ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 12 | December - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

CURRENT TRENDS OF MICROBIOLOGICAL FLORA IN CHRONIC OTITIS MEDIA

ENT

Dr. Anand Prakash (M.S.) Assistant Professor, Department of ENT & Head Neck Surgery, M.L.N. Medical College, Prayagraj, Uttar Pradesh, India

Dr. Shivendra Pratap Singh (M.S), Assistant Professor, Department of ENT & Head Neck Surgery, M.L.N. Medical College, Prayagraj, Uttar Pradesh, India

Dr. Sankalp Keshari (M.S), Assistant Professor, Department of ENT & Head Neck Surgery, M.L.N. Medical College, Prayagraj, Uttar Pradesh, India

Dr. Sachin Jain (M.S.), Professor and Head, Department of ENT & Head Neck Surgery, M.L.N. Medical, College, Prayagraj, Uttar Pradesh, India

Dr. Mohd Rizvan* (M.S.), Junior Resident, Department of ENT & Head Neck Surgery, M.L.N. Medical College, Prayagraj, Uttar Pradesh, India *Corresponding Author

ABSTRACT

Background:- Chronic otitis media (COM) is a chronic inflammation of the middle ear and mastoid cavity, which is manifested by repeated discharge from the ear through perforation of the eardrum. If left untreated, it can lead to serious complications like meningitis, brain abscess, facial paralysis and mastoiditis etc. **Objective:-** The present study was undertaken to identify the pattern of microorganisms causing chronic otitis media and to determine the antibiotic sensitivity pattern of the microorganisms prevalent in this area. **Method:-** The study included 125 clinically diagnosed cases of COM presented in our OPD. **Result:-** Out of 125 samples, 120 samples were culture positive. The most common organisms causing COM were Staphylococcus aureus, Peptococci, Peptostreptococci (gram positive anaerobes), and Micrococci. Levofloxacin, moxifloxacin, clarithromycin were the most effective antibiotics. **Conclusion:-** Knowledge of microbial patterns in our locality and patterns of their antibiotic sensitivity helps to use appropriate antibiotics. In this study, the most common anaerobes are Peptococci followed by Peptostreptococci.

KEYWORDS

Chronic otitis media, mastoiditis.

INTRODUCTION: -

Chronic Otitis Media is a chronic and long standing infection of the middle ear cleft being presented by aural discharge with variable degree of hearing loss. Sometimes the course of the disease is so aggresive that it may produce irreversible local destruction of middle ear cleft mucosa and underlying bone.[1]

The WHO defines Chronic Otitis Media as "otorrhoea" through a perforated tympanic membrane present for at least two weeks.[2] Chronic Otitis Media can occur when acute otitis media (AOM) causes acute perforation of the tympanic membrane or when acute otitis media occurs in conjunction with chronic perforation or tympanostomy tubes.[3] The complication ranges from persistent otorrhoea, mastoiditis, labyrinthitis, facial nerve paralysis to more serious intracranial abscess or thrombosis, meningitis etc. Incidence of Chronic Otitis Media is higher in developing countries especially among low socioeconomic society because of malnutrition, overcrowding, poor hygiene, inadequate health care and recurrent upper respiratory tract infections.

Although the complications are less common now due to availability of broad spectrum antibiotics, the resistance of the causative organisms is very common.[4] The most common sequelae of Chronic Otitis Media is conductive or sensorineural hearing loss.[5] Chronic Otitis Media is one of the most important cause of preventable hearing loss in India and other developing countries.[6]

The organisms isolated from Chronic Otitis Media include both aerobic and anaerobic bacteria and fungi.[7] Chronic Otitis Media is a disease of multiple etiology and is well known for its persistence and recurrence, despite treatment. Microbiological flora of middle ear varies and depends on the type of otitis media. In acute form major organism present are Haemophilus influenzae, Streptococcus pnumonae.[8]

In Chronic Otitis Media the bacteria may be aerobic (eg. Pseudomonas aeruginosa, Staphylococcus aureus, Streptococcus pyogenes, Proteus mirabilis, Klebsiella species) or anaerobic (eg. Bacteroids, Peptostreptococci, Propionibacterium)[9].

Among fungus Aspergilus niger was most common followed by Candida albicans.

MATERIALS AND METHODS:-

This observational study was conducted after getting due clearance from Ethics committee of Institute, in the Department of ENT & Head Neck Surgery, SRN Hospital, MLN Medical College, Prayagraj. Patients were taken from duration (August 2018 to August 2019).

Patients were properly informed regarding the disease, examination under otoscopy and microscopy, expected outcomes, potential complications and written informed consent were taken from patients before participating in the study. Patients for study were taken from OPD of Department of ENT & Head Neck Surgery of SRN Hospital, MLN Medical College, Prayagraj. The diagnosis of Chronic Otitis Media was carried on the basis of history, clinical examination, otoscopic examination and by examination under microscope.

The specimen was taken from the middle ear cavity and mastod antrum in the form of three ear swabs under sterile conditions and transferred immediately for processing, culture and antibiogram testing.

- First swab for direct smear examination for Gram staining, ZN staining, KOH mount.
- Second swab to inoculate Mac Conkey agar and blood agar plate.
- Third swab for isolation of fungus on Sabourad's dextrose agar.

After the overnight incubation at 37°C aerobically, the plates were examined for growth and culture characteristics were identified.

The isolates were identified by Gram staining, morphology, motility, culture characteristics and biochemical reactions by the standard techniques and antibiotic susceptibility pattern was obtained for further analysis.

RESULT:-

The present study "Current trends of Microbiological flora in chronic otitis media" was done in the Department of E.N.T&H.N.S Moti Lal Nehru Medical College, Prayagraj during the period August 2018 to August 2019

Table no.1 Age Distribution in COM (Chronic otitis media)

AGE DISTRIBUTION	NO OF CASES	PERCENTAGE
1-10 Year	0	
11-20 Year	36	30.00
21-30 Year	45	37.50
31-40 Year	31	25.83
41-50 Year	6	5.00
51-60 Year	2	1.66

Maximum no of patients were in the 3rd decade of life followed by 2nd decade (Table no.1)

COM was predominant in female (F: M=3:2). Unilateral COM was three times more common than bilateral COM Mucosal type of COM was three times more common than Squamosal COM.

Table no.2 Distribution of Risk Factor Associated with COM

Associated Features	Number	Percentage
URTI	50	41.66
Upper airway allergy	59	49.16
DNS	50	41.66

Most common associated risk factors for COM was upper airway allergy (49.16%) followed by URTI (41.66%) and deviated nasal septum (41.66%). (Table no-2)

Table no.3 Distribution of Microorganisms in COM

Organism	Number of Isolates	Percentage
Staphylococcus aureus (aerobic)	46	38.33
Peptococci (anaerobic)	36	30.00
Micrococci (aerobic)	17	14.16
Peptostreptococci (anaerobic)	17	14.16
Pseudomonas (aerobic)	2	1.66
Morganella morgani (aerobic)	1	0.83
Candida tropicalis	1	0.83

Table no. 3 shows that **Staphylococcus aureus** was the most common micro-organism present in the study followed by **Peptococci (anaerobic), Peptostreptococci (anaerobic), Micrococci. Pseudomonas and Morganella** were the only gram negative bacteria in our study.

In present study **Candida tropicalis** was the only fungal isolate in study.

Table no. 4 Distribution of Microorganisms on the basis of Physical properties (n=120)

No of cases	Aerobes	Anaerobes	Fungi
120	66 (55%)	53 (44.16%)	1

Table no.4 shows that Out of total 120 cases, aerobes were seen in 55% cases, anerobes in 44.16% cases, fungi were seen in 0.83% cases.

Table no.5 Antimicrobial Sensitivity of Microorganisms

Antibiotic Sensitivity	Staph Aureus (aero bic)	Micrococci (aero bic)	Peptococci (anaero bic)	Pepto-Streptocci (anaero bic)	Pseudo –monas (aero bic)	Morganella (aero bic)
Amoxyclav	17.39	35.23	19.44	23.52	_	100
Pipracillin + tazobactum	23.91	11.76	47.22	52.94	_	0
Cefuroxim	17.39	11.76	16.66	17.64	_	0
Ceftriaxone	23.91	41.17	36.11	0	_	100
Cefoperazone +sulbactum	32.6	35.29	36.11	29.41	100	100
Ofloxacin	19.56	58.82	63.89	41.17	_	100
Levofloxacin	50	41.17	30.05	58.83	_	100
Moxifloxacin	56.52	47.05	25	29.41	_	0
Linezolid	56.52	41.17	44.44	41.17	_	0
Clindamycin	43.47	17.64	19.44	47.05	_	0
Clarithromycin	54.34	64.7	69.44	41.17	_	0
Azithromycin	45.65	64.7	33.33	23.52	_	0
Doxycycline	39.13	47.05	50	35.29	_	0

From table no.5 it was evident that **Staphylococcus aureus** was most sensitive to Moxifloxacin, Linezolid and most resistant to Amoxyclav and Cefuroxim.

Micrococci was most sensitive to Clarithromycin and Azithromycin and most resistant to Cefuroxim and Pipracillin+tazobactum.

Peptococci was most sensitive to Clarithromycin while most resistant to Amoxyclav.

Peptostreptococci was most sensitive to levofloxacin while most resistant to Ceftriaxone**.**

Table no. 6 Antibiotic Resistance OF Microorganisms

Antibiotic Resistance	Staph aureus (aero bic)	Micrococci (aero bic)	Peptococci (anaero bic)	Pepto-Streptocci (anaero bic)	Pseudo-monas (aero bic)	Morganella (aero bic)
Amoxyclav	82.6	64.7	80.55	80	100	0
Pipracillin + tazobactam	76.08	88.23	52.88	50	100	100
Cefuroxim	82.6	88.23	83.34	70	100	100
Ceftriaxone	76.08	58.82	63.89	100	100	0
Cefoperazone + sulbactum	67.31	64.7	63.89	80	0	0
Ofloxacin	80.43	41.17	36.11	60	100	0
Levofloxacin	50	58.82	69.45	40	100	0
Moxifloxacin	43.47	52.94	75	80	100	100
Linezolid	43.47	58.82	55.56	60	100	100
Clindamycin	82.6	82.36	80.56	60	100	100
Clarithromycin	45.65	35.29	30.56	70	100	100
Azithromycin	54.34	35.29	66.67	80	100	100
Doxycycline	60.87	52.54	50,00	80	100	100

Staph. aureus was most resistant to Clindamycin, Cefuroxim and Amoxyclav.

Micrococci was most resistant to Pipracillin+tazobactum and Cefuroxim.

Peptococci was most resistant to Amoxyclav (Table no. 6).

Pepto streptococci was most resistant to ceftriaxone.

DISCUSSION: -

Chronic otitis media (COM) is considered a major public health problem in the developing world, and India is one of the high prevalence countries where urgent attention is needed. It is a persistent disease with a risk of irreversible complications and is an important cause of preventable hearing loss in children and adults. Since chronic otitis media is a disease that can cause significant morbidity, early microbiological diagnosis ensures effective treatment. Thus, knowledge of pathogens and their antibiotic sensitivity patterns in different regions of the country would guide treating physicians in selecting appropriate antibiotics that would help us reduce complications and the emergence of resistant strains.

In our study, 125 samples were obtained from patients attending the OPD of the ENT Clinic. Out of 125 cases, 120 cases were culture positive for various microorganisms in the study and 5 cases showed no growth and were excluded from the study.

The analysis of age distribution in our study showed the maximum

occurrence of COM in the 3rd decade of life, while Poorey and Arati Iyer (2002)[10], Arti Agarwal et al. (2013)[4] demonstrated the maximum occurrence of COM in the age group 1-10 years and then 11-20 years. Analysis of gender distribution in our study revealed that COM was found to be more common in females (60%) than males (40%). This was consistent with the study conducted by Loy et al. (2002)[11] and Nazir and Kadri (2014)[12], while a study by Patigaroo et al. (2016)[13] showed a higher incidence in the male population.

The most common risk factor for developing COM was upper respiratory tract allergy (49.16%), followed by DNS (41.66%) and URTI (41.66%). In our study, most patients had mucosal type of COM disease (72.5%) and 27.5% of patients had Squamosal COM disease.

Monomicrobial growth was observed in 120 culture samples positive for various microorganisms. Analysis of the bacterial profile of our study showed that Gram-positive cocci outnumbered Gram-negative bacilli.

In this study, Staphylococcus aureus (38.33%) was the predominant pathogen in both mucosal and squamous COM followed by Peptococci (30.00%), Micrococci (14.16%), Peptostreptococci (14.16%), Pseudomonas (1.86%), Morganella morgani (0.83%), and Candida tropicalis (0.83%). Similar findings were also found in a study conducted by Singh A.H et al. (2012)[14] and Prakash R. et al. (2013)[15]. A study conducted by Poore and Arati Iyer (2002)[10], Loy et al. (2002)[11], Harvinder Kumar and Sonia seth (2011)[16], Afolabi et al (2012)[17], Rakesh Kumar et al. (2013)[18], found that Pseudomonas aeruginosa was the predominant organism causing COM. Saunders et al (2009)[9] reported that S. epidermidis species was the most common bacteriological agent in chronic otitis media.

In our study, Gram-positive anaerobes such as Peptococci and Peptostreptococci were the most common anaerobes (44%), while in study by Loy et al. (2002), [11] anaerobes were found in only 6.6% of cases. A study conducted by Nikakhlagh et al (2008)[7] shows that anaerobes were found in 33.10% of cases and Bacteroides was the most common followed by Peptostreptococci and Clostridium. Other study conducted by Sweeney G et al (1982)[19] shows that anaerobes were found in 25.7% of cases, of which Prevotella melaninogenicus was the most common anaerobes in COM, while in our study the most common anaerobes were Peptococcus and Peptostreptococcus.

Various studies conducted on COM have found a predominance of Gram-negative bacteria in ear discharge, with Pseudomonas and Proteus species being the most commonly identified aerobic organisms, while Bacteroides and Peptococcus, Peptostreptococcus are the most commonly found anaerobes.

These studies show that the microbial profile varies between different regions based on patient population and geographic distribution, thus requiring frequent analysis and updating of the microbial profile. In present study, the fungal isolate was Candida tropicalis (0.83%).

In our study, moxifloxacin and linezolid (56.52%), followed by clarithromycin and azithromycin (54.34%), levofloxacin (50.00%) and doxycycline (39.13%) were found to be the most sensitive drugs against Staphylococcus aureus. The most resistant drug for Staph aureus was Amoxiclav.

In our study, the most sensitive peptococcal drug was clarithromycin (69.44%), followed by ofloxacin (63.89%) and doxycycline (50.00%). Doxycycline was found to be equally susceptible to ofloxacin against peptococci. Peptococci were most resistant to amoxyclav (82.60%), which is a routinely used antibiotic, followed by cefuroxime, clindamycin. In our study, clarithromycin and azithromycin were the most sensitive drugs against micrococci, followed by ofloxacin and moxifloxacin.Micrococci were most resistant to piperacillin + tazobactum followed by clindamycin.

In our study, levofloxacin (58.83%) was the most sensitive drug against peptostreptococci, followed by pipracillin+tazobactum (52.94%), ofloxacin and linezolid. Peptostreptococci were most resistant to ceftriaxone (100%), followed by moxifloxacin and azithromycin.

CONCLUSIONS:-

A total of 125 patients with chronic ear discharge (COM) were included in the study, of which 5 patients showed no growth, were not excluded from the study. The ratio of women to men was 1.5:1. Most patients have unilateral disease (74.66%), while 31 patients (25.33%) have bilateral disease. Patients show growth of a variety of microorganisms and all cases have a monomicrobial growth pattern.The most common microorganism isolated in descending order was Staphylococcus aureus, Peptococci, Peptostreptococci (gram-positive cocci), Micrococci. Gram-positive anaerobes such as Peptococci and Peptostreptococci were found in 44.16% of cases, while in another study, anaerobes were found in lesser numbers. Most patients showed sensitivity to moxifloxacin, levofloxacin, linezolid, clindamycin, clarithromycin, azithromycin, while the maximum number of patients showed resistance to amoxyclav and cefuroxime.

REFERENCES

1. Maji PK Chatterjee TK Chatterji S Chakrabarty J ,Mukhopadhyay BB.The investigation of bacteriology of chronc suppurative otitis media in patients attending a tertiary care hospital with special emphasis on seasonal variation. *Indian J Otolaryngol Head Neck Surg* 2007;59:128-31
2. World Health Organization. Prevention of deafness and hearing impairment, Geneva: Report by the Director General; 1986. Document A39/14.
3. Morris Ps, Leach AJ. Acute and chronic otitis media. *Pediatr. Clin N Am.* 2009; 56:1383-99.
4. Arati Agarwal, Kumar, D., Ankur Goyal, Sapna Goyal, Namrata Singh, Khandelwal G. Microbiological profile in patients of otitis media with ear discharge. *Indian Journal of Otology.* 2013; Vol 19 (1):5-8.
5. Verhoeff M, van der Veen E L, Rovers M M, Sanders EAM, Schilder A GM. Chronic suppurative otitis media: A review. *Int J Pediatr Otorhinolaryngol* 2006; 70: 1-12.
6. Aucuin, J. 2004 Department of child and adolescent health development and team for prevention of blindness and deafness, chronic supportive otitis media: Burden of illness and management options. Geneva: World health organization.
7. Nikakhlagh S, Khosravi AD, Fazliopur A, Safarzazdeh M, Rashidi N. Microbiologic Findings in patients with chronic suuppurative otitis media. *J Med Sci.* 2008; 8:503-6.
8. Saunders JE, Raju RP, Boone J, Berryhil W. Current Bacteriology of suppurartive otitis: Resistant Patterns and outcomes Analysis, *Otology & Neurotology,* 2009; 30(3):339-343.
9. Da Costa SS, Papareha MM, Schachern PA, Yoon TH, Kimberley BP. Temporal bone histopathology in chronically infected ears with intact and perforated tympanic membranes. *Laryngoscope*. 1992; 102: 1229-36.
10. Poorey. V.K.,Arati Iyer. Study of Bacterial flora in chronic suppurative Otitis Media and its clinical significance. *Ind. J. Otolaryngol Head &Neck Surg*. 2002; 54(2):91-95.
11. Loy, A.H.C., Tan, A.L., Lu, P.K.S. Microbiology of chronic suppurative otitis media in Singapore, *Singapore Med. J.* 2002; 43(6):296-299.
12. Asifa Nazir 1 , S. M. Kadri et al Aerobic bacteriology of chronic suppurative otitis media : a hospital based study International Journal of Research in Medical Sciences Nazir A et al. *Int J Res Med Sci*. 2014 Nov ; 2(4):1521-1525.
13. Patigaroo SA, Wani SM, Anjum N, Islam M, Sumbrai Dm Ahmad R. Drift in the bacteriology of chronic suppurative otitis media and methicillin-resistant Staphylococcus aureus as an emerging pathogen: an experience. *Int J Med Sci Public Health* 2016; 5:671.
14. Singh, A.H., Basu, R.,Venkatesh,A. Aerobic bacteriology of chronic otitis media in Rajahmundry, Andhra Pradesh, India. *Biology and Medicine.* 2012; 4(2); 73-79.
15. Prakash R, Juyal D, Negi V, Pal S, Adekhandi S, et al. Microbiology of chronic suppurative otitis media in a tertiary care setup of Uttarakhand state, India. *N Am J Med Sci* 2013; 5(4): 282-287.
16. Harvinder Kumar, Sonia Seth. Bacterial and Fungal Study of 100 cases of Chronic Suppurative Otitis Media. *Journal of Clinical and Diagnostic Research.* 2011; 5(6): 1224-1227.
17. Afolabi O, Salaudeen A, Ologe F, Nwabuisi C, Nwalolo C. Pattern of bacterial isolates in the middle ear discharge of patients with chronic suppurative otitis media in a tertiary hospital in North central Nigeria. *Afr Health Sci* 2012; 12(3): 362-368.
18. Rakesh Kumar ,Srivastava, P.,Sharma,M.,Rishi,S.,Nirwan, P.S., Hemwani, K, et al. Isolation and antimicrobial sensitivity profile of bacterial agents in CSOM Patients at NIMS hospital, Jaipur. *Int J Pharm Bio Sci.* 2013; Vol 3(4): 265-269.
19. Sweeney G, Piccozi GL, Browning GG. A quantitative study of aerobic and anaerobic bacteria in chronic suppurative otitis media. *J Infect* 1982; 5(1):47-55.