

Bacterial Study of Chronic Suppurative Otitis Media (CSOM) in Tertiary Care Centre Saharsa, Bihar**Abhishek Anand¹, Surbhi Sindhu², Diwan Mahmood Khan³**¹Associate Professor, Department of Pathology, Lord Buddha Koshi Medical College and Hospital²Associate Professor, Department of Microbiology, Lord Buddha Koshi Medical College and Hospital³Associate Professor, Microbiology, Lord Buddha Koshi Medical College and Hospital

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Abstract

Otitis media is a major health problem and occurs with a high incidence and prevalence in both developed and developing countries. The hearing impairment produced by otitis media affects intellectual performances, behavior and intelligence. It is a disease of multiple etiology and is well known for its persistence and recurrence in spite of treatment. Considering the above facts, this study was undertaken to isolate bacteria (aerobes and anaerobes) in chronic suppurative otitis media and to study their sensitivity pattern for aerobic bacteria to help the clinician to treat the patient.

100 clinically diagnosed cases of CSOM samples were studied from July 2024 to June 2025 in the Department of Microbiology, Lord Buddha Koshi Medical College and Hospital, Baijnathpur, Saharsa, Bihar. Most cases were recorded during July to October (47%), i.e. monsoon season 68 (82%) were culture positive and 32 (18%) were culture negative. Incidence of monomicrobial etiology 75.6% was more common than the polymicrobial etiology 17%. Among the aerobic bacteria the most common bacteria were *Pseudomonas aeruginosa* 34.1% followed by *Staphylococcus aureus* 15.8%. The total anaerobic bacteria were 9.8%, the most common anaerobic bacteria are from *Bacteroid* species 4.8% followed by *Pepto streptococcus* 3.6%.

Keywords: Chronic suppurative otitis media, Gram Negative bacteria, Gram Positive bacteria, Antimicrobial resistance.

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Introduction

Otitis media is a major health problem and occurs with a high incidence and prevalence in both developed and developing countries. The inflammation often begins when infection that cause sore throat, cold or other respiratory or breathing problems spread to middle ear. It can be either suppurative or nonsuppurative. [1,4]

Acute otitis media (AOM) is a common childhood illness. An AOM episode, if not diagnosed promptly or is inadequately treated can lead to chronic suppurative otitis media (CSOM). [1,4]

Chronic otitis media (COM) is defined as a perforation of the tympanic membrane with persistent drainage of pus from the middle ear lasting at least two weeks. Chronic Suppurative Otitis Media is one of the most common childhood disease and according to WHO estimate affects 65 to 330 million people worldwide mainly in developing countries.

Majority of the patients neglect the disease because of its silent course. Illiteracy and low socio-

economic status add to the magnitude.[5,6] It is also capable of causing irreversible sequel and fatal intracranial complications such as facial nerve paralysis, lateral sinus thrombosis, labyrinthitis, meningitis and brain abscess. It affects intellectual performances. Psychosocial development often conflicting effect on expressive and receptive language, behavior and intelligence. Its incidence has increased due to the widespread use of tropical antibiotics, aural preparations.[7]

The indiscriminate and half-hearted use of antibiotics and poor follow up of the patients have resulted in infectional changes in the microbiology of the disease. Due to the development of beta lactamase producing microorganism, drug resistant strains emerge making a major cause of treatment failure in these patients.[8] For selection of appropriate antimicrobial agents, the knowledge of the pathogens and its antibiotics sensitivity pattern are important. Considering the above facts, this study was undertaken to isolate aerobes and anaerobes from samples in chronic suppurative

otitis media patients and study their sensitivity pattern of aerobic bacteria to help the clinician to treat the CSOM patients and empirically at the tertiary care center in Saharsa.

Material and Methods

A Cross-sectional study was conducted in 100 clinically diagnosed cases of CSOM samples from July 2024 to June 2025 in the Department of Microbiology Lord Buddha Koshi Medical College and Hospital, Bajinathpur, Saharsa, Bihar. Detailed clinical history regarding age, gender, duration of discharge from the ear and antibiotic therapy was taken and entered in excel chart. Patients of any age, both genders, unilateral or bilateral draining ears due to CSOM of more than two weeks (WHO-definition) was included in the study.

Inclusion Criteria

1. The patients diagnosed to have suffering from CSOM after through clinical evaluation by an ENT surgeon.
2. Patients who were not on any antibiotic treatment for minimum two weeks

Exclusion Criteria

1. Patients who had taken systemic antibiotics within two weeks.

Three sterile swabs which were procured from Hi-Media were used to collect discharge from patients diagnosed with CSOM. All care was taken to avoid surface contamination. Swabs were then transported to microbiology laboratory. First swab was used for gram staining. Second swab was for aerobic bacteriology. Third swab was used for anaerobic study.

Then 2nd swab was inoculated on Blood Agar, Chocolate Agar, and MacConkey Agar. These plates were kept at 37°C for 24-48 hours. Bacterial isolates were identified by their colony characteristics; morphology by gram's staining reaction and standard biochemical reaction. Antimicrobial susceptibility testing was performed for all the isolates with positive cultures according to Kirby-Bauer's disk diffusion method following Clinical Laboratory Standard (CLSI) Guideline 2023.[16] 3rd swab used for anaerobic culture was inoculated in Robertson's cooked meat (RCM)/Thioglycolate sulphate broth and incubated at 37°C for 7 days. If turbidity appear, sub-cultures was done from RCM on Blood agar in anaerobic jar. The jars was closed and incubated at 37°C for 72 hours and thereafter, the isolates from the culture plates were identified using Gram staining, colony morphology and anaerobic kit (ANAERO Test 23).

Results

Out of 100 CSOM cases 91 (91%) were of Tubo-tympanic that is safe type and 9 was of Attico-

antral (unsafe) type of CSOM. Among 100 cases 47 (47%) cases were observed during July to October, 28 (28%) cases were observed during November to February and 25 (25%) cases during March to June.

Among the aerobic bacteria the most common bacteria is *Pseudomonas aeruginosa* 28(34.1%) followed by *Staphylococcus aureus* 13(15.8%), 02 were MRSA and 05 were ESBL.

Among the anaerobic bacteria the most common bacteria is from *Bacteroid* species 04 (4.8%) followed by *Pepto streptococcus* 03 (3.6%).

Table 01 shows the total number of strains isolated were 82, of which 62 (75.6%) strains were mono microbial isolates, 14 (17.1%) strains were poly microbial isolates.

Table 02 shows the antibiotic susceptibility pattern of aerobic gram positive organism isolated from CSOM cases. Out of 15 isolates 100% were sensitivity to Amikacin, Azithromycin Linezolid and Vancomycin (100%) followed by Ciprofloxacin (86.7) and Ampicillin (86.7%). Penicillin is resistant in all cases of gram positive cocci.

Table 03 shows the antibiotic susceptibility pattern of aerobic gram negative bacilli isolated from CSOM case. Out of 59 gram negative isolate, Amikacin (96.6%), Ciprofloxacin (93.2%) and Imipenem (96.6%) is the most sensitive followed by Gentamycin (71.2%), Ceftazidime (69.5%) and Piperacillin/tazobactam (74.6%). Ampicillin sulbactam (44.1%) is the most resistant in all cases of gram negative bacilli.

Discussion

The prevalence rate of CSOM is higher in India. CSOM and an important cause of preventable hearing loss particularly in the developing world and a reason of serious concern. Early, microbiological diagnosis ensures prompt and effective treatment to avoid complication. CSOM cases were prevalent during monsoon season 47 (47%) cases and during winter season 28% cases in the present study. This finding correlated with Maji PK et al (2007) and Manche SK et al (2016). Increased incidences in monsoon season because of moist climate and accidental accumulation of rain water in middle ear. During winter season is mainly attributed to repeated upper respiratory tract infection (viral, bacterial). [11,12]

In the present study monomicrobial etiology was 55 (55%) and polymicrobial was 21 (21%). Our study is correlated with Hiremath SL et al studies. Availability and use of topical and systemic broad-spectrum antibiotics in the period before consultation was probably responsible for the lower incidence of mixed infection.[6]

In our study, *P. aeruginosa* (34.1%) was the most prevalent bacterial organism found in the middle ear with CSOM, which is similar to the Mohit Aggarwal et al and Asish J et al. *Pseudomonas* was the most prevalent organism and this could be due to the variation in micro-organisms in different regions and effect of climate. *Pseudomonas*, however is the predominant cause of CSOM in tropical region does not usually inhabit the upper respiratory tract, its presence in the middle ear cannot be ascribed to an invasion through eustachian tube and it should be considered as secondary invader gaining access to the middle ear via defect in tympanic membrane. [1,13]

This is followed by *S. aureus* (15.8%) as the second most common, which also corresponds to other studies in other centers. W. R. Gopichand et al, Swaroopani N. B. et al have found *Staphylococcus aureus* as the second most common organism causing CSOM. [14,3]

In our study among all bacterial isolate anaerobic bacteria responsible for CSOM are 9.7%. Among anaerobic most common are *Bacteroid* species (4.8%). Our finding was in contrast to B. Nagarajalet al and Maji P K et al. [15,11]

Growth of anaerobes shows that progression of infection from acute to chronic stage could have created anaerobiosis, which offered favorable microenvironment for the growth and proliferation of anaerobic pathogens. There was strong evidence that mixed aerobic, anaerobic cultures characterized chronic infection suggesting a potential synergy between anaerobic and aerobic bacteria. In the present study Amikacin, Azithromycin and Linezolid shown 100% sensitivity for gram positive cocci. Penicillin (0%) and Cotrimoxazole (46.7%) are the most resistant

drugs. Penicillin is the oldest antibiotic and its excessive overuse make it resistant for all gram positive cocci.

In this present study Amikacin, Imipenem, Piperacillin + Tazobactam shows maximum sensitivity for the gram negative bacilli. Our study is co relating with Arvind N et al and G. Jyothi Laksmi et al. No MBL was detected as all the *Pseudomonas* spp. isolated were mostly from OPD patient.

Conclusion

CSOM is the most common chronic infectious disease worldwide. There is an urgent need to focus research studies in the area of CSOM, which will open up avenues to design novel therapeutic against CSOM and hence prevent hearing loss. Topical antibiotics, which are the first- line therapy of choice, are limited only to those that are not potentially ototoxic.

This study concludes that the most common aerobic organism responsible for CSOM is *Pseudomonas aeruginosa* followed by *Staphylococcus aureus*. *Bacteroids* species are the causative organism of CSOM among anaerobes. Among 13 *Staphylococcus* species 02 were MRSA and among GNB 05 detected as ESBL producer. The most effective antibiotic is Amikacin and Azithromycin for both gram negative and gram positive organism.

With different groups of organisms as etiological agents predominantly as mixed infections and their varying resistance to different classes of antibiotics, studying the microbiological pattern of organisms and antibiotic sensitivity testing will contribute considerably to the diagnosis and management of these infections specially the MDR strains.

Table1: Shows the total number of organisms isolated in the present study

Organism	No. of Isolates (N= 82)	%
<i>Pseudomonas aeruginosa</i>	28	34.1
<i>Staphylococcus aureus</i>	13	15.8
<i>Proteus mirabilis</i>	06	7.3
<i>Klebsiella pneumoniae</i>	05	6.1
<i>Citrobacter freundii</i>	02	2.4
<i>Klebsiella oxytoca</i>	03	3.6
<i>Enterobacter aerogenes</i>	01	1.2
<i>Acinetobacter</i> spp	08	9.7
<i>Proteus vulgaris</i>	01	1.2
<i>Eschericia coli</i>	05	6.1
<i>Enterococcus faecalis</i>	02	2.4
<i>Peptostreptococcus</i>	03	3.6
<i>Bacteroides</i> species	04	4.8
<i>Atopobium parvulum</i>	01	1.2

Table 2: Antibiotics sensitivity pattern of Gram positive cocci

Antibiotics	Sensitivity (n= 15)	%
Penicilin	00	00.0

Ampicillin	13	86.7
Gentamycin	11	73.3
Tobramycin	09	60.0
Cotrimoxazole	07	46.7
Amikacin	15	100
Azithromycin	15	100
Ciprofloxacin	13	86.7
Cifoxitin	14	93.3
Vancomycin	15	100
Linezolid	15	100

Table 3: Antibiotics sensitivity pattern of Gram negative bacilli

Antibiotics	No of Sensitivity isolates (n= 59)	%
Ampicillin + Sulbactam	26	44.1
Piperacillin + Tazobactam	44	74.6
Imipenem	57	96.6
Cefotaxime	34	57.6
Cefoperazone	38	64.4
Ceftazidime	41	69.5
Amikacin	57	96.6
Gentamycin	42	71.2
Ofloxacin	32	54.2
Ciprofloxacin	32	54.2
Tetracyclin	30	50.8
Levofloxacin	40	67.7

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