study. [20] Denboba et al studied the antibiotic susceptibility profiles of bacteria isolated from patient ear discharges suspected of otitis media. [21] Muluye et al conducted a study to determine the bacterial isolates and their drug susceptibility patterns from patients who had ear infection. A retrospective study was conducted from September, 2009 to August, 2012 at Gondar University Hospital, Northwest Ethiopia. A total of 228 ear discharge samples were tested for bacterial isolation and 204 (89.5%) cases were found to have bacterial isolates. From the total bacterial isolates, 115 (56.4%) were gram negative bacteria and the

predominant isolate was proteus species (27.5%). Of individuals who had ear infection, 185 (90.7%) had single bacterial infection while 19 (9.3%) had mixed infections. Under five children were more affected by ear infection. The prevalence of ear infection was significantly high in males (63.7 vs 36.3%) ($p=0.017$). [22,23]

Conclusion

The present study concluded that, ear infection is a major health problem in developing countries and *Staphylococcus aureus* was the commonest infective organism detected. The profile and predominant bacteria isolated highlights the need for continuous surveillance and reporting of the microbiology of ear infection in our local community in order to guide clinicians use the appropriate antimicrobials towards the incriminated etiologies.

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