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MICROBIOLOGICAL PROFILE OF OTORRHEA IN PATIENTS ATTENDING OPD IN TERTIARY CARE HOSPITAL.

Medical Microbiology

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ABSTRACT

Background: Otorrhea or aural discharge is usually due to diseases of the ear. Otitis media can be acute or chronic. Acute otitis media is fairly common among younger age group, chronic suppurative infection spares no age group. Other conditions leading to otorrhea includes otitis externa, otomycosis, trauma and foreign body obstruction1. It is a destructive and persistent disease with irreversible sequelae and can proceed to serious intra and extra cranial complications. The disease is common mainly in low socio-economic status and found to be more prevalent during high humidity environment with profound impact in hearing2. It is an important cause of preventable hearing loss, affects children's language development and intellectual performance. Between 65 and 330 million individuals globally get ear infections, and 60% of them experience significant loss of hearing. This is the cause of significant economic and health issues, particularly in developing countries with little resources for diagnosis and treatment3. Ear infection may be of bacterial and fungal origin2. Therefore, diagnosis and management of otitis media is extremely important.

Aims and objectives:

1. To study etiological agents responsible for causing the otorrhea obtained from patients attending ENT OPD in tertiary care hospital.
2. Antibiotic sensitivity patterns of isolates causing otorrhea.

Material and methods: A Total of 100 patients who were clinically diagnosed with otorrhea of all age groups and both sexes were selected for study from June 2023 to November 2023. Ear discharge was collected under aseptic precautions using sterile cotton swabs and direct microscopic examination and culture was done. This study was conducted in Department of Microbiology in collaboration with Otorhinolaryngology department, NKP Salve Institute of Medical Sciences & Research Center and Lata Mangeshkar Hospital, Nagpur. **Results:** A total of 100 patients were included in the study, among them 55 were males and 45 were females. Growth was observed in 72% and no growth was seen in 28%. Gram-Positive bacteria i.e. S. aureus is 24 (33.3%) and Gram-Negative bacteria is 33 (57.89%) out of which P. aeruginosa is 15 (20.83%). Out of 15 (20.8%) positive fungal cultures, Aspergillus Niger 08 (53.33%) was most common. The S.aureus isolates were most sensitive to Vancomycin followed by Amoxicillin clavulanic acid. The antibiogram of Pseudomonas aeruginosa showed maximum sensitivity to Imipenem. The most sensitive antibiotic for all Gram-negative bacteria is Piperacillin Tazobactam. **Conclusion:** Knowledge of spectrum of microorganisms causing otorrhea is necessary to administer targeted therapy in order to obtain better results. In our study, S.aureus and P.aeruginosa were most common isolates whereas Aspergillus species is the commonest fungal isolate in otorrhea seconded by candida species. Vancomycin has been found to be highly effective drug for Gram-Positive bacteria while Imipenem and Piperacillin Tazobactam were better choice for Gram-Negative bacteria. We also found 20.9% of fungal isolates indicating the importance of use antifungal agents. Early and effective treatment based on the knowledge of causative microorganisms and their antimicrobial sensitivity ensures prompt clinical recovery and possible complications can thus be avoided.

KEYWORDS

Otorrhea, ASOM, CSOM, Otomycosis

INTRODUCTION

Otorrhea or aural discharge is usually due to diseases of the ear. Inflammatory conditions of external and middle ear account for most ear discharges. These include acute and chronic otitis externa, acute otitis media, Chronic Otitis Media with or without cholesteatoma and otomycosis.[1,4]Otitis media which can be serous, acute or chronic is one of the most common diseases worldwide. Acute otitis media is fairly common among younger age group, chronic suppurative infection spares no age group[1]. CSOM can occur with or without cholesteatoma. It is a persistent disease of the middle ear, which is capable of causing severe destruction sequelae with the manifestation of deafness, discharge, and a permanent perforation[2]. It is a destructive and persistent disease with irreversible sequelae and can proceed to serious intra and extra cranial complications like hearing loss, meningitis, brain abscess which may endanger the patient's life[1,2,5].

The etiology of ear discharge is of complex nature, majority being aerobic bacteria, and the rest are anaerobes, fungi and mixed infections. Therefore, the need to determine the cause behind the discharge and to find out the nature and microorganism related to it becomes important[1]. The, study was undertaken in Lata Mangeshkar Hospital, Nagpur to determine microbiota flora and sensitivity pattern of otorrhea. To help in the appropriate management for control of the infections and to reduce the complications and also prevent the emergence of resistant strains.

MATERIAL AND METHODS:

This is a prospective study carried out in 100 patients presenting with otorrhea. The study was conducted at the out-patient Department of Otorhinolaryngology in collaboration of the Department of Microbiology at Lata Mangeshkar Hospital, Nagpur. The study was approved by Institutional Ethical Committee and informed consent was taken from the patient/ guardian. The duration of the study was 6 months from June 2023 to November 2023. Patients included in the study were determined by persistent or intermittent unilateral or bilateral ear discharge with perforated tympanic membrane for a duration of over 6 weeks and on no local or systemic antibiotic therapy for seven days prior to sample collection also by the patient's willingness to participate.

All patients were clinically examined and pus as obtained with the help of two aural swabs aseptically from patient; one for microscopy and the other for culture was sent for bacteriological and mycological examination. Culture media used for bacteriology was Blood agar and MacConkey agar. Mycological assessment was performed using SDA (Sabouraud's Dextrose Agar), Candida chrome agar, Corn Meal agar and Slide culture technique was used for confirmation and differentiation of morphology of fungal species. As per standard conventional protocols including Microscopy, Staining reaction, Culture characteristics, Biochemical reactions, the isolates from otorrhea samples were studied. Establishment of antibiotic

susceptibility for bacterial isolates is by standard Kirby-Bauer technique and antifungal susceptibility were done.

History was taken from each patient including age, sex, socio-economic status, symptoms and signs, hearing loss and previous treatment if any.

Data Interpretation & Analysis

Data were entered and analyzed using SPSS (Statistical Package of Social Sciences) version 20 software. Results were presented through graphs and tables. The statistical significance of association was measured by using the Chi-square test. A *P* value < 0.05 was considered as statistically significant. Results were formulated in tables and calculated in percentages.

RESULT

A total of 100 patients were included in the study, among them 55 were males and 45 were females with male: female ratio of 1.23:1. The patients age varied from 3 – 70 years amongst which 12 % were under 10 years, 17% in 10 -20 years, 24% in 20 – 30 years, 23% in 30 – 40 years, 12% in 40 – 60 years and 12% more than 60 years. Most common age group with otorrhea belonged to 21- 40 years.

Table 1 Age and sex wise distribution of otorrhea patients

AGE GROUP (years)	MALES	FEMALES	NUMBER
0-10	7	5	12
11-20	9	8	17
21-30	13	11	24
31-40	14	9	23
51-60	6	6	12
60-70	7	5	12
TOTAL	55	45	100

Out of 100 samples, growth was observed in 72% and no growth was seen in 28%.

Total aerobic bacteria were 57 in which Gram-Positive bacteria i.e.

S. aureus is 24 (33.3%) out of which MSSA is 18 (75%) and MRSA is 6 (25%) and Gram-Negative bacteria is 33 (57.89%) out of which P. aeruginosa is 15 (20.83%), K. pneumoniae is 8 (11.11%), E. coli is 5 (6.94%) P. mirabilis 4 (5.55%) and P. vulgaris 1 (1.38%) were the predominant bacterial isolate respectively. Gram Negative bacteria 33 (57.9 %) were more dominant than Gram Positive 24 (42.1 %). Fungal isolates were 15 (20.83%). (Fig. 1). No anaerobic bacteria were identified in given study.

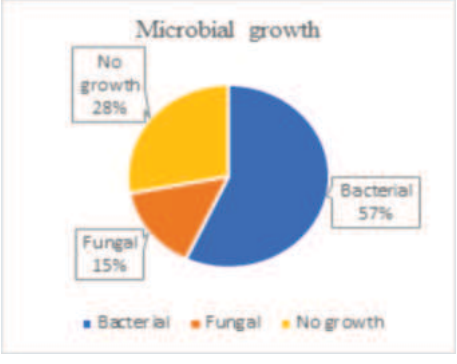

Figure 1 Pie chart representing microbial growth in ear discharge (n= 72).

Table 2 Bacterial isolates in positive culture growths (n= 57)

BACTERIAL ISOLATES	NUMBER OF CASES	PERCENTAGE
Gram positive bacteria	24	42.1
MSSA	18	31.58
MRSA	6	10.52
Gram negative bacteria	33	57.9
Pseudomonas aeruginosa	15	26.32
Klebsiella pneumoniae	8	14.03
E. coli	5	8.77
Proteus mirabilis	4	7.02
Proteus vulgaris	1	1.76

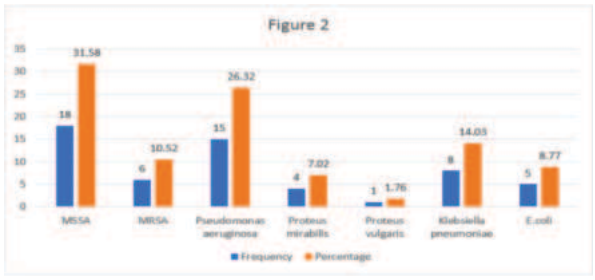

Figure 2 Bar chart showing frequencies of bacterial isolates in positive culture growths (n= 57)

Out of 15 (20.8%) positive fungal cultures, Aspergillus niger 08 (53.33%) was most common followed by Candida albicans 05 (33.33 %), Aspergillus fumigatus 02 (13.33%).

Table 3 Fungal isolates in positive culture growths (n= 15)

FUNGAL ISOLATES	NUMBER	PERCENTAGE (%)
Aspergillus niger	08	53.33
Aspergillus fumigatus	02	13.33
Candida albicans	05	33.33
Totarl	15	100

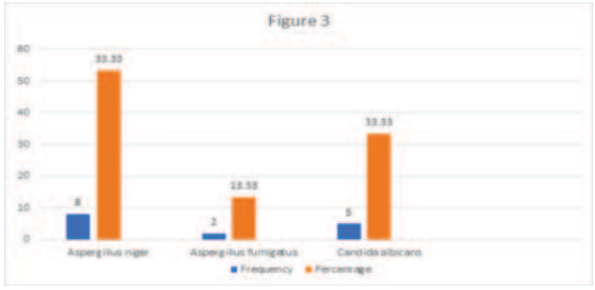

Figure 3 Bar chart showing frequencies of fungal isolates in positive culture growths (n= 15)

Table 4 Antibiotic susceptibility pattern of MSSA and MRSA (n=24)

ANTIBIOTICS	Number	Percentage
Amoxicillin-clavulanic acid	17	70.83
Erythromycin	15	62.50
Vancomycin	24	100
Cefoxitin	14	58.33
Ciprofloxacin	16	66.67
Clindamycin	17	70.83

Table 5 Antibiotic susceptibility pattern of Pseudomonas aeruginosa (n=15)

ANTIBIOTICS	Number	Percentage
Levofloxacin	13	86.67
Cefotaxime	6	40
Ceftazidime	5	33.33
Imipenem	15	100
Tetramycin	9	60
Piperacillin Tazobactam	12	80
Amikacin	14	93.33
Gentamycin	12	80

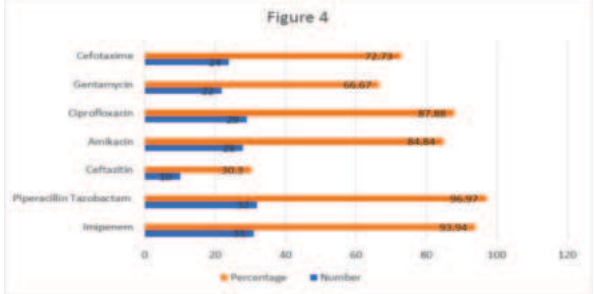

Figure 4 Bar graph representing the antibiotic susceptibility pattern of Gram-Negative bacteria (n=33)

DISCUSSION

It has previously been assumed that a healthy individual's ear is sterile[8]. The main route of spread of infection to the middle ear is through the eustachian tube from the nasopharynx[8,9]. Understanding the etiology of ear infections and resistance pattern is crucial in planning interventions and managing ear infections[10].

In the present study the most common age group affected was 20-40 years and predominantly in males which corresponds to studies by Vijayniwas et al.[2], Bhan C et al.[11], Kombade S et al.[12]. However, this was in contrast with study of Gupta S et al.[13], where maximum incidence of CSOM was observed in the age group of 0–20 years (40%) and with studies of Biju M et al.[14], Mahajan T et al.[15], which revealed that females are more affected than males. Shamim R et al.[16] and Rani RU *et al*.[17], has reported that the majority of the participants were in the age group 0-20 years with female predominance.

Out of 100 samples, in this study, Gram negative bacteria 33 (57.9 %) were more predominant than gram positive 24 (42.1 %). Similar findings were seen in Kombade S et al.[12], Alam M et al.[18]. This is also in accordance to a study by Shangali A et al.[19] in Tanzania.

The most common isolate in the present study was S. aureus (42.1%) followed by P. aeruginosa (26.32%). This was well in agreement with Bhan C et al.[11], Alam M et al.[18], Shangali A et al.[19], Singh AH et al.[20], Prakash R et al.[21] whereas Kombade et al.[12], Gupta S et al.[13] and Biju M et al.[14], Rani RU *et al*.[17], Khattak et al.[22], Gupta P et al.[23] state P. aeruginosa as single most common bacterial isolate.

In our study, 20.8% positive fungal cultures were identified and Aspergillus niger was most common species followed by Candida albicans, Aspergillus fumigatus. This was supported by studies of Bhan C et al.[11], Gupta S et al.[13], Biju M et al.[14], Shamim R et al.[16], Gupta P et al.[23] and Singh N et al.[24] in contrast to studies of Rani RU *et al*.[17], Shangali A et al.[19], Pavani K et al.[25] and Jadhav VJ et al.[26] and where Candida albicans is more commonly found than Aspergillus species.

Table 6 Table depicting some recent studies with comparable results.

Study	Year
Vijayniwas et al.	2023
Shangali A et al.	2023
Alam M et al.	2022
Gupta S et al.	2022
Kombade SP et al.	2021
Varshney et al.	2020

The S. aureus isolates were most sensitive to Vancomycin followed by Amoxicillin clavulanic acid and were least sensitive to Cefoxitin (58.6%) followed by Erythromycin (62.50%), Ciprofloxacin (66.67%). Study by Gupta S et al.[13] showed sensitivity pattern of Staphylococcus, Vancomycin was 100% sensitive and was highly sensitive to Amoxycillin (76.9%), Levofloxacin (65.4%) least to Cefoxitin (26.9%). In a study by Kombade SP et al.[12], no resistance was seen to vancomycin in *S. aureus*. A very low sensitivity was observed for Penicillin, Erythromycin (30.30%) and Ciprofloxacin (18.8%) with sensitivity for Cefoxitin (66.70%).

The antibiogram of Pseudomonas aeruginosa showed maximum sensitivity to Imipenem (100%) followed by Amikacin (93.33%) and Levofloxacin (86.67%). It was least sensitive to Ceftazidime (33.33%). A study by Gupta S et al.[13], showed 100% sensitivity for Meropenem. It also revealed high sensitivity to Levofloxacin (87%), Piperacillin Tazobactam (87%) and Amikacin (81.5%) followed by Ceftazidime (44.4%) and Cefotaxime (37%). The results of these studies are comparable. However, another study by Kombade SP et al.[12], demonstrated 100% sensitivity for Ceftazidime followed by followed by Piperacillin Tazobactam (95.52%), Ceftazidime Tazobactam (92.9%) and Cefepime (81.8%). It showed moderate sensitivity to Amikacin (77.78%), Fluoroquinolones (76.92%) and Imipenem (64.91%).

The most sensitive antibiotic for all Gram-negative bacteria is Piperacillin Tazobactam followed by Imipenem and Fluoroquinolones. This finding is consistent with studies by previous investigators[2,27].

CONCLUSION:

Knowledge of spectrum of microorganisms causing otorrhea is necessary to administer targeted therapy in order to obtain better results. In our study, S. aureus and P. aeruginosa were most common isolates a whereas Aspergillus species is the commonest fungal isolate in otorrhea seconded by Candida species. Vancomycin has been found to be highly effective drug for Gram-Positive bacteria while Imipenem and Piperacillin Tazobactam were better choice for Gram-Negative bacteria. Irrational use of antibiotics has led to masked or latent infections with increasing complications due to changes in bacterial flora and emergence of resistant strains not responding to commonly used antibiotics in practice. We also found 20.8% of fungal isolates indicating the importance of use antifungal agents. Early and effective treatment based on the knowledge of causative microorganisms and their antimicrobial sensitivity ensures prompt clinical recovery and possible complications can thus be avoided.

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