



Original Research Article

Evaluation of Microbiological Profile of Ear Discharge of Patients Attending Otorhinolaryngology OPD at the Tertiary Care Teaching Hospital

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ABSTRACT

Introduction: Otitis media or externa is common clinical conditions encountered during routine otorhinolaryngology practice. Depending upon duration it can be divided into acute, sub acute or chronic and are characterized by suppuration of middle ear cavity or external auditory canal which gives rise to discharge from ear. If left untreated or proper management not has been done it can lead to various complications with chronic form.

Aims and objectives: To study different microorganisms isolated from ear discharge and their co-relation with symptomatology and antibiotic sensitivity pattern of these isolated bacteria.

Materials and methods: Total 100 patients were enrolled in the studies for the duration of one year at otorhinolaryngology OPD and ear swabs of discharging pus and debris were collected by from affected ear. All samples were processed in department of microbiology. Organisms were identified morphologically and biochemically by standard laboratory procedures and antibiotic susceptibility pattern was determined by modified Kirby Bauer disc diffusion method.

Results: Out of 100 patients, 85 % of patients were positive, from them 91 isolates of bacteria studied. Mostly, females with age between 21 to 30 years were commonly affected. Otorrhea was most common symptom followed by Otagia. Trauma by self scratching was most common predisposing factor. Out of 91 organisms, 78.8% bacterial and 28.2% were fungus isolated. The most common organism isolated was *Pseudomonas aeruginosa* (24.7%) followed by *Staphylococcus aureus* (22.3%), *Klebsiella pneumonia* (17.6%). In fungus isolates most common was *Aspergillus niger* (16.4%). 100% and 90.47% isolates of *Pseudomonas aeruginosa* showed antibiotic sensitive to amikacin and ceftazidime respectively and 78.9% isolates of *Staphylococcus aureus* were sensitive to amoxicillin and 100% isolates were sensitive to clindamycin, chloramphenicol and fluoroquinolones respectively.

Conclusion: *Pseudomonas aeruginosa* was the most common isolate followed by *Staphylococcus aureus* and both were sensitive to aminoglycosides and fluoroquinolone. These both drugs should be included in the drug formulary to cover the most common aerobic isolates causing otitis media. It is of utmost important to administered correct therapy to prevent the complications like chronic otitis media, encephalitis, brain abscess and chronic mastoiditis and conductive deafness.

Key words: Otorrhea, Otitis media, *Pseudomonas aeruginosa*, *Aspergillus niger*.

INTRODUCTION

Both the otitis media and externa are the inflammation of middle and external ear respectively, caused by different bacteria, virus and fungi. Both are most frequent clinical conditions in routine otorhinolaryngology practice especially in developing country. It is more common into infants and young children; however it can also affect adults. Out of most predisposing factors, trauma, diabetes, malnutrition, decreased immunity and ascending infection through upper respiratory tract etc have been recognised frequently encountered. ^(1,2)

However, in case of otomycosis (fungus) who usually survives in area with humidity, such infections are more common in tropical region where atmosphere is hot and humid. Owing to secretion of epithelium lining of auditory canal, it is warm and moist structure and which lead to frequent bacterial and fungal infections in the ears. ⁽³⁾

Second most noteworthy for infection to settled out is thin skin lining of external meatus which is easily get traumatized by minor scratch or intervention over there. Otitis media commonly presents as earache or otalgia, headache, ear discharge, fever, itching in ear, decreased hearing. ^(1,4) If left untreated then it can produce severe complications like chronic otitis media, encephalitis, brain abscess and chronic mastoiditis and conductive deafness. So, it is very importance to accurately diagnose causative organism and immediately initiate proper treatment of otitis media to prevent above described complications ^(1,2) Also, identification of correct pathogenic organism and its predisposing factor makes it easy for clinician to find suitable treatment and prevention of its recurrence.

MATERIALS AND METHODS

This was non-interventional, observational and prospective study conducted on patients visiting out-patient

department (OPD) of otorhinolaryngology at our hospital and the department of microbiology of tertiary care teaching hospital for one year duration period. Once complete clinical evaluation of patients done, patients who were diagnosed as probable case of otitis media and who met the inclusion criteria and willing to signed informed consent form were included in the study. Pre-validated case report forms (CRFs) for each patient in current study were fulfilled. Demographic details, clinical findings including duration of symptoms, time of presentation, past history, any associated predisposing and risk factors etc were recorded in a case record form. By using sterile ear swab discharging materials were collected by treating clinician and on most of time two samples from each patients were taken and after that each of these samples were inoculated on to nutrient agar, Mac Conkey agar, blood agar and two sets of Sabouraud Dextrose agar. Material smeared onto two slides- one for gram stain and other for 10% KOH preparation. Identification of microorganism was done using standard laboratory conventional method.

RESULTS

There were total 100 patients, out of that 50 % were male and 50 % were female. Out of total 100 samples, 85 (85%) patient's samples were positive for presence of microorganisms. There were 91 isolates from total 85 positive samples. 28 percentages of patient's age was between 21 to 30 years in current study and female preponderance was found in positive patients. Age wise distribution of samples showed in (Table-1).

As shown into table 2, out of total 85 positive specimens, 91 organisms were isolated. 79 samples had single organism isolated from the culture study, while 6 samples had mixed growth. There were only

fifteen patients who had a sterile culture with no organisms isolated (Table-2).

Table -1: Age wise distribution of patients in the study (n=100)

Age (years)	Patients in each group	Percentages
0-10	4	4%
11-20	22	22%
21-30	28	28%
31-40	15	15%
41-50	16	16%
51-60	8	8%
61-70	4	4%
> 71	3	3%
Total	100	100%

Table-2: Isolated microorganisms from direct microscopic examination and culture in the study (n=91)

Specimens positive on microscopic examination	Bacteria isolated by culture	Fungi isolated by culture
85 (85%)	67(78.8%)	24 (28.2%)

Table-3: Fungus pathogen isolated from culture in the study (n=24)

Fungus isolate	No. of isolates
Candida tropicalis	4 (4.70%)
Candida krusei	1 (1.17%)
Candida albicans	2 (2.35%)
Candida guilliermondii	1 (1.17%)
Aspergillus niger	14 (16.47%)
Aspergillus flavus	1 (1.17%)
Aspergillus fumigatus	1 (1.17%)

In current study, most common predisposing factor causing otitis media and externa, was trauma secondary to self cleaning seen in 31 patients (36.4%), followed by diabetes as a co-morbidity in 8.23% of patients and swimmers and hearing aid users contributed 3.52% of patients. Duration of symptomatology was varied from 3 days to even 6 months with chronic complain on and off of disease. Most common symptom was otorrhea, seen in all patients (100%), followed by otalgia (69%), pruritus (31%), aural fullness (19%) and hearing impairment (9%).

Out of total 24 fungal isolates 16 were filamentous fungi and 8 were yeast like fungi studied. (Table-3). Out of total 85 positive cases, commonest organism was *Pseudomonas aeruginosa* found in 21(24.70%), Followed by *Staphylococcus aureus* in 19(22.35%), *Klebsiella pneumoniae* in 15(17.64%), *Proteus*

mirabilis in 5 (5.88%) of patients. Least observed was *Acinetobacter baumannii* in 4.70% of patients and *Providencia sp.* in 3.52% of patients (Figure-1).

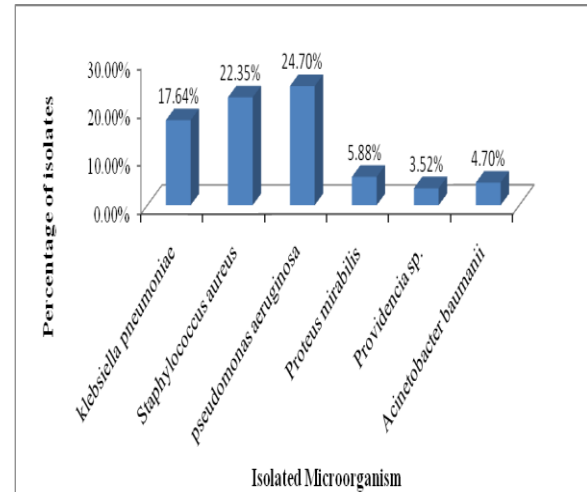


Figure-1: Distribution of isolated organisms from culture in the study (n=67)

In isolated cases of *Pseudomonas*, all were sensitive to Piperacillin-Tazobactam, Chloramphenicol, Amikacin and Imipenem group of drugs. Most commonly used drug against *Pseudomonas*; Ceftazidime showed sensitivity of 90.47%

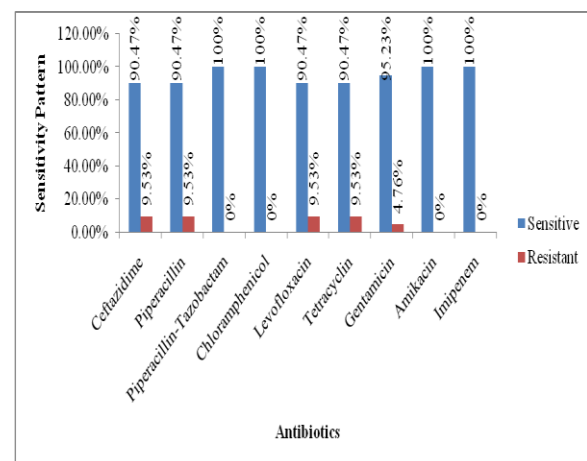


Figure-2: Sensitivity Pattern amongst *Pseudomonas aeruginosa*.

As shown in table-4 *S. aureus* was 100% sensitive to levofloxacin, clindamycin, chloramphenicol, vancomycin and linezolid

group of drugs. 89.47% isolates were sensitive to ciprofloxacin and tetracycline. 4 isolates (21.05%) were found to be methicillin resistant. *Klebsiella* was 100% sensitive to ampicillin-sulbactam, cefoperazone-sulbactam, aminoglycosides. It showed 86.6% sensitivity to fluoroquinolone, which is most commonly used drug. Least sensitivity pattern found to tetracycline group of drugs (53.33%).

Table-4: Sensitivity pattern of *Staphylococcus aureus*

Antibiotics	No. of Sensitive isolate
Penicillin G	11 (57.89%)
Ampicillin	15 (78.94%)
Amoxicillin	15 (78.94%)
Oxacillin	15 (78.94%)
Ciprofloxacin	17 (89.47%)
Levofloxacin	19 (100%)
Cotrimoxazole	17 (89.47%)
Clindamycin	19 (100%)
Chloramphenicol	19 (100%)
Azithromycin	16 (84.2%)
Tetracyclin	17 (89.4%)
Vancomycin	19 (100%)
Linezolid	19 (100%)

DISCUSSION

Present study was carried out in 100 patients on the basis of clinical suspicion. This study was intended to cover all the aspects related to ear infections not only

organisms involved but its clinical correlation, predisposing factors and sensitivity pattern amongst bacteria which we commonly come across. In the present study incidence was found to be 85% and similar observation found in studies done by Arjyal c et al (82.6% incidence) and by Bayeh Abera et al (82% of incidence) in patients of otitis media. (5,6) Present study showed 21-30years of age group was most commonly affected in contrary to that in study done by Arjyal c et al most affected age group was 11-20 years. (5) This is due to young adults are more exposed to hot and humid condition out the homes which make them more susceptible for otitis media.

In current study, during microbiological analysis 28.2% fungal isolates were isolated while study done by A H C Loy et al showed fungal involvement of 8.8% and by Nageshwari et al reported fungus isolation rate of 23.6%. (7,8) Loy reported *Aspergillus niger* (3.3%) to be commonest followed by *Candida sp* (2.2%), similar findings are observed in present study with isolation rate of *Aspergillus niger* is 16.4%. (7)

Table-5: Comparison of general characteristic of patients in different studies

Observations	Present study	Nageshwari et al,2012 ^[8]	Arti Agrawal et al,2013 ^[9]
Culture positive cases	85/100 (85%)	121/150 (80.6%)	113/125 (90.4%)
Common age group affected (years)	21-30	0-30	0-20
Total Bacterial isolates recovered	67/91 (78.8%)	123/161 (76.3%)	110/113 (97.3%)
Total fungal isolates recovered	24/91 (28.2%)	38/161 (23.6%)	3/113 (2.6%)
Most commonest bacterial isolate	<i>Pseudomonas aeruginosa</i> (24.7%)	<i>Staphylococcus aureus</i> (42.2%)	<i>Staphylococcus aureus</i> (37.6%)
Second commonest bacterial isolate	<i>Staphylococcus aureus</i> (22.3%)	<i>Pseudomonas aeruginosa</i> (16.7%)	<i>Pseudomonas aeruginosa</i> (32.8%)
<i>Pseudomonas</i> sensitivity to Aminoglycosides	Gentamicin-95.23% Amikacin-100%	Gentamicin-18.50% Amikacin-70%	Amikacin-89.4%
<i>Pseudomonas</i> sensitivity to Fluroquinolone	Levofloxacin-90.47%	Ciprofloxacin-85%	Moxifloxacin-93.6%
Oxacillin resistant isolate (MRSA)	21.05%	22.05%	20%
Commonest fungus recovered	<i>Aspergillus niger</i> (16.4%)	<i>Aspergillus niger</i> (17.3%)	<i>Candida species</i> (1.6%)

In present study, 85% positive cases were observed with total 78.8% and 28.2% of bacterial and fungal isolates respectively, with most common bacterial isolate was *Pseudomonas aeruginosa* (24.7%). While

study carried out by Nageshwari et al showed 80.6% positive cases with total 76.3% and 23.6% of bacterial and fungal isolates respectively and most common bacterial isolate was *Staphylococcus aureus*

(42.2%).⁽⁸⁾ Another study conducted by Arti Agrawal et al showed 90.4% positive cases with total 97.3% and 2.6% of bacterial and fungal isolates respectively and again most common bacterial isolate was *Staphylococcus aureus* (37.6%)⁽⁹⁾ (Table 5).

CONCLUSION

Trauma to auditory canal was most common predisposing factor and most common presenting symptom was otorrhea followed by otalgia. Bacterial isolate were more than fungal isolate in present study. However, otomycosis was common causative agent of both otitis media and externa. Total bacterial isolates were 78.8% among which most common isolate was *Pseudomonas aeruginosa* and fungal isolates were 28.2%, among that most common was *Aspergillus niger*. *Pseudomonas aeruginosa* isolates showed good sensitive to aminoglycosides and chloramphenicol while all *Staphylococcus aureus* isolates were sensitive to levofloxacin and chloramphenicol. Above all things conclude that Microscopic evaluation of ear discharge sample by smear examination (microscopy) can give presumptive idea to identify causative pathogen. But, managing middle or external ear infection with chronicity or complicated status, culture should be done to identify causative organism. Antibiotics and anti fungal agents should be use after the diagnosis by culture and sensitivity report to avoid unnecessary resistance pattern and patient's morbidity.

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