Bacteriological study and antibiotic resistance profile in patients with ear discharge visiting ENT OPD

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Abstract

Background: Chronic suppurative otitis media is persistent inflammation of the middle ear or mastoid cavity. Synonyms include "chronic otitis media (without effusion)", chronic mastoiditis, and chronic tympanomastoiditis. Chronic suppurative otitis media is characterised by recurrent or persistent ear discharge (otorrhoea) over 2-6 weeks through a perforation of the tympanic membrane. Typical findings may also include thickened granular middle ear mucosa, mucosal polyps, and cholesteatoma within the middle ear. Variety of organisms founds 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.

Objectives: (1) To isolate bacteria from patients with ear discharge (2) To find out antibiotic resistance of isolated organisms.

Materials and 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 May 2017 to October 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 twenty eight (64%) of the patients were males. Ciprofloxacin, Amoxicillin- clavunic acid, Levofloxacin, Cefadroxyl, Cefixime shows resistance to it.

Conclusion: Chronic otitis media is more prevalent in males than females. Commonest organisms found were Pseudomonas aeruginosa followed by staphylococcus aureus. Commonly prescribed drugs Ciprofloxacin, Amoxicillin- clavunic acid, Levofloxacin, Cefadroxyl, Cefixime shows resistance to most of the organisms.

Keywords: Chronic Suppurative Otitis media, Ear discharge, Resistance.

Introduction

Chronic suppurative otitis media is persistent inflammation of the middle ear or mastoid cavity. Synonyms include "chronic otitis media (without effusion)", chronic mastoiditis, and chronic tympanomastoiditis. Chronic suppurative otitis media is characterised by recurrent or persistent ear discharge (otorrhoea) over 2-6 weeks through a perforation of the tympanic membrane. Typical findings may also include thickened granular middle ear mucosa, mucosal polyps, and cholesteatoma within the middle ear.(1) 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.(4,5,6) 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, mastoditis, 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.

Materials and 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 May 2017 to October 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

- 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

- Conditions causing otorrhoea due to:

Trauma-Cerebrospinal fluid otorrhoea.
Acute otitis media
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 & sealed with cap & 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 & Culture

From the specimen, smear is made on a glass slide & 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 & 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: Ciprofloxacin, Levofloxacin, and Amoxicillin-Clavunic acid, Amikacin, Gentamycin, Cefixime, and Cefadroxyl. The antibiotic disc impregnated culture plates were incubated at 37' 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 128 (64 %) were males and 72 (36 %) were females. (Table -1)

Table 1: Sex wise distribution

Sex	No. of cases	Percentage (%)
Male	128	64%
Female	72	36%
Total	200	100

Out of 200 patients, in 179 (89.5%) patients organisms has been isolated and 21 (10.5) % patients no organisms found. (Table-2)

Table 2: No of organisms isolated.

Isolated	No. of cases	Percentage (%)
Single	143	89.5
No organisms	21	10.5

Out of 200 cases, Pseudomonas aeruginosa seen in 90 (45%) cases, Staphylococcus aureus in 60 (30%) cases, Proteus mirabilis in 20 (10 %) cases, Escherichia coli in 15(7.5%) cases, Klebsiella in 15 (7.5%) cases (Table-3).

Table-3: Types of organisms isolated.

Sr. no	Organisms Isolated	No .of cases	Percentage (%)
1	Pseudomonas aeruginosa	90	45
2	Staphylococcus aureus	60	30.
3	Proteus Mirabilis	20	10
4	Escheriachia.coli	15	7.5
5	Klebsiella species	15	7.5
8	No growth	21	10.5%

Pseudomonas aeruginosa, Staphylococcus aureus, Proteus mirabilis, Escheriachia coli, Klebsiella all organisms shows resistance to commonly prescribed drugs in opd basis from 95 to 75%. cases (Table-4).

Table 4: Bacteria isolated and their drug sensitivity

Sr. no	Organisms isolated	No. of cases	Antibiotic sensitivity	No. of cases	%
1	Pseudomonas aeruginosa	90	Ciprofloxacin	84	93.3
			Levofloxacin	80	88.8
			Augmentin	75	83.3
			Amikacin	65	72.2
			Cefadroxyl	65	72.2
			Cefixime	64	71.1
2	Staphylococcus aureus	60	Ciprofloxacin	58	96.7
			Levofloxacin	58	96.7
			Augmentin	49	81.6
			Amikacin	48	80

			Cefadroxyl	46	76.7
			Cefixime	45	75
3	Proteus species	20	Ciprofloxacin	20	100
			Levofloxacin	20	100
			Augmentin	19	95
			Cefadroxyl	18	90
			Cefixime	19	95
4	Escheriachia.coli	15	Augmentin	12	80
			Amikacin	12	80
			Cefadroxyl	11	73.3
			Cefixime	11	73.3
5	Klebsiella species	15	Ciprofloxacin	14	93.3
			Augmentin	12	80
			Amikacin	11	73.3

Discussion

In our study most of the patients belongs to male group 128 (64%) and females were 72(36%). Chronic Suppurative Otitis Media was more common in males compared to females. This study correlates with the study report of Iqbal et al[9] and Kumar et al.[11] Male predominance may be due to their occupational or environmental exposure.

Out of 200 patients,179 (89.5%) shows growth which was similar to,S Nkakhlagh et al[12] 82% and Vikas Khanna et al[13] 84%, no organisms in 21(10.5%) cases. Chakraborty et al found[14] (12.6%) of culture negative samples in their studies.

Out of 200 isolated bacteria cases, Pseudomonas aeruginosa is the most predominant organisms isolated in 90 patients contributing to (45%) followed by staphylococcus aureus in 60 cases (30%), Proteus mirabilis in 20 cases (10 %), Escherichia coli in 15 cases(7.5%), Klebsiella in 15 cases(7.5%).The similar findings with Pseudomonas was reported by Gulati et.al[15] in 1969 and Taneja et al[16].

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 most common nosocomial infection.[10]

Moreover, the signs and symptoms of earache may often mislead the etiology of the infection, which makes it very difficult for the clinician to relate the disease to the exact etiology. Hence, the physician may advocate antibiotic therapy irrespective of the etiology of the disease. This may lead to unwanted economic loss, stress to the patient if the ear infection is due to the virus or fungi, and foremost antibiotic resistance. For these reasons, it is very important to study the microbiological profiles of ear infection and their extent of antibiotic resistance for the proper management of patients with ear infections. Moreover, antibiotic resistance is a growing global problem listed among major threats to human health by the World Health Organization.[17]

Currently, the flow of patients to ENT clinic and the prescription for ear infection are rapidly increasing day by day. The knowledge of the bacteriology of an ear infection and the laboratory susceptibility testing of micro-organism implicated could make drug selection in antimicrobial chemotherapy more rational and easier. Therefore, this study tried to understand antibacterial susceptibility and resistance pattern of the commonly isolated bacteria from ear infection. Base on the Table 4 , the overall resistance profile of antibacterial agent was, Ciprofloxacin, Amoxicillin- clavunic acid, Levofloxacin, Cefadroxyl, Cefixime, Amikacin and Gentamycin . These results were almost comparable with previous study done in Dessie.[18]

All the isolated bacteria showed maximum resistance to Penicillin G and Ampicillin, Ciprofloxacin ,Levofloxacin, Gentamicin. Similar high resistant rates to these antibiotics have also been reported by Loy et al, Bairy et al and Ballal et al.[19,20,21] Among the Pseudomonas aeruginosa isolates, maximum resistance was found to Ciprofloxacin (93.3%) while is in Burdwan in 2007 shows it was (53.4%) and study by Prakash et al who reported 100% resistance to Ceftazidime. Most of organisms shows resistance to commonly prescribed antibiotics like Jang et al shows resistance of pseudomonas to ciprofloxacin.[22]

The probable reasons for this variation could be attributed to antimicrobial resistance profile of bacteria varies among population because of difference in geography, local antimicrobial prescribing practices and prevalence of resistant bacterial strains.

Concerning about antibiotics, present study was indicated that almost all isolated bacteria were resistant to one and more drugs. This high rate of multidrug resistance could be attributed to misuse of drugs.[18]

Conclusion

Chronic otitis media is more prevalent in males than females. Commonest organisms found were Pseudomonas aeruginosa followed by staphylococcus aureus. All isolated organism's shows resistance to commonly prescribed antibiotics in opd basis. 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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Conflict of interest: We declare that there are no conflicts of interest.

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