Original Research Article

Microbiological assessment of discharging ear – culture isolates, bacteriological isolates and their antimicrobial susceptibility patterns – A retrospective case study

Meenakshi Kekre[1], Smriti Saxena[2*], Piyush Sinha[3], Suman Chandrakar[4], Sandip Sahu[5]

[1]Professor and HOD, Department of Otolaryngology and Head and Neck Surgery, SSIMS, Bhilai, India
[2]Assistant Professor, Department of Otolaryngology and Head and Neck Surgery, SSIMS, Bhilai, India
[3]PG third year, Department of Otolaryngology and Head and Neck Surgery, SSIMS, Bhilai, India
[4]PG second year, Department of Otolaryngology and Head and Neck Surgery, SSIMS, Bhilai, India
[5]PG first year, Department of Otolaryngology and Head and Neck Surgery, SSIMS, Bhilai, India

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Abstract

In the present study, patients coming to ENT OPD with the complaint of discharge were examined and aural swabs were taken for study of bacteriological isolates and their antibiotic susceptibility, under all aseptic precautions and before starting any treatment. The samples were sent to Microbiology department. Empirical treatment was started before the reports arrived. After the reports were available, the treatment was revised according to the organism and their sensitivity report. The data regarding the same was studied and analysed.

In our study, we found that male patients were more commonly affected than female patients. Most common age group involved in our study was 26-35 years followed by 36-45 years. The number of children affected in our study was less as compared to other study which may be because of primary treatment received at primary or secondary care centre.

Keywords: microbiological,discharge, ear

Introduction

Ear discharge is a common presentation in medical practice. It affects people of all age group. The underlying cause is inflammatory condition of the external and middle ear accounting for most ear discharges. These include acute and chronic otitis externa, acuteotitis media, chronic suppurative otitis media with or without cholesteatoma, and malignant otitis externa.It may also occur as a result of tympanotomy and ventilation tube insertion[1].The bacteriologic spectrum of ear discharge is variable. Majority of practitioners treat discharging ears empirically with systemic and topical antibiotics, and do not routinely send specimens of the discharge for microbiological analysis unless the discharge is refractory to treatment,however, several authors suggest otherwise. Like any other disease of microbiologic origin, it is important to know the spectrum of organisms causing ear discharge and their antibiogram[2].Our study is aimed at finding the local pattern of microbes and their antimicrobial susceptibility pattern in cases of discharging ear to provide a guideline for empirical antibiotic therapy. Widerange of organisms are isolated from the cases of discharging ear which vary from study to study. Predominating organisms are Pseudomonas aerugenosa, Staphylococcus aureus, Proteus species, E.coli, Diptheroids, Streptococci, Bacteroids, mixed pathogens and fungi may also be present.

Materials and method

This retrospective study was conducted from July 2021 to June 2023 for a duration of two years among the patients who attended with the complaint of discharging ear at Department of Otolaryngology & Head Neck Surgery, Shri Shankaracharya Institute of Medical Sciences, Bhilai (C.G.). Study was conducted on 150 patients and discharge from the ear was taken in a swab under asceptic conditions and sent for studying pattern of microbes and their antimicrobial susceptibility, before starting any treatment.

Inclusion Criteria

1. Chronic ear discharge for more than 3 months.
2. Patients not receiving antibiotics for atleast last 2 weeks.
3. COM active mucosal disease.

Exclusion Criteria

1. COM squamous type.
2. Otomycosis.
3. Otitis externa

Table 1: Distribution of ear infection in relation to sex of patients

SEX	N	%
Male	96	64
Female	54	36
Total	150	100

*Correspondence
Dr. Smriti Saxena
Assistant Professor, Department of Otolaryngology and Head and Neck Surgery, SSIMS, Bhilai, India
E-mail: saxena.smriti04@gmail.com

\Table 2: Distribution of ear infection in relation to age of patients

AGE RANGE	N	%
05-15	6	4
16-25	23	15.33
26-35	47	31.33
36-45	35	23.33
46-55	29	19.33
56-65	8	5.33
65 and above	2	1.33
Total	150	100

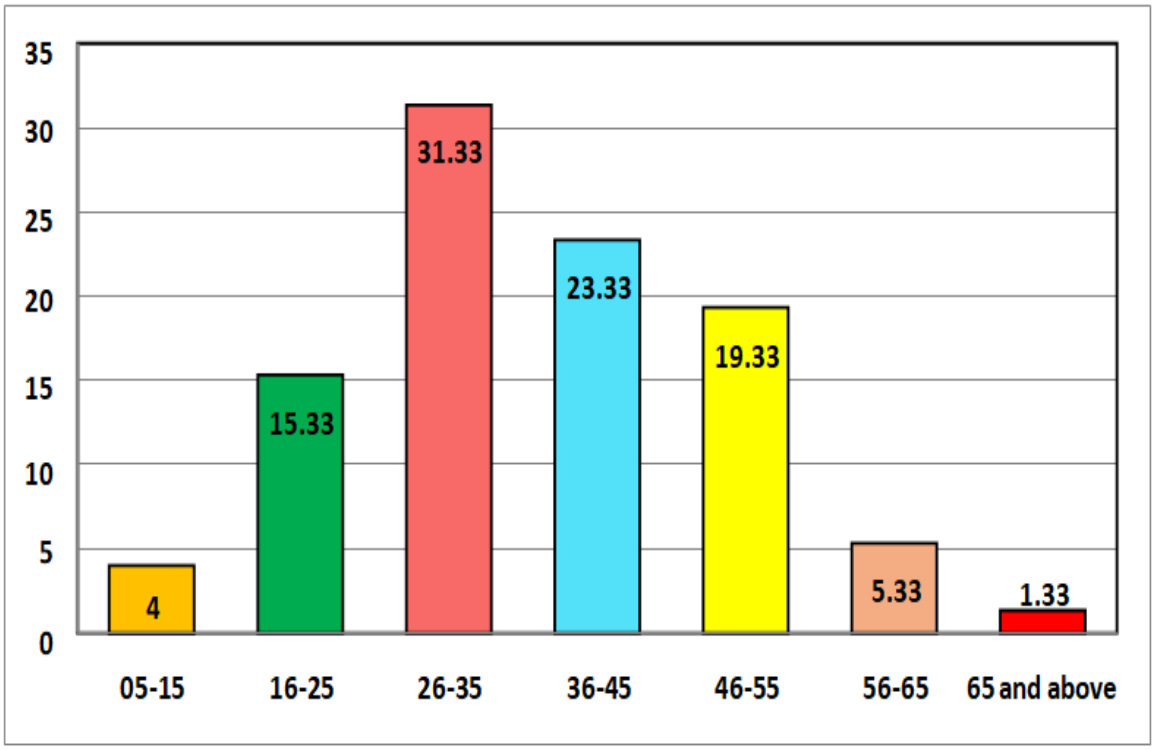


Table 3: Distribution of bacterial isolates from ear discharge of patients

BACTERIA	N	%
Staphylococcus aureus	67	44.67
Pseudomonas aeruginosa	50	33.33
Klebsiella pneumonia	5	3.33
Klebsiella oxytoca	2	1.33
Haemophilis influenza	2	1.33
Enterococcus	1	0.67
Acinetobacter	1	0.67
Providencia rettgeri	1	0.67
Proteus mirabilis	1	0.67
No growth	20	13.33
Total	150	100

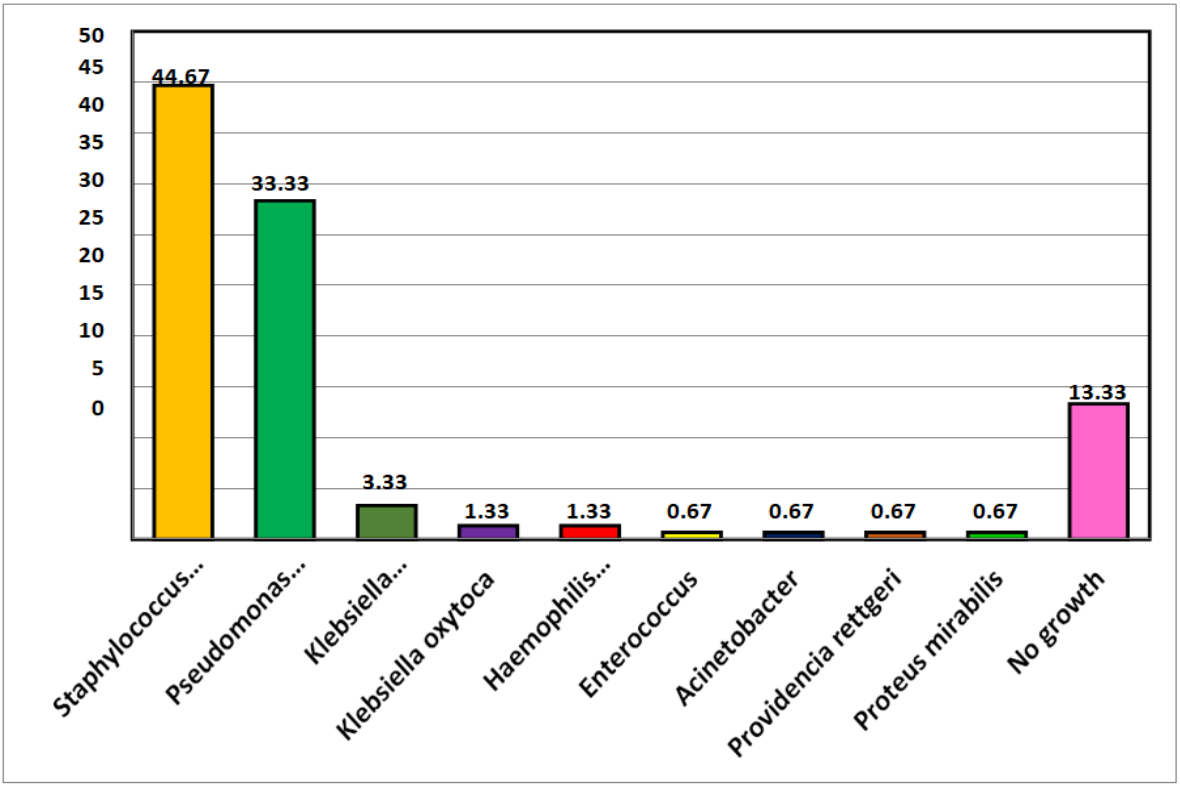


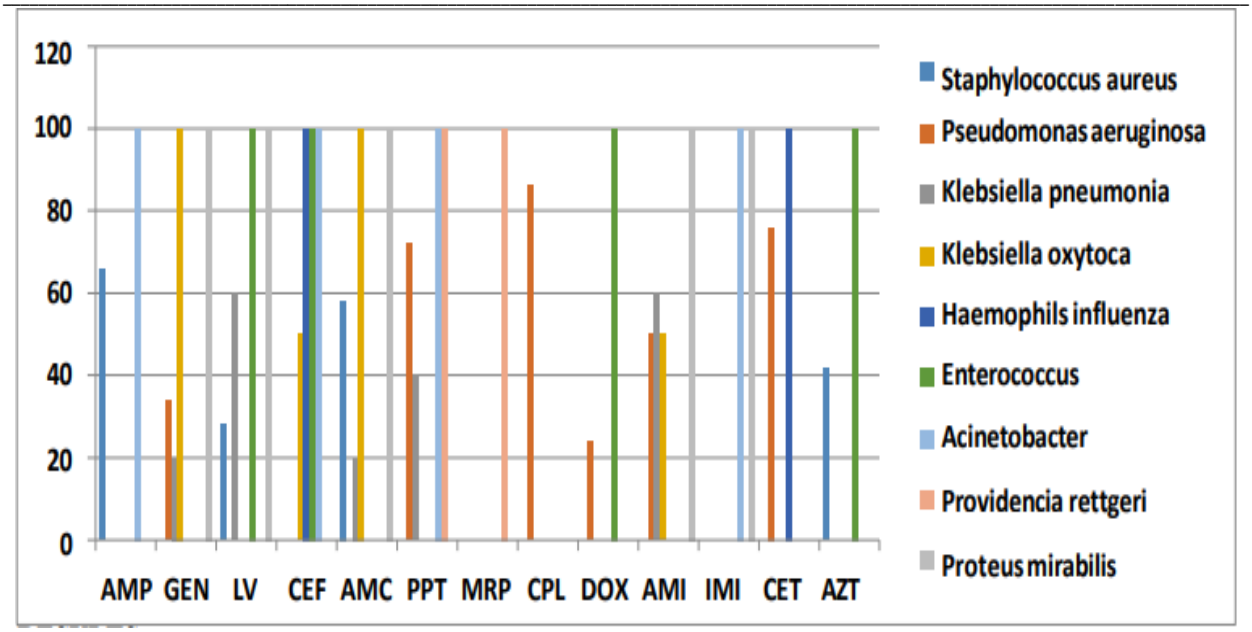
Table 4: Antimicrobial sensitivity patterns of bacterial isolates

	AMP	GEN	LV	CEF	AMC	PPT	MRP	CPL	DOX	AMI	IMI	CET	AZT
Staphylococcus aureus	44		19		39								28
Pseudomonas aeruginosa		17				36		43	12	25		38	
Klebsiella Pneumonia		1	3		1	2				3			
Klebsiella Oxytoca		1		2	1					2			
Haemophilis Influenza				1								1	
Enterococcus			1	1					1				1
Acinetobacter	1			1		1					1		
Providencia Rettgeri						1	1						
Proteus mirabilis		1	1		1					1	1		

AMP- AMPICILLIN , GEN- GENTAMICIN , LV- LEVOFLOXACIN, CEF- CEFTRIAXONE, AMC- AMOXYCILLIN /CLAVULINIC ACID, PPT – PIPERACILLIN/ TAZOBACTUM , MRP – MEROPENAM , CPL- CIPROFLOXACIN , DOX – DOXYCYCLINE, AMI – AMIKACIN, IMI – IMIPENAM , CET –CEFTAZIDIME , AZT – AZITHROMYCIN.

Table 4: Antimicrobial sensitivity patterns of bacterial isolates according to percent

	AMP	GEN	LV	CEF	AMC	PPT	MRP	CPL	DOX	AMI	IMI	CET	AZT
Staphylococcusaureus	65.7		28.3		58.2								41.8
Pseudomonas aeruginosa		34				72		86	24	50		76	
Klebsiellapneumonia		20	60		20	40				60			
Klebsiella oxytoca		100		50	100					50			
Haemophils influenza				100								100	
Enterococcus			100	100					100				100
Acinetobacter	100			100		100					100		
Providencia rettgeri						100	100						
Proteus mirabilis		100	100		100					100	100		



Results

In the present study, of total 150 ear swabs, samples were collected and processed for study.

The sex-wise distribution of patients was males (64%) and females (36%). The male-to-female ratio was 1.7:1 (Table 1).

Their age ranged from >5 to 65 years and above. The peak incidence seen in age groups 5-15 years (4%) followed by age groups 16-25 years (15.33%), 26-35 years (31.33%), 36-45 years (23.33%), 46-55 years (19.33%), 56-65 years (5.33%), and 65 years and above (1.33 %) (Table 2).

The most common bacteria causing ear discharge was S.aureus in **67** (44.67%) samples followed by P.aeruginosa **50** (33.33%), K.pneumonia **05** (3.33%), K. oxytoca **02** (1.33%), H.influenzae **02** (1.33%), Enterococcus, Acinetobacter, Providencia rettgeri and Proteus mirabilis **01** (0.67%) each (Table 3). No growth was seen in **20** cases (13.33).

The results of sensitivity testing are described in Table 4. Among 67 isolates of S.aureus, it was sensitive to Ampicillin 44 (65.7%), Amoxicillin /Clavulanic acid 39 (58.2%), Azithromycin 28 (41.8%), Levofloxacin 19 (28.3%). P. aureginosa was sensitive to Ciprofloxacin in 43 out of 50 isolates accounting for 86% followed by Cefotaxime 38 (76%), Piperacillin/Tazobactum 36 (72%), Amikacin 25 (50%), Gentamicin 17 (34%) , Doxycycline 12 (24%). K.pneumonia was sensitive to Levofloxacin and Amikacin in each 3 out of 5 isolates (60%) followed by Piperacillin /Tazobactum 2 (40%), Gentamicin and Amoxicillin/Clavulanic acid 1 each (20%). K.oxytoca was sensitive to Ceftriaxone and Amikacin with 100% sensitivity each followed by 50% sensitivity with Gentamicin and Amoxicillin/ Clavulanic acid (1 out of 2 cases). H. influenza was sensitive to Cefuroxime and Cefotaxime 100% each.

Enterococcus was sensitive to Levofloxacin, Ceftriaxone, Doxycycline and Azithromycin with each 100%. Acinetobacter was sensitive to Ampicillin, Levofloxacin, Piperacillin /Tazobactum , Amikacin (100%). Providencia was sensitive to Piperacillin/Tazobactum and Meropenam with each 100%. Proteus mirabilis was sensitive to Ampicillin, Gentamicin, Cefuroxime, Amikacin, Imipenam with each 100%. However, no growth was seen in 20 patients .

Discussion

Ear discharge is one of the most common complaint amongst ENT patients encountered in OPD. It may be due to various causes like recurrent URTI causing Eustachian tube blockage , ear cleaning habits and local and environmental factors. It is most commonly seen in patients with habit of repeated ear pricking with cotton bud, sharp objects like keys , pins etc. This, in turn, may cause excoriation of external auditory canal causing furunculosis , otomycosis and other type of condition like otitis externa or may cause trauma to tympanic membrane resulting in its perforation through which ear discharge comes . The ear discharge may be of mucoid, mucopurulent or purulent in nature[3].

Discharge may be seen mainly in adults because of ear cleaning habits, long standing history of recurrent URTI , whereas children are also affected mainly because of acute ear infection like acute otitis media which may result in ear discharge later on[4].

Various causes of ear discharge includes active mucosal chronic otitis media, otitis externa, otomycosis, squamosal otitis media, neglected foreign body. Active mucosal chronic otitis media mainly presents with mucoid or mucopurulent discharge whereas squamosal disease presents with scanty purulent discharge.

A wide variety of bacterial and fungal isolates are organisms responsible for discharging ear. Some bacteria are commensals of external auditory canal while some may cause secondary bacterial infections. The bacteriological and fungal profile alters geographically as it depends on various factors like local climatic conditions, immune status of the patients etc. In our study, the whitish flakes simulating fungal infections were not taken into study because of inappropriate reporting due to deficient reagent and improper collection method. Hence, we have excluded otomycosis from our study and taken into account only the mucoid or mucopurulent discharge.

In the present study, patients coming to ENT OPD with the complaint of discharge were examined and aural swabs were taken for study of bacteriological isolates and their antibiotic susceptibility, under all asceptic precautions and before starting any treatment. The samples were sent to Microbiology department. Empirical treatment was started before the reports arrived. After the reports were available, the treatment was revised according to the organism and their sensitivity report. The data regarding the same was studied and analysed.

In our study, we found that male patients were more commonly affected than female patients[5][6]. Most common age group involved in our study was 26-35 years followed by 36-45 years. The number of children affected in our study was less as compared to other study which may be because of primary treatment received at primary or secondary care centre.

Staphylococcus aureus was the most common causative organism in

our study followed by Pseudomonas aeruginosa[7][8][9][10]. Getanah et al and Rao et al found the similar results in which Staphylococcus was the most common organism identified whereas studies done by Jyothi R et al and Ilechukwu GC et al suggested Pseudomonas to be the most common organism to be isolated . This may be because of varying environmental and climatic conditions, immunity of patients. Various other organism were found to be responsible were Streptococcus pneumonia, S.oxytoca, Proteus.

Antibiotic susceptibility test was also performed in all samples sent for bacteriological study. In our study, we found that S.aureus was sensitive to ampicillin, amoxicillin/clavulanic acid, azithromycin, levofloxacin[11]. P. aeruginosa was sensitive to ciprofloxacin, cefotaxime , piperacillin/tazobactum , amikacin , gentamicin , doxycycline[12]. K.pneumonia was sensitive to levofloxacin and amikacin followed by piperacillin/tazobactum, gentamicin and amoxicillin/clavulanic acid[13][14]. K.oxytoca was sensitive to ceftriaxone, amikacin, gentamicin and amoxicillin/ clavulanic acid. H. influenza was sensitive to cefuroxime and cefotaxime. Enterococcus was sensitive to levofloxacin, ceftriaxone, doxycycline and azithromycin. Acinetobacter was sensitive to ampicillin, levofloxacin, piperacillin/tazobactum, amikacin. Providencia was sensitive to piperacillin/tazobactum and meropenam. Proteus mirabilis was sensitive to ampicillin, gentamicin, cefuroxime, amikacin, imipenam. However no growth was seen in 20 patients .

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