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Bacterial Isolates of Ear Dicahrge from Patients with Csom after an Empirical Treatment.

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Abstract

Background: *Chronic suppurative otitis media (CSOM) is one of the common infective conditions which can cause many complications if not treated properly. Improper use of antibiotic among the common population has led to many drug resistant organisms, therefore it is necessary to study the antibiotic susceptibility pattern before treating the patient with CSOM. Aim of the study was to identify the bacterial isolates causing CSOM and to study their antibiotic susceptibility pattern after an empirical treatment.*

Materials and Methods*: This study was undertaken in a tertiary care center of Ahmedabad, Gujarat with an aim to study the bacterial flora and their sensitivity to a series of antibiotics in cases of CSOM with purulent discharge after an empirical treatment. These samples were sent to the microbiology laboratory for isolation of numerous bacteria and antibacterial sensitivity testing of those matching the inclusion criteria.*

Results*: In present study conducted from January 2020 till August 2020, we observed daily OPD patients were approx, around 150 out of which 25-30% patients had complaints of ear discharge (which is around 40-45), we excluded patient having otitis externa, acute otitis media, otomycotic discharge. We found approx. 1556 patients of CSOM having ear discharge, among these 1556 patients, 52 patients didn't give consent for the study so an empirical treatment was given to rest all of them, of which 240 patients had persistent ear discharge , their samples of ear discharge were collected and were subjected to microbiological testing after 2 days with hold of both oral and topical antibiotic , of which most predominant organism seen was Pseudomonas species, which was seen in 150 patients (69%) followed by Staphylococcus aureus (12%), Proteus mirablilis (7%).*

Conclusion*: A continuous and periodic evaluation of microbiological pattern and their antibiotic sensitivity pattern prevalent in local area, helps in prescribe proper antibiotics for successful treatment of CSOM and thus minimizing its complications and emergence of resistant strains.*

Key words*: Ear discharge , chronic suppurative otitis media , antibiotic sensitivity, empirical treatment.*

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I. Introduction

Chronic suppurative otitis media (CSOM) is a chronic inflammation of the mucoperiosteal layer of the middle ear cleft which leads to chronic ear discharge and hearing impairment that may have a serious long term effect on language, auditory and cognitive development and on educational progress.[1]

It is known for its recurrence and persistent infection and is one of the common causes of deafness and permanent perforation of tympanic membrane.[2]

The disease usually occurs after upper respiratory viral infections followed by invasion by pyogenic organisms.[3]

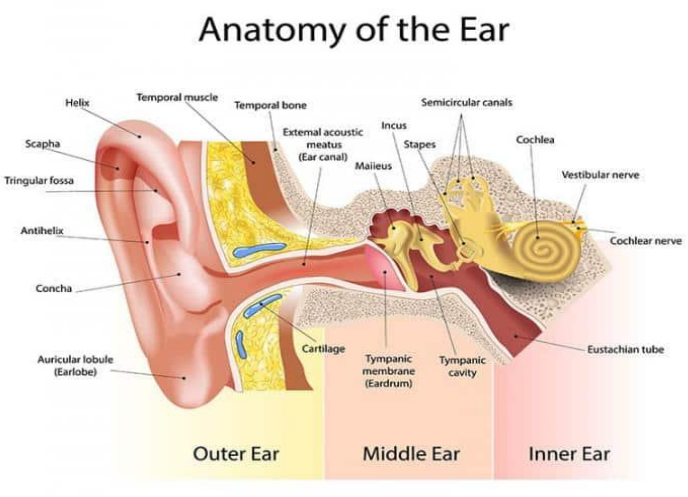
Active chronic otitis media is a chronic inflammation of the mucoperiosteum of the middle ear cleft, with episodes of recurrent ear discharge for more than 3 to 6 weeks, through a permanent perforation of the tympanic membrane.[4] The incidence of CSOM depends on race and socio-economic factors based on poor living conditions like overcrowding, poor hygiene and nutrition. CSOM needs considerable attention, not only because of its high incidence and chronicity, but also because of issues such as bacterial resistance and ototoxicity with misuse of topical and systemic antibiotics.[5]

The widespread indiscriminate, haphazard use of antibiotics and poor follow up of patients has precipitated the emergence of many resistant strains of bacteria which can produce both primary and post-operative infections. Changes in the microbiological flora following the advent of sophisticated synthetic antibiotics increases the relevance of reappraisal of the modern day flora in CSOM. Antibiotic pattern in vitro is very important for the clinician to plan a general outline of treatment for a patient with a chronically discharging ear.[6]

The present study was undertaken to study the microbial flora of CSOM and the sensitivity pattern of the causative organism after an empirical treatment. This can be used as a guideline in prescribing the

appropriate antibiotics, there by controlling the infection which forms the primary step in the management of chronic suppurative otitis media.

Anatomy of the ear:
A brief to the anatomical orientation of ear in schematic form.



II. Materials And Methods

The study was carried out in a tertiary care center of Ahmedabad, Gujarat, on the outpatient department basis, visiting the Department of ENT in L.G General Hospital and were subjected to testing in Department of Microbiology AMC MET Medical college, Maninagar, Ahmedabad, Gujarat India.

The study group included 240 patients, both male and female were included in the study.

In present study conducted from January 2020 till August 2020, we observed daily OPD patients were approx, around 150 out of which 25-30% patients had complaints of ear discharge (which is around 40-45), we excluded patient having otitis externa, acute otitis media, otomycotic discharge. We found approx. 1556 patients of CSOM having ear discharge, among these 1556 patients 52 patients didn't give consent for the study. So an empirical treatment was given to rest all of them.

EMPIRICAL TREATMENT for a period of seven days:

1. **ORAL ANTIBIOTIC- TAB. AMOXICILLIN-CLAVULANIC ACID (625mg)**
2. **AN ORAL DECONGESTANT (**chlorpehniramine maleate (4mg) + paracetamol (500mg) + phenylephrine (10mg)**)**
3. **TOPICAL PLAIN CIPROFLOXACIN EAR DROPS (0.3%w/v) (two drops thrice a day)**

After a 7 days of empirical treatment 240 patients had presented with persistent ear discharge, their **samples were collected 2 days after stopping both topical and oral antibiotic**, during the study period falling under the inclusion and exclusion criteria.

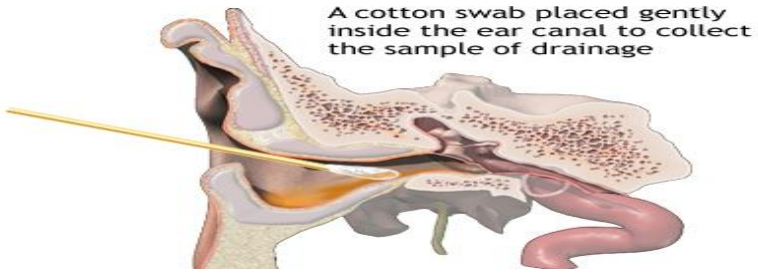
Inclusion criteria

- Patients presenting with chronic ear discharge for more than 6-12 weeks.
- Patients after receiving an empirical treatment for a week followed by stoppage of topical and oral antibiotics both for 2 days.
- Patients willing to participate in the study.

Exclusion criteria

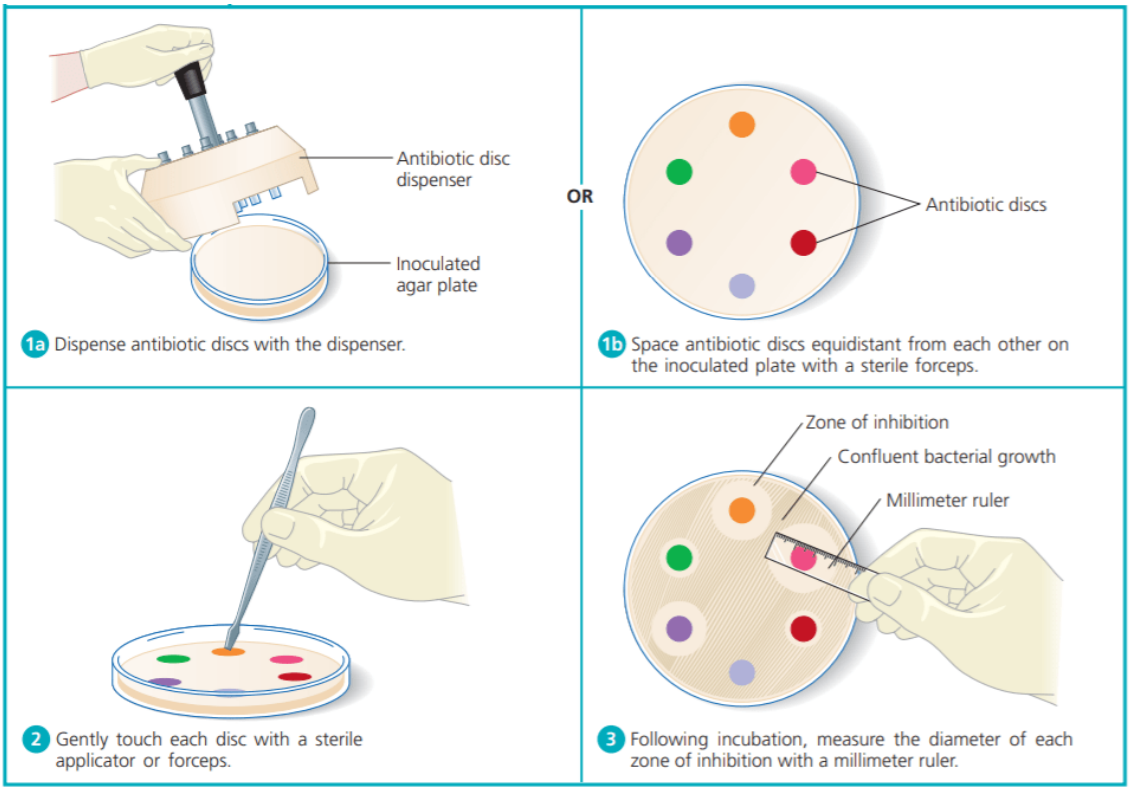
- Patients not willing to participate in the study.
- Patients with single and first episode of ear discharge.

A thorough complete clinical examination of ear, nose and throat was carried out.
Two swabs were collected from patients discharging ear, using sterile cotton wool swabs and ear speculum under aseptic precautions and sent for culture and sensitivity. All care was taken to avoid surface contamination with contents of external auditory canal (EAC).



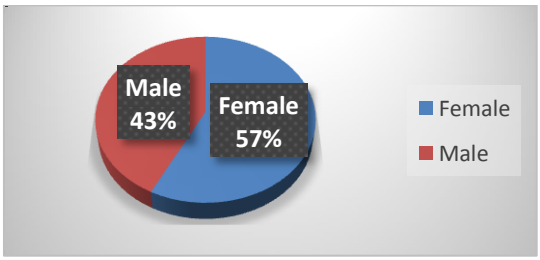
The first swab was used for direct Gram stain and the second swab was inoculated in blood agar and Mac-conkey agar plates and incubated at 37^0C for 24hrs.The conventional methods of bacterial identification involve examination of the culture characteristics, as well as biochemical and physiologic testing on pure cultures obtained from single colonies. Biochemical medium for identification of bacterial growth required are triple sugar iron, citrate agar slant, urea slant, phenylalanine slant, tryptophan broth, glucose phosphate broth.

Antibiotic susceptibility testing of the organisms diagnosed was done by Kirby Bauer disk diffusion method (Donald C. Sockett DVM) in Muller Hinton agar. The plates were read after overnight incubation at 37^0C by measuring the zone of inhibition around the antibiotic discs and reference tables were used to determine if the bacteria are sensitive (S), intermediate (I) or resistant (R) to the antimicrobial drugs as per CLSI (Clinical Laboratory Standards Institute) guidelines.



III. Results

A total of 240 patients were included in the study, comprising of 102 males and 138 females



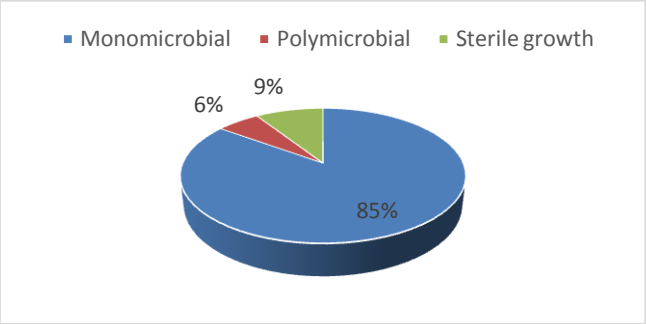
The mean age of the patients was 17.38 years, with the peak age group between 20 and 30 years. One-hundred seventy (70.83%) patients had unilateral disease, while 66 (27.5%) patients had bilateral disease.

Table 1: Age and sex distribution in 240 patients of CSOM

Age group (years)	Males	Females	Unilateral	Bilateral	Total number	Percentage
0-10	12	[18]	14	16	30	12.5
11-20	10	15	18	7	25	10.4
21-30	38	53	69	22	91	37.9
31-40	32	40	54	18	72	30
>40	10	12	19	3	22	9.1
Total	102	138	174	66	240	

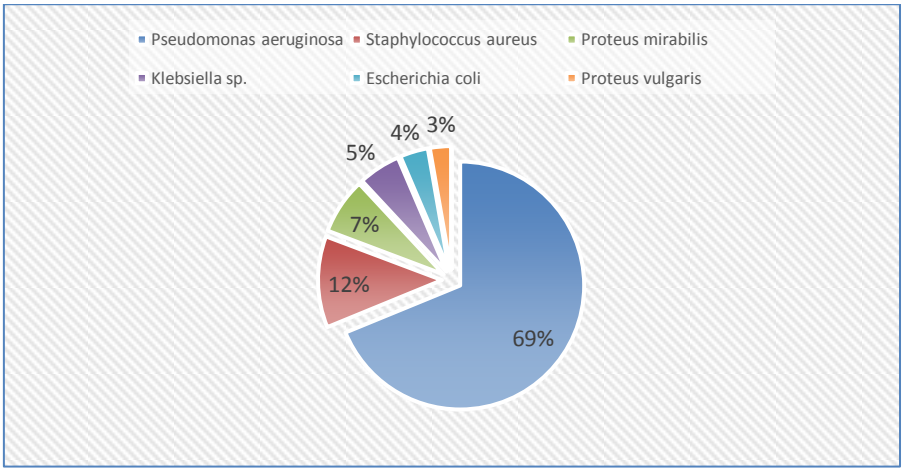
Microbial status

Among the **240** samples, **218** were **culture positive** and **22** samples were **sterile. 204** samples were **monomicrobial** and **14** samples showed **polymicrobial** growth.



Organisms isolated from aural discharge

In our study, **Pseudomonas** species was the most common isolated bacteria, seen in **69%** of isolates followed by the **Staphylococcus aureus** in **12%** of isolates, followed by **Proteus mirablis** in **7%** .



Antibiotic sensitivity patterns

The antibiogram of CSOM cultures showed that **Meropenem** has the **highest sensitivity** to all the bacterial isolates whereas **ciprofloxacin, levofloxacin, ofloxacin** and showed **least sensitivity** to Pseudomonas Sp., Staphylococcus aureus, Escherichia coli.

Pseudomonas aeruginosa showed sensitivity of **100% (Polymyxin B)**, 98.7% (Meropenem), 94.7% (Cefoperazone), 90.6% (PiperacillinTazobactam), and 56% (Ciprofloxacin, Levofloxacin, Ofloxacin)

S. aureus showed a sensitivity of **92.3% to Meropenem**, 88.5% PiperacillinTazobactam followed by 84.6% for Cefoperazone.

Proteus mirabilis showed a **100% sensitivity to Meropenem, Piperacillin-Tazobactam, and Cefoperazone**, 87.5% sensitivity Ciprofloxacin, Levofloxacin, Ofloxacin and Gentamicin, and showed **complete resistance to Polymyxin B.**

IV. Discussion

Due to changing pattern of bacteriological profile of otitis media and sensitivity of microorganisms towards antibiotics, it has become very imperative to find out the organism causing the disease.

When ear swabs taken from these ears were cultured using standard microbiological techniques, 94.28% of these ears showed growth after 72 h. Majority of the patients in this group showed monomicrobial growth (85%). Pseudomonas was the most common microbe isolated (69 %). Similar conclusion was also drawn by other studies[7,8] Sharma et al.[9] reported that aural swabs collected from patients of CSOM showed Pseudomonas in 36% cases, followed by S. aureus in 30% of cases. Similar conclusion was drawn by Indudharan et al.[10] who found Pseudomonas as the most common organism in CSOM.

22 patients showed sterile growth. Possible causes for sterile culture reports are as follows:

a. Faulty technique of swab collection.
b. Insufficient quantity of ear discharge for analysis.
c. Broken or damaged container.
d. Contamination
e. Temperature chain not maintained.
f. Insufficient incubation period.
g. Collection of swab after antibiotic treatment.

Microorganism	Cases	Cipr (%)	Levo (%)	Oflx (%)	Genta (%)	PolyB (%)	Mero (%)	Tpz (%)	Cefo (%)
Pseudomonas Sp.	150	84 (56)	84 (56)	84 (56)	84 (56)	150 (100)	148 (98.7)	138 (90.6)	142 (94.7)
Staphylococcus aureus	26	7 (26.9)	7 (26.9)	7 (26.9)	7 (26.9)	0 (0)	24 (92.3)	23 (88.5)	22 (84.6)
Proteus mirabilis	16	14 (87.5)	14 (87.5)	14 (87.5)	14 (87.5)	0 (0)	16 (100)	16 (100)	16 (100)
Klebsiella Sp.	12	12 (100)	12 (100)	12 (100)	12 (100)	12 (100)	12 (100)	12 (100)	12 (100)
Escherichia coli	8	2 (25)	4 (50)	2 (25)	8 (100)	8 (100)	8 (100)	8 (100)	2 (25)
Proteus vulgaris	6	6 (100)	6 (100)	6 (100)	6 (100)	0 (0)	6 (100)	6 (100)	6 (100)

cipro: ciprofloxacin, levo: levofloxacin, oflx: ofloxacin, genta: gentamicin, polyB: polymyxin B, mero: meropenem, tpz: piperacillin-tazobactum, cefo: cefoperazone.

Goyal et al.[11] in 250 cases found Pseudomonas as the most common organism, followed by S. aureus, while Kuchhal[12] studied 75 subjects and found Staphylococcus in the maximum number of cases, followed by Pseudomonas. Taneja Mansi et al. and Taneja had reported S. aureus (33.3% and 30.71%, respectively) as the most common organism, which was most sensitive to clindamycin,[13,14] while in a recent study, Malkappa et al. have shown the incidence of S. aureus as 22.2% and Pseudomonas aeruginosa as 45.2%.[15]

S. aureus was the second most common microbe isolated in these cases with CSOM. Similar conclusion was also drawn by Fairbanks[7] which reported Staphylococcus as the second most common cause.

In the present study, Polymyxin B showed a high rate of activity against Pseudomonas aeruginosa, Klebsiella, and Escherichia coli with a sensitivity 100%and completely resistant towards Proteus Sp., followed by Piperacillin-tazobactum and Meropenem which showed a high rate of activity against Proteus mirabilis, Klebsiella Sp., Escherichia coli, Proteus vulgaris with a sensitivity index of 100% and a 90.6%, 98.7%, respectively for Pseudomonas Sp. And an emerging decreased sensitivity of fluroquinolones as per shown in the table.

In contrast, Chandersekhar et al reported that in case of Pseudomonas sensitivity to ceftazidime (100%), ciprofloxacin (98.8%) and amikacin (97%).[16] In Vishwanath et al study reported that the tobramycin was the most effective (83.8%), followed by gentamicin (78.1%), ciprofloxacin (75.6%) and neomycin (3.5%).[17]

Our study results were also compared to the A Panchasara et al[(18)]study , which showed similar results after topical antibiotic-steroid combination ear drops , post topical drops swab also showed pseudomonas as the most common organism.

V. Conclusion

Most of the cases may respond to empirical antibiotic therapy. In cases with severe symptoms and the ones refractory to empirical treatment, a culture from ear canal will not be a tax on patient. This helps in giving a better understanding about the disease, causative organisms and helps in avoiding the use of inappropriate antibiotics that usually result in developing resistant strains of bacteria.[19]

It is important to know what type of bacteria is taking part in event of suppuration so that appropriate antibiotics may be instituted early and effectively to prevent complications. Chronic otitis media is generally of long duration with repeated active inflammation. Repeated empirical prescription of antibiotics over a long period of time can induce multidrug-resistant strains.

In conclusion, Pseudomonas species and Staphylococcus aureus were found to be the common cause of persistent cases of CSOM. These organisms are found to be more susceptible to higher antibiotics like piperacillin/tazobactam and meropenem and they were less susceptible to the routinely used drugs like fluroquinolones and cephalosporins.

Also, the resistance pattern of the microorganisms usually keeps changing. Hence, routine use of topical antibiotics for any case of CSOM as empirical therapy must be reviewed and judicial use of antibiotics is recommended. Appropriate antimicrobial drugs should be prescribed after proper diagnosis of the causative organism and its antimicrobial susceptibility pattern in persistent CSOM cases. The patients should also be advised to take the drugs for the complete prescribed duration. This will not only help in minimising the complications, but also help in preventing the emergence of resistant strains.

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