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# BACTERIOLOGICAL PROFILE OF CHRONIC SUPPURATIVE OTITIS MEDIA IN A RURAL TERTIARY CARE HOSPITAL

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**Ear Nose Throat**

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**Abstract:**

**Background:** Chronic Suppurative Otitis Media is a major Health problem in developing countries. The widespread use of antibiotics has precipitated the emergence of multiple resistant strains of bacteria which can produce primary and post operative infections. Information regarding the common pathogens and their antibiotic sensitivities is essential for the proper choice of antibiotics.

**Objectives:** To study the bacteriological profile of microorganisms found in ear discharge of patients with chronic suppurative otitis media (CSOM).

**Materials and methods:** This was a descriptive cross sectional study carried out in Department of ENT in collaboration with department of Microbiology, of PRH, Loni. Total 120 Patients of Chronic Suppurative Otitis Media of both genders belonging to any age group presenting with unilateral or bilateral ear discharge of more than 3 months were included for the study. Each ear swab of all 120 CSOM patients was evaluated for the type of microorganism, bacterial isolate, the culture and antibiotic sensitivity pattern.

**Results:** 106 bacterial (88.40%) and 4 fungal isolates (6.70%) were found from 120 samples. Out of all the ear swab samples 81.70% were monobacterial isolates and 6.70% were polybacterial responsible for mixed infections. Pseudomonas aeruginosa (34.20%) and Staphylococcus aureus (32.50%) were the predominant isolates. Followed by Klebsiella, Diptheroids , Ecoli, Proteus.

**Conclusion:** The study suggests that the common etiological agents for chronic suppurative Otitis Media were Pseudomonas aeruginosa and Staphylococcus aureus.

**Keywords:** Bacteriological Profile, Chronic Suppurative Otitis Media, Rural Tertiary Care Hospital

## Introduction

Chronic suppurative otitis media (CSOM) is a chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent otorrhea through a tympanic perforation. It is a massive public health problem, and India is one of the countries with highest CSOM prevalence where urgent attention is needed (WHO, 2004). It is a common cause of hearing impairment and can occasionally lead to fatal intracranial infections.[1,2]

CSOM is a disease of multiple etiologies and is well known for its persistence and recurrence in spite of treatment.[3] CSOM produces mild to moderate conductive hearing loss, in more than 50% of cases. Today majority of otogenic complications like facial palsy, intracranial and extracranial abscess and meningitis are a result of CSOM, the characteristic of bacteriology is mainly pseudomonas

aeruginosa along with bacillus proteus and E coli as shown by earlier studies.[2,3,4] Others include Proteus, E. coli, Klebsiella, Enterobacter, Nonfermenting gram negative bacteria and beta hemolytic Streptococcus.[5,6] The basic principles of medical management of CSOM are aural hygiene and the use of topical antimicrobial in many cases of CSOM the antibiotics are prescribed indiscriminately. The consequences are treatment failure, the emergence of resistant strains of organisms, superinfection, intracranial and extracranial complications and lengthening the treatment costs and suffering. This indiscriminate and haphazard use of antibiotic and poor follow-up of these patients has resulted in the persistence of low grade infections.[5] The untreated cases of CSOM can result in a broad range of complications, which ranges from persistent otorrhoea, mastoiditis, labyrinthitis, facial nerve palsy to more serious intra-cranial abscess or thrombosis. Early diagnosis and treatment is hence necessary to avoid such complications.[7] Topical antibiotic treatment is often effective and seldom harmful; most experts would start with a wide-spectrum antibiotic on an empiric basis and make a request for cultures if drug resistance is suspected.[8] So, knowledge of the local pattern of infection is essential to enable efficacious treatment of this disorder. Hence this study is carried out to know the bacterial etiology of CSOM and their antibiotic susceptibility pattern in a rural tertiary care hospital. This knowledge is very important for the clinicians for appropriate management of the cases and to prevent or minimize the occurrence of complications. Treatment of the cases after studying the antimicrobial susceptibility pattern will help in preventing the emergence of resistant strains in the community.[9]

## Aims and Objectives

To study the bacteriological profile of microorganisms found in ear discharge of patients with chronic suppurative otitis media (CSOM)

## Methodology

This was a descriptive, cross sectional study done in department of ENT in collaboration with the Department of Microbiology, at Pravara Rural Hospital, Loni over a period of 2 years. Total 120 Patients of Chronic Suppurative Otitis Media coming to the ENT OPD or admitted in the wards were enrolled for the study during the study period. Patients satisfying the following eligibility criteria were selected for the study.

In this study the patients of Chronic Suppurative Otitis Media of both genders belonging to any age group presenting with unilateral or bilateral ear discharge of more than 3 months will be selected on OPD and IPD basis; the patients willing to give informed written consent; patients of either sex and the patients of any age were included.

And the patients having active Ear discharge of less than 3 months(ASOM), Ear discharge with Intact tympanic membrane (Otitis externa), patients with cholesteatoma on clinical examination, confirmed with radiological examination (X-ray Mastoid Bilateral Schullers View); patients with intra-cranial or extracranial complications (petrositis, facial paralysis, meningitis, abscess); patients receiving prior Antibiotics(local or systemic) at presentation; patients with serious medical conditions such as immunodeficiency states, malignancy or blood dyscrasia and the patients who are not willing to participate in study were excluded.

## Study conduct

A diagnosis of CSOM was made using WHO Definition (2004):

- A history of chronic purulent ear discharge (>3 months)
- Tympanic membrane perforation, verified with otoscopic examination. Removal of cerumen and cleaning of ear discharge were done to adequately visualize the character of the discharge, tympanic membrane perforation and the status of the middle ear (polypoid, thickened, eroded).
- The evaluation and diagnosis was exclusively made before inclusion of the patient.

## Specimen / Sample Collection

Aseptic microsurgical techniques were observed in collection of specimens. Each tympanic membrane was adequately visualized. Sterile cotton pledges soaked in povidone-iodine (betadine) was swabbed 3 times around

the external auditory canal. A sterile cotton swab soaked in 70% ethyl alcohol was likewise applied thrice around EAC.A sterile, dry cotton micro cotton swab was applied to the fluid draining from the tympanic membrane with sterile ear speculum avoiding contact with the external auditory canal walls. Each specimen bottle was labeled with the patients name and ear laterality and submitted for direct culture aerobes and sensitivity studies at the Dept.Of Microbiology within 15mins of collection.[10]

## Direct smear examination

With one swab a thin smear is made on a clean glass slide and is fixed with 95% methanol, by pouring one or two drops on the smear and allowed to act for a minimum of 2 minutes or until the methanol dries on the smear. Gram staining is done for the smears so made and is examined under oil immersion objective to note the various morphological types of bacteria, their number, Gram reaction, presence or absence of inflammatory cells and also to note the numbers of squamous epithelial cells in the sample.[11]

## Cultures used for the specimens

Direct culture material was seeded on Blood agar, Mac Conkey's agar and on Chocolate agar plates. All plates were incubated aerobically at 370C and evaluated at 24 hours, 48 hours and 72 hours and the plates were discarded if there was no growth. The specific identification of bacterial pathogens was done based on microscopic morphology, staining characteristics, cultural and biochemical properties using standard laboratory.[3,11]

## The following parameters were recorded

I. **Demographic Profile**
II. **Type of CSOM : Mucosal , Squamous**
III. **Type of microorganism :**
a. Bacterial isolates
b. Fungi
c. Sterile, if any
IV. **Bacterial profile :**
a. Type of bacterial growth : Monobacterial, Polybacterial
b. Type of bacteria : Gram positive , Gram negative
c. Bacterial strains

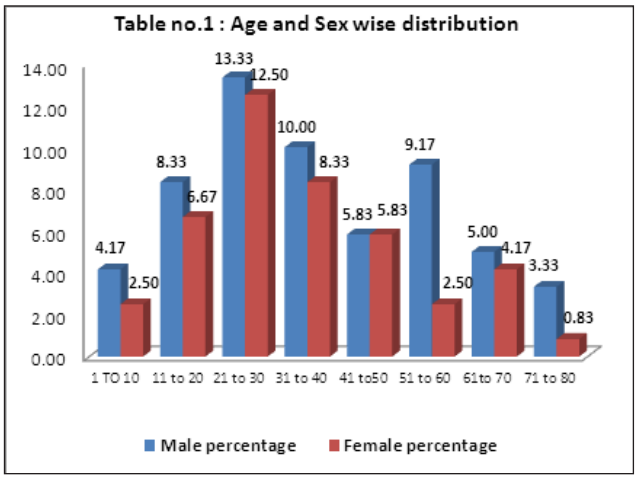
**Sample size:** Specimens / Ear swabs of 120 patients of CSOM

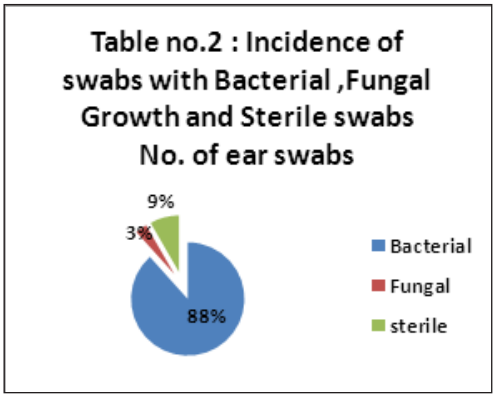
**Study duration:** 2years

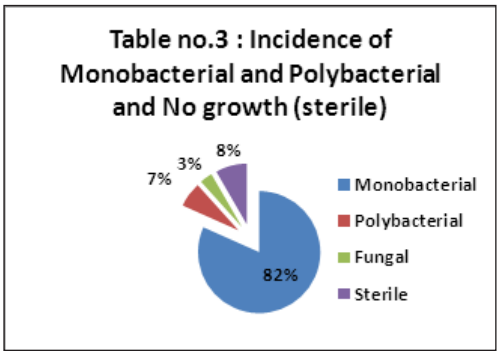
## Ethical Consideration

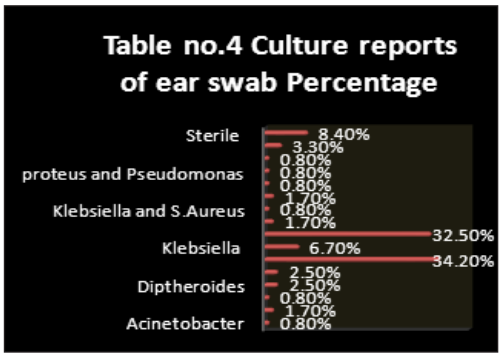
Approval from IEC (Institutional Ethical Committee) was duly taken and study was done after ethical clearance. Waiver for consent form was received from Ethical council.

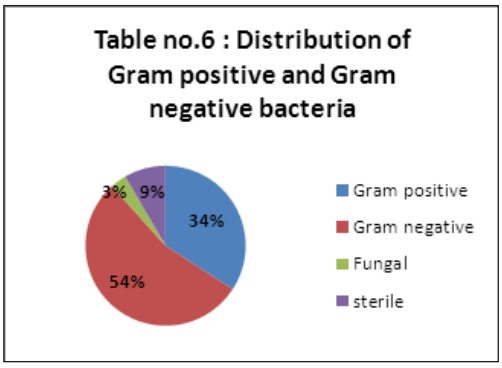
## Results






## Discussion

Clinical recognition of neonatal sepsis is not always straight-forward. Appropriate intervention requires an early etiological diagnosis. For effective management of neonatal sepsis cases, study of the bacteriological profile with their antibiotic sensitivity pattern plays an important role. Several studies on neonatal sepsis have documented the diversity of bacteria and their temporal variability. The present study reiterates the earlier findings and emphasizes the importance of periodic surveys of microbial flora encountered in particular neonatal settings to recognize the trend. In this study, the culture positivity was 17.23% of both blood and CSF samples. The culture positivity of the blood samples were 23.3% and the CSF samples were 5.99% .Similar blood culture positivity of around 24.88% was reported by Mathur et al in their study.[5] But a significantly higher blood culture positivity rate of 42% was reported by Ghanshyam et al in their study in a tertiary care hospital in India[6] and a lower blood culture positivity rate of 13.7% was reported by Kaistha et al in their study.[7] The CSF culture positivity rates in the study by Katiyar et al was 2.06% which is lower than the findings in our study.[8]

The low culture isolation rate in this study might be due to several reasons like administration of antibiotics before blood or CSF collection either to the mother or to the infant. Also the possibility of infection with anaerobes cannot be ruled out .Negative culture does not exclude sepsis as cases with negative blood culture have been reported with fatal illness and post-mortem evidence of infection .Chow et al reported that 26% of all neonatal septicemia was caused by anaerobes.[4]

Early onset sepsis was found in majority of the confirmed cases rather than late onset sepsis .The percentage of EOS in this study was found to be 92.54% with Klebsiella, CONS, Pseudomonas and Staph. aureus being the predominant pathogens causing EOS. The LOS was reported in 7.45% cases, with CONS, Klebsiella and Staph. aureus causing the LOS. Higher culture positivity rates in LOS were reported by P. Jyothi et al (25.2%) and Kaistha et al (14.18%) which differs from this study.[9] All the other studies reported higher culture positive rates in EOS except in a study by Ahmed et al in Bangladesh which reported the positivity rates of EOS as low as 26% .They reported that the higher mortality rates in early onset cases to be the reason for this discrepancy.[10]

In this study, Gram negative organisms were isolated in about 59.32% of the cases with Klebsiella (48.57%) and Pseudomonas (26.85%) being the predominant ones among the gram negative organisms. Similar findings was reported by Ghanshyam et al with 60% gram negative isolates with Klebsiella as the predominant gram negative isolate.[6] Comparatively a higher incidence of gram negative isolates was found in the study of Mathur et al (87.1%).[5]

In this study gram Positive were isolated in 40.67% cases with CONS and Staph. aureus being the predominant pathogen. In the study by P. Jyothi et al, they also found CONS to the predominant Gram positive organism[9] but majority of the other studies reported Staph. aureus to be the predominant Gram positive organism over CONS.[6,7,11] Various studies have shown that in the last two decades, the isolation of Gram positive organisms has increased significantly.[7] But nevertheless the predominance of gram negative corroborates with the findings of other studies done in the Indian context. Many studies have shown the preponderance of gram negative organisms in tropical and developing countries also.[10,12]

Klebsiella was found to be the predominant pathogen causing neonatal sepsis which is in accord with many studies like that of Ghanshyam et al (33.8%), Zakariya et al (66%), Mathur et al (38.5%), Kaistha et al (28.3%)

and P. Jyothi et al (31%) which were done in India. Other studies from developing countries also found Klebsiella as the common organism. But studies done by Ahmed et al, Agnihotri et al and Bhat et al showed the predominant pathogen to be E. coli (30%), Staph. aureus (35.3%) and Pseudomonas (33.2%) respectively.

Group B Streptococcus (GBS) was not isolated in this study, unlike western, developed countries where it is the major agent of neonatal septicemia This may be attributed to low prevalence of GBS colonization of pregnant women in this area or possibly, to the presence of strains with low virulence.[10] Since a sizeable number of culture specimens were negative by aerobic culture , the possibility of infection by anaerobes must be entertained and anaerobic culture can be performed routinely in cases of neonatal sepsis.[6] However, the feasibility, logistics and cost-effectiveness of routine anaerobic culture for neonatal sepsis need to be explored further.

The antibiotic sensitivity testing showed that most of the gram negative isolates were sensitive to meropenem followed by chloramphenicol, ciprofloxacin, gentamicin and amikacin. They were not sensitive to the commonly used antibiotics like penicillin, ampicillin etc. The antibiotic sensitivity testing of the gram positive isolates showed that they were maximally sensitive to linezolid, netilmicin and vancomycin. This is comparable to the study done by P. Jyothi et al in which maximum sensitivity was observed in imipenem and linezolid.[9] Netilmicin and Amikacin was found to be highly sensitive in the study done by Agnihotri et al for Staph. aureus and gram negative isolatesrespectively.[13] While the study by Mathur et al showed Gentamicin to be sensitive in gram negative cases.[6] Many studies also reported cefotaxime to have shown maximum sensitivity[5] but it could not be compared as some of the samples from this study had not undergone the sensitivity testing for cefotaxime. Besides the antimicrobial sensitivity patterns differs in different studies as well as at different times in the same hospital. This is because of emergence of resistant strains as a result of indiscriminate use of antibiotics. Thus, Meropenem and Linezolid were found to the most sensitive drugs for gram negative and gram positive respectively, but these two drugs should not be used indiscriminately and kept as reserve drugs, otherwise resistance to these drugs may develop, thereby threatening the treatment.

Therefore, to conclude, an effective infection control programme which will among others ensure good and effective hand washing, regular antibiotic susceptibility surveillance and evaluation, and the enforcement and periodic review of the antibiotic policy of the hospital as well as the encouragement of rational antibiotic use will reduce the rates of acquiring neonatal infections and development of bacterial resistance.

## Conclusion

In this study the culture positivity was found to be 17.23% with 259 (23.31%) positive for bacterial growth out of 1111 blood culture samples and 36 (5.99%) positive for bacterial growth out of 601 C.S.F culture samples.

Klebsiella was found to be the most common agent causing the neonatal sepsis followed by CONS, Pseudomonas, Staph. aureus and E.coli. Gram Negative sepsis (59.32%) predominated in this study. The predominant gram negative organism isolated were Klebsiella and Pseudomonas followed by Acinetobacter and E. coli. The predominant organisms isolated among the gram positive were CONS and Staph.aureus. Early onset sepsis was found to be the major burden of neonatal sepsis in the rural setting.

Meropenem and Linezolid were found to the most sensitive drugs for gram negative and gram positive respectively .A low susceptibility to commonly used antibiotics like ampicillin is a cause of concern. Hence the study shows the trend of increasing resistance to commonly used antibiotics .Thus there is need of periodic evaluations, as knowledge of the bacteriological profile of the etiologic agents would help to reduce the associated mortality in neonatal septicemia and the antibiotic sensitivity testing would help in implementation of a rational empirical treatment strategy.

## Acknowledgement

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## References

1. S. Vergnano, M Sharland et al Neonatal Sepsis : an international perspective, Arch Dis Child Fetal

Neonatal Ed 90 2005

2. Singh M : Perinatal and neonatal mortality in a hospital, Indian J. Med 1991

3. National Neonatal Perinatal Database (2005) Report for the year 2002-2003, Neonatal Neonatology Forum, India

4. Chow A W et al The significance of anaerobes in neonatal bacteremia : analysis of 23 cases and review of the literature Pediatrics 1974

5. M Mathur et al Bacteriological profile of neonatal septicemia cases (For the year 1990-91). J Postgrad Med 1994

6. G. D. Kumhar, V. G. Ramachandran & P. Gupta Bacteriological Analysis of blood culture isolates from neonates in a tertiary care hospital in India, J Health Popul Nutr, Dec 2002

7. Kaistha N et al Neonatal septicemia isolates and resistance patterns in a tertiary care hospital of north India, J Infect Dev Ctries 2010

8. Katiyar et al Bacteriological profile of neonatal septicemia in Pravara Rural hospital, Pravara Med review 2012

9. P Jyothi et al Bacteriological profile of neonatal septicemia and antibiotic susceptibility pattern of the isolates Journal of Natural Science Biology and Medicine Vol-4 (306-309) 2013

10. Ahmed et al Clinical and Bacteriological Profile of Neonatal septicemia in a tertiary level pediatric hospital in Bangladesh, Indian Pediatrics 2002

11. Zakariya BP et al Neonatal sepsis in a tertiary care hospital in South India: Bacteriological profile and antibiotic sensitivity pattern, Indian J Pediatr. 2011

12. Kenneth C. Iregbu et al Bacteriological profile of neonatal septicemia in a tertiary hospital in Nigeria, African Health Sciences Vol 6 Sept 2006

13. Agnihotri N et al Antimicrobial susceptibility of isolates from neonatal septicemia, Jpn J. Infect Dis 2004