

Original Research Article

Bacteriological study and antibiotic sensitivity profile in patients with ear discharge visiting ENT OPD at tertiary care center

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ABSTRACT

Background: Otitis media (OM) is a big menace in countries like India. Chronic suppurative otitis media (CSOM) is chronic inflammation of middle ear, which affects the tympanic membrane, middle ear mucosa and other middle ear structures characterised by the presence of persistent perforation or persistent mucoid or muco-purulent discharge for at least 8 weeks. Variety of organisms found in patients suffering from chronic otitis media like, *Pseudomonas*, *Staphylococcus aureus*, *Proteus mirabilis*, *Klebsiella pneumonia* and *Escherichia coli* found. The pattern of organisms varies in different geographical areas. The objectives of the study were to isolate bacteria from patients with ear discharge, to find out antibiotic sensitivity of isolated organisms

Methods: This is an observational cross sectional study done in the OPD department of otorhinolaryngology, at P.D.U medical college and hospital, Rajkot, for a period of six months from January 2017 to June 2017. A total number 200 patients of both gender between 5 to 74 years who visited the OPD department of otorhinolaryngology with chronic ear discharge taken for study.

Results: Out of 200 patients of 5-74 years with chronic suppurative otitis media were examined and out of this Hundred and twelve (54%) of the patients were males with mean age of 33.44. *Pseudomonas aeruginosa* was the commonest identified organisms the sensitivity pattern highly favoured Piperacillin, Amikacin and Polymyxin B, Cefoparazone.

Conclusions: Chronic otitis media is more prevalent in males than females. Commonest organisms found were *Pseudomonas aeruginosa* followed by *Staphylococcus aureus*. Piperacillin, Amikacin, Gentamicin, Polymyxin B and Cefoperazone were found most effective agents against *Pseudomonas aeruginosa*.

Keywords: Chronic suppurative otitis media, Ear discharge, sensitivity

INTRODUCTION

Otitis media (OM) is big menace in countries like India.^{1,2} Chronic suppurative otitis media (CSOM) is chronic inflammation of middle ear, which affects the tympanic membrane, middle ear mucosa and other middle ear structures characterised by the presence of persistent perforation or persistent mucoid or muco-purulent discharge for at least 8 weeks. Clinically, CSOM presents with ear discharge and conductive deafness. The commonly occurring symptoms are ear discharge, loss of hearing, pain, itching, and fever.³ The disease may begin

in childhood or as a complication of untreated or inadequately treated acute suppurative otitis media or may be chronic from onset.⁴⁻⁶ The bacteria may gain entry to the middle ear through a chronic perforation.⁷ Children tend to have higher predisposition to ear infection than adults because anatomy of the eustachian tube in children permits easier access of organism through the nasopharynx.⁸

Untreated cases of CSOM may cause various complications. These may be related to the spread of bacteria to structures adjacent to the ear or to local

damage in the middle ear itself. Such complication range from persistent otorrhoea, mastoiditis, labyrinthitis, facial nerve paralysis to more serious intracranial abscesses or sigmoid sinus thrombosis. The goal of management is to achieve a safe, dry ear, eradicate disease and improve hearing.

Variety of organisms founds in patients suffering from chronic otitis media like, *Pseudomonas*, *Staphylococcus aureus*, *Proteus mirabilis*, *Klebsiella pneumonia* and *Escherichia coli* found into the middle ear through a chronic perforation. The pattern of organisms are different in different geographical areas.⁹

METHODS

This is an observational cross sectional study carried out in patients visiting with chronic ear discharge in OPD, department of otorhinolaryngology, P.D.U medical college and hospital, Rajkot for a of six months from January 2017 to June 2017. Total number 200 patients of age group range from 5 years to 74 years of both genders visiting with chronic ear discharge presenting in the OPD, department of otorhinolaryngology were examined.

Inclusion criteria

Inclusion criteria were patient of age group from 5 years to 74 years visiting with chronic ear discharge for at least 8 weeks in OPD of department of otorhinolaryngology at P.D.U Medical College and Hospital, Rajkot; Patient presenting with mucopurulent or purulent ear discharge either unilateral or bilateral.

Exclusion criteria

Exclusion criteria were conditions causing otorrhoea due to: 1. Trauma-Cerebrospinal fluid otorrhoea, 2. Acute otitis media, 3. Foreign body in ear; Patients who have taken antibiotics therapy, local or systemic within 2 weeks before presenting to the department.

Methodology

Collection of sample

According to standard procedures, the ear discharge samples were collected by using sterile cotton swab containing test tube obtained from microbiology department. The outer contaminated discharge is cleaned with sterile cotton. Discharge from deep area near tympanic membrane is taken on the sterile swab through a sterile ear speculum to avoid sample contamination, under Bull's lamp with head mirror in ENT OPD.

Transport of sample

The specimen containing swab is kept immediately in sterile test tube and sealed with cap and it is properly labelled with name, date, and age, and sex, OPD number

of patient and site of specimen with a dully filled request form and sent to microbiology department.

Smear, staining and culture

From the specimen, smear is made on a glass slide and Gram stained for preliminary identification of pathogenic flora. If pathogenic organisms are present in the stained specimen, the same swab is inoculated in a suitable culture media (Blood agar, Nutrient agar, Mac Conkey's agar) for 24 hrs at 37°C for growth characteristic of organisms. Next day, the morphology of growth studied and pathogenic organisms confirmed by gram stain and biochemical reactions.

Antibiotic sensitivity testing

Antibiotic sensitivity was carried out using the Kirby-Bauer disc diffusion method on Muller-Hinton agar and commercial antibiotic discs were used for antimicrobial testing. The antibiotic discs used were: Penicillin G, Ampicillin, Piperacillin, Ciprofloxacin, Amikacin, Gentamicin, Cefoperazone, Cefotaxime, Vancomycin, Imipenem, Linezolid.

The antibiotic disc impregnated culture plates were incubated at 37°C overnight. The diameter of the zone of inhibition was measured and recorded as a resistant or susceptible according to the CLSI (Clinical Laboratory Standards Institute) guidelines.

RESULTS

Out of 200 patients 112 (56%) were males and 88 (44%) were females (Figure 1). The most common age group was of patients was 25 to 34 years (28%) with mean age 33.44 years (Table 1).

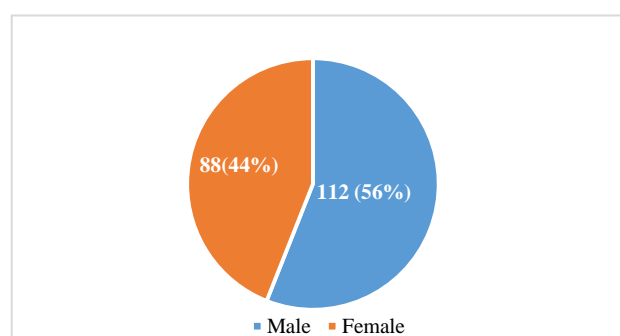


Figure 1: Sex wise distribution of patients.

Out of 200 patients, in 169 (84.5%) patients organisms have been isolated and 31 (15.5%) patients no organisms found. Out of this 169 (84.5%) patients, 133 (78.69%) patients had a single while 36 (22.31%) patients had double organism isolated (Table 2).

Out of 205 isolation cases, *Pseudomonas aeruginosa* seen in 85 (41.4%) cases, *S. aureus* in 63 (30.7%) cases,

Proteus mirabilis in 19(9.4%) cases, *Escheriachia coli* in 15 (7.4%) cases, *Klebsiella* in 12 (5.8%) cases, *Streptococcus* seen in 6(2.9%) cases and *Pneumococci* in 5 (2.4%) cases (Table 3).

Table 1: Age wise distribution of patients.

Age group	Male	Female	Total	%
5 to 14 yrs	10	9	19	9.5
15 to 24 yrs	24	18	42	21
25 to 34 yrs	32	24	56	28
35 to 44 yrs	22	16	38	19
45 to 54 yrs	10	14	24	12
55 to 64 yrs	8	3	11	5.5
65 to 74 yrs	6	4	10	5

Table 2: No of organisms isolated.

Isolated	No. of cases	Percentage (%)
Single	133	66.5
Double	36	18
No organisms	31	15.5

Table 3: Types of organisms isolated.

S. no	Organisms Isolated	No. of cases	Percentage (%)
1	<i>Pseudomonas aeruginosa</i>	85	41.4
2	<i>S. aureus</i>	63	30.7
3	<i>Proteus Mirabilis</i>	19	9.4
4	<i>Escheriachia.coli</i>	15	7.4
5	<i>Klebsiella species</i>	12	5.8
6	<i>Streptococcus</i>	6	2.9
7	<i>Pneumococci</i>	5	2.4
8	No growth	31	15.5

Table 4: Bacteria isolated and their drug sensitivity.

S. no	Organisms isolated	No. of cases	Antibiotic sensitivity	No. of cases	%
1	<i>Pseudomonas aeruginosa</i>	85	Piperacillin	79	92.9
			Amikacin	74	87.05
			Gentamicin	72	84.7
			Polymyxin B	69	81.1
			Cefoperazone	69	81.1
			Vancomycin	44	51.7
2	<i>Staphylococcus aureus</i>	63	Ampicillin	58	92.06
			Piperacillin	58	92.06
			Amikacin	49	77.8
			Cefoperazone	48	76.1
			Linezolid	46	73.0
3	<i>Proteus species</i>	19	Vancomycin	45	71.4
			Gentamycin	16	84.2
			Ciprofloxacin	12	63.1
4	<i>Escheriachia.coli</i>	15	Amikacin	14	93.3
			Piperacillin	14	93.3
			Cefoperazone	12	80
5	<i>Klebsiella species</i>	12	Ciprofloxacin	10	83.3
			Piperacillin	9	75
6	<i>Streptococcus</i>	6	Piperacillin	4	66.7
			Amikacin	4	66.7
7	<i>Pneumococci</i>	5	Ciprofloxacin	3	60

Pseudomonas was sensitive to Piperacillin 79 cases (92.9%), Amikacin 74 cases (87.05%), Gentamicin 72 cases (84.7%), Polymyxin B 44 cases (51.7%), and Cefoperazone 69 cases (81.1%) Vancomycin 44 (51.7%) cases. Out of 63 cases of *S. aureus* 58 sensitive to Ampicillin (92.06%), 58 (92.06%) sensitive Piperacillin, 49 (77.8%) sensitive to Amikacin, 48 (76.1%) sensitive to Cefaparazone. 19 cases of *Proteus Mirabilis* 16 was sensitive to Gentamycin (84.2%) and 12 was sensitive to Ciprofloxacin (63.1%). *Escherichia coli* 14 (93.3%) shows sensitive to Amikacin and Piperacillin and 12 (80%) shows sensitive to Cefoperazone. *Klebsiella* was most sensitive to Ciprofloxacin 10 cases (83.3.4%). *Streptococcus* were sensitive to Piperacillin and Amikacin 4 cases (66.7%). *Pneumococci* were sensitive to Amikacin and Gentamycin (100%) (Table 4).

DISCUSSION

Otitis media (OM) is big menace in countries like India.^{1,2} Chronic suppurative otitis media (CSOM) is chronic inflammation of middle ear which affects the tympanic membrane, middle ear mucosa and other middle ear structures characterised by the presence of persistent perforation or persistent mucoid or mucopurulent discharge for at least 8 weeks.

In our study most of the patients belongs to male group 112 (56%) and females were 88 (44%). Chronic suppurative otitis media was more common in males compared to females. This study correlates with the study report of Iqbal et al, Nwasbuisi et al and Kumar et al.^{10,12,13} Male predominance may be due to their occupational or environmental exposure.

In our most of cases from the age group of 25 to 34 years (28%) with mean age of 33.44. Loy et al showed the increased prevalence of CSOM in 30-40 years age in his study.¹⁴ Age group difference seen because of geographical variation and sampling error.

Out of 200 patients, 169 (84.5%) shows growth which was similar to, Nkakhlagh et al 82% and Khanna et al 84%.^{15,16} Out of 169 cases single organisms found in 133 patients (65.5%) cases while double organisms found in 36 cases (18%) and no organisms in 31 (15.5%) cases. Chakraborty et al found (12.6%) of culture negative samples in their studies.¹⁷ Similar findings were observed with an incidence of 11-15% in Chaturvedi et al and Taneja et al study it was 16%.^{18,19}

Out of 205 isolated bacteria cases, *Pseudomonas aeruginosa* is the most predominant organisms isolated in 85 patients contributing to (41.4%) followed by *S. aureus* in 63 cases (30.7%), *Proteus mirabilis* in 19 cases (9.4%), *Escherichia coli* in 15 cases(7.4%), *Klebsiella* in 12 cases (5.8%), *Streptococcus* in 6 cases (2.9%) and *Pneumococci* in 5 cases (2.9%). The similar findings with *Pseudomonas* was reported by Gulati et al in 1969, Kulkarni et al and Taneja et al.^{19,21,22}

Pseudomonas aeruginosa and *Staphylococcus aureus* are most commonly reported organisms. *Pseudomonas aeruginosa* is the predominant organism because it is infrequently found in the normal ear and rarely initiates acute infection. It is ubiquitous in our physical environment and has a predilection for moist areas. It is most common nosocomial infection.¹¹

Antibiotic sensitivity of *Pseudomonas aeruginosa* isolated from Chronic Suppurative Otitis Media specimens in our study revealed that they were sensitive to Piperacillin, Amikacin, Gentamicin, Cefoperazone, Polymyxin B and Vancomycin. Study of Mansoor et al showed, *Pseudomonas* was sensitive to Amikacin, Cefoparazone and Ciprofloxacin.²⁰

S. aureus were sensitive to Ampicillin,, Piperacillin, Amikacin Linezolid, Vancomycin and Cefoperazone. Kumar et al study revealed that *S. aureus* was sensitive to Amikacin and Linezolid; and resistant to Piperacillin.¹³

In *Proteus* infection Gentamycin is only 85.5% effective in our study whereas previous studies Zaida et al showed Gentamycin being the drug of choice.²³ *Klebsiella* spp. were sensitive to Ciprofloxacin in our study. *Escherichia coli* were sensitive to Amikacin, Ciprofloxacin and Piperacillin. Study of Iqbal et al showed that *Escherichia coli* were resistant to Ciprofloxacin.¹⁰

CONCLUSION

Chronic otitis media is more prevalent in males than females. Commonest organisms found were *Pseudomonas aeruginosa* followed by *S. aureus*. Piperacillin Amikacin and Cefoperazone, Gentamicin, Vancomycin, Polymyxin B were found most effective agents against *Pseudomonas aeruginosa*. The important factor responsible for development of resistance is delay in treatment taking, inappropriate duration of treatment and dose of antibiotics. As there is an increasing resistance to antibiotics, poor socio-economic status and increased cost of treatment, prevention is better. Some suggestions include, appropriate use of antibiotics by selection, dosage and duration, public awareness for personal hygiene and environmental cleanliness, pus culture examination before starting antibiotic therapy. Continuous evolution of antibiotic sensitivity helps in proper treatment and decrease rate of complication.

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