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Aerobic Bacteriological profile of Chronic Suppurative Otitis Media (CSOM).

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Abstract

Background: Chronic Suppurative Otitis Media (CSOM) is a middle ear condition, characterized by persistent or recurrent discharge. CSOM is a significant health problem in developing countries mainly due to the intracranial and extracranial complications it causes. Therefore this study was undertaken to know the aerobic bacteriological profile of CSOM.

Material and methods: A total of 160 clinically diagnosed cases of CSOM were studied. The organisms were identified by standard microbiological methods and antibiogram was done according to CLSI guidelines.

Results: The most common organism isolated was pseudomonas aeruginosa 37.5% followed by Staphylococcus aureus 34.3%, with maximum sensitivity seen to Piperacillin + Tazobactum and Linazolide respectively.

Conclusion: Thus this study enabled us to understand the etiological pathogens and their susceptibility patterns involved in causing CSOM, so that proper empirical treatment can be started thus helping to reduce the potential risks of complications.

Keywords: Chronic Suppurative Otitis Media, Antibiotic susceptibility, Pseudomonas aeruginosa, Staphylococcus aureus.

Introduction

The WHO defines CSOM as “Otorrhoea through a perforated tympanic membrane present for at least two weeks”[1]. CSOM is one of the most common type of infection seen in all age group. According to WHO estimate (WHO 2004), around 65 to 330 million people worldwide are affected by CSOM in developing countries, mainly due to inadequate antibiotic treatment, overcrowding, poor nutrition and poor hygiene, thus requiring an urgent attention. Microorganisms can gain entry into middle ear via external auditory canal through the perforated tympanic membrane or through Eustachian tubes from nasopharynx.[2,3] Untreated cases of CSOM can result in various complications ranging from intracranial to extra cranial like persistent otorrhoea, mastoiditis, labyrinthitis, facial nerve paralysis, intracranial abscess/thrombosis.[4,5] In both children and adults, infections resulting from CSOM can cause chronic hearing loss which has a negative impact on the development of language, speech and social interactions in school or work place performance.[6,7] Most common bacterial pathogens found to be associated with CSOM are *Pseudomonas aeruginosa*, MRSA, MSSA, *Proteus mirabilis*, *Kleibseilla pneumoniae*, *E.coli* etc; which may vary depending on geographical areas.[8,9] Since CSOM is associated with significant morbidity, knowledge of pathogens responsible for CSOM will help in selection of

the most appropriate treatment regimen. This study was done to determine the aerobic organisms causing CSOM and their antibiotic susceptibility patterns. This knowledge is important not only to prevent morbidity but also acts as a guideline for empirical antibiotic therapy, thus in turn helps in preventing the emergence of resistant strains in the community.

Material and Methods

This study was conducted in the Department of Microbiology, Jawaharlal Nehru Medical College, KLE's Dr. Prabhakar Kore's Charitable Hospital and MRC, Belagavi. A total of 160 purulent discharge samples from clinically diagnosed cases of CSOM during Jan 2017 to Dec 2017 that were received for culture and sensitivity at the Microbiology laboratory, JNMC were included in this study. Sterile cotton swab sticks were used to collect the samples. The pus swabs were processed by Gram staining and then cultured on Blood agar and Mac Conkey media followed by incubation at 37^0C for overnight. The bacterial isolates were identified by standard microbiological methods and antibiotic testing was done by Modified Kirby Bauer Disc Diffusion method as per CLSI guidelines.[10, 11] Results of all the tests were interpreted in accordance with CLSI guidelines.[12]

Results

A total of 160 samples of patients with CSOM were processed. The age range showing maximum cases of CSOM was between 11-20 yrs followed by 21-30 yrs as shown in table no-2.There were a total of 70 females and 90 males with CSOM as depicted in the table no-1

The right side ear was involved in 83 (51.87%) cases, left in 57 (35.62%) cases and bilateral in 20 (12.5%), as shown in table no-3. Of the total 160 CSOM cases studied, microbiological cultures were yielded from 136 samples, 93(58.12%) samples had a single type of organism isolated while the remaining 3(1.87%) had two/more organisms isolated.

There were 24(15%) samples who had a sterile culture with no organisms grown in culture and 40 (25%) samples with skin commensals isolated.

The most common causal organisms isolated were Pseudomonas aeruginosa 37.5 %, Staphylococcus aureus 34.3% followed by Proteus sp. 6.24% and K.pneumoniae 4.16% as showed in table no-5

Fungi accounted for 04 (4.16%) of total organisms isolated. Antibiotic sensitivity pattern of all the isolated bacterial strains are mentioned in Table no-7, 8 and 9.

Among the 34.3% Staphylococcus aureus isolated, 18 (18.7%5) were MRSA, with high sensitivity to Lenazolide, Cotrimoxazole, Gentamycin and tetracyclin. (Table no-5) Among the Pseudomonas aeruginosa isolated, Pipracillin + Tazobactum has the highest susceptibility rate 86.1%, followed by Meropenem 72.2% and Amikacin 66.67%.(Table no-4)

Table 1: Distribution of patients based on age groups (n=160)

Age	Number (%)
< 10 yrs	20 (12.5)
11-20 yrs	40(25)
21-30 yrs	33(20.625)
31-40 yrs	25(15.62)
41-50 yrs	20(12.5)
>50 yrs	22(13.75)

Table 2: Type of organisms isolated as pure culture from CSOM cases (n=96)

Microorganisms	Number of cases (%)
MSSA	15 (15.62)
MRSA	18 (18.75)
Pseudomonas aeruginosa	36 (37.5)
CONS	01 (1.04)

Streptococcus pyogens	03 (3.12)
E.coli	02 (2.08)
K.pneumoniae	04 (4.16)
Proteus mirabilis	05 (5.20)
Proteus vulgaris	01 (1.04)
Citrobacter koseri	01 (1.04)
Citrobacter freundii	05 (5.20)
Candida sp.	04 (4.16)
Enterococcus sp.	01(1.04)

Table 3: Organisms isolated as mixed cultures (n=3)

Microorganisms	Number (%)
Pseudomonas aeruginosa + K.pneumoniae	1 (33.3)
MRSA + Proteus mirabilis	1 (33.3)
MRSA + Citrobacter freundii	1 (33.3)

Table 4: Antibiotic sensitivity pattern of Pseudomonas aeruginosa (36)

Antibiotic	Sensitive (%)
Ceftazidime	20 (55.5)
Pipracillin + Tazobactum	31 (86.1)
Gentamycin	18 (50)
Tobramycin	14 (38.89)
Amoxyclav	05 (13.88)
Amikacin	24 (66.67)
Ciprofloxacin	17 (47.2)
Levoflaxacin	13 (36.1)
Imipenem	16 (44.4)
Meropenem	26 (72.2)
Azetreonam	21 (58.3)

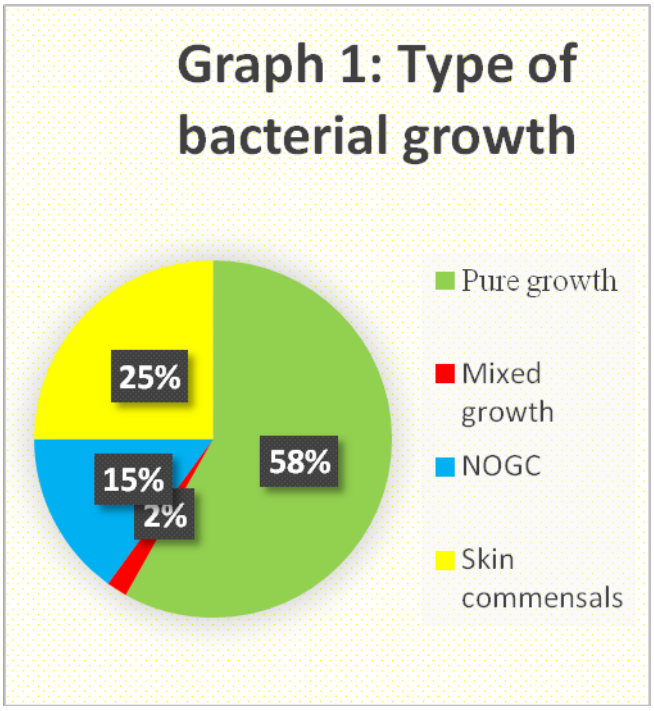
Table 5: Antibiotic sensitivity pattern of Staphylococcus aureus (33)

Antibiotic	Sensitive (%)
Ampicillin	17 (51.5)
Amoxyclav	10 (30.3)
Cotrimoxazole	22 (66.6)
Erythromycin	15 (45.5)
Clindamycin	23 (69.69)
Gentamycin	25 (75.7)
Linezolide	30 (90.9)
Penicillin	02 (6.06)
Vancomycin	15 (45.4)
Tetracycline	22 (66.66)
Chloramphenicol	26 (78.78)
Doxycycline	13 (39.39)

Table 6: Antibiotic sensitivity pattern of E.coli, K.pneumoniae and Citrobacter sp. (18)

Antibiotic	Sensitive (%)
Ampicillin	02 (11.1)
Gentamycin	11 (61.1)
Ceftazidime	09 (50)
Azetreonam	07 (38.88)
Chloramphenicol	04 (22.22)
Tetracyclin	04 (22.22)
Pipracyclin	07 (38.88)
Amikacin	11 (61.1)
Amoxyclav	02 (11.1)
Pipracillin + Tazobactum	14 (77.77)
Cefepime	01 (5.55)
Ceftriaxone	06 (33.33)
Ciprofloxacin	06 (33.33)
Levofloxacin	02 (11.1)
Tetracycline	10 (55.5)
Meropenem	10 (55.5)
Cotrimoxazole	10 (55.5)

Graph 1: Type of bacterial growth



Discussion

CSOM and its complications are the most common conditions encountered by otologists, pediatricians and general practitioners. CSOM being the most common cause leading to hearing impairment disability and poor scholastic performance with occasional fatal intracranial complications, early microbiological diagnosis ensures prompt and effective treatment to avoid such complications.[13] Since empirically therapy is started even before the results of microbiological culture are obtained, selection of antibiotics is based on its efficacy, resistant to bacteria, safety; toxicity risk and cost as well.[14] So knowledge of local microorganism's pattern causing CSOM and their antibiotic sensitivity is therefore essential for the start of an effective empirical therapy.

In our study, CSOM was common in children and young adults which was similar to the finding seen by other studies done by Michael et al; Mansoor et al; Bansal et al; Wariso et al; Shyamla et al and Poorey et al.[15, 16, 17, 18, 19, 20]

The main cause for higher incidence of CSOM in this younger age group is due to short and wide Eustachian tube.[21] Also the supine position of the babies while breast feeding along with traditional belief of oil instillation in children.[18,22] More frequent cold and URTI in children could also be a cause for higher incidence of CSOM in them.[23, 24, 25] But few studies like the one done by Loy et al; showed that age group of 31-40 had higher tendency for CSOM infection.[14]

Gender analysis showed that CSOM incidence was more common in males 56.25% than in females 43.75%, which was in accordance with others studies done by Lakshmiphati et al; Bansal et al; Poorey et al; Moshi NH etal; Mishra et al; Ahmad et al; Gulrati and Vijaya et al; who also reported male predominance.[17, 20, 26, 27, 28, 29, 30, 31] Probable reason for male predominance in our study could be due to more outdoor working conditions of men compared to women.

In contract; female predominance in the incidence of CSOM was seen in studies done by Prakash et al; Mansoor et al; Loy et al and Shrestha et al and reason being difference in the geographical areas.[32, 16, 14, 33]

Monomicrobial growth was seen in 93 (58.12%) of cases, which is similar to the studies done by Prakash et al (85% monomicrobial growth); Naz Ret al (93%) and Nazir A etal;(89% of monomicrobial growth).[32, 34, 36] 1.87% showed polymicrobial growth which was in accordance with other studies done.[19, 36, 37]

We in our study have found that majority of patients i.e 38.54% revealed gram positive followed by 56.25% gram negative. The most common being Pseudomonas aeruginosa 37.5% followed by Staphylococcus aureus 34.37 %. This finding is in tandem with other studies done by Mansoor T et al; Shyamala R et al; Nazar A et al; Sharma S et al; Sharma K et al; Kumar S et al; Lee SK et al;[16, 19, 35, 37] but in contrast with other studies done by Loy AHC et al; Shrestha et al; Ahn JH et al; Nia KM et al; in

which Staphylococcus aureus was reported as a major causative organism in causing CSOM.[14, 33, 41, 42]

This variation in results could be due to change in climate / geographical factors and difference in empirical antibiotic treatment started.[43]

15% of CSOM cultures showed no growth which was similar to those studies done by Vijaya D; Asiri SA et al; and Sinha A et al; [31, 44, 45]

Negative cultures may be due to no bacteria present in it or due to anaerobic growth or due to start of antibiotic therapy before sample collection.

Most of the Pseudomonas aeruginosa in our study were sensitive to Pipracillin + Tazobactum (86.1%) and Meropenem 72.2% while resistant to Amoxyclav 13.89%.

In a study by Loy et al; Pseudomonas aeruginosa showed ceftazidime, cioroflaxacin, pipracillin and amikacin sensitive.[14]

In another study by Ayson et al; Pseudomonas aeruginosa was resistant in 64.3% of cases and 85.7% sensitive to ciprofloxacin.[46]

The antimicrobial susceptibility pattern of Staphylococcus reveled 90.9% sensitive to Linezolide followed by Chloramphenicol and Gentamycin with least sensitivity to Penicillin 6.06%.

Isolates of E.coli, Proteus and Klebseilla sp; Pipracillin + Tazobactum was found to be most effective drug followed by Gentamycin and Amikacin. This observation is similar to the findings done by the study done by other researchers like Gulati et al;.

Conclusion

Microbial predominance and their antibiogram patterns vary in CSOM due to variation in patient population, community, inadvertent use of antibiotics as well as due to change in the climatic conditions and geographical areas. So periodic evaluation of microbiological profile of CSOM cases is needed in every health center catering a defined area of population, in order to instill effective empirical treatment. This in turn will help to prevent emergence and spread of resistant pathogens as well as to prevent life threatening complications.

References

1. World Health Organization. Prevention of deafness and hearing impairment. Geneva: Report by the Director General; 1986. document A39/14.
2. Roland PS. Chronic otitis media: a clinical overview. Ear Nose Throat J 2002; 81: 8.
3. Verhoeff M, et al. Chronic otitis media: a review. Int J Pediatr Otorhinol 2006; 70-71.
4. Irfanalimirza, Liaquatali, Muhammad Arshad .Microbiology of chronic suppurative otitis media - experience at Bahawalpur. Pak Armed Forces Med J 2008; 4 : 38- 42.
5. Shrestha B L, Amatya R C M, Shrestha I, Ghosh I. Microbiological profile of chronic suppurative otitis media. Nepalese J ENT, Head & Neck Surg. 2011; 2(2) :6-7.
6. Alan E, Dugdale. Management of chronic Suppurative otitis media. Med J Aust 2004; 180(2): 91-93.
7. El-sayed Y. Bone conduction impairment in uncomplicated CSOM. Am J Otolaryngol 1998; 19: 149-53.
8. Jakimovska F, Cakarm, Lazareveskia. CSOM – Microbiological findings. Balkan j otolneuro -otol, 2002: 104-6.
9. Anwar-us-Salam, Abid SH, Abdulla EM. Suppurative Otitis in Karachi: An Audit of 510 cases. Pak J Otolaryn 1997; 13:66-9.
10. Isenberg H.D. Clinical Microbiology Procedures Handbook. 2nd ed Washington: ASM Press; 2007; 1.
11. Franklin R and Cockerill. Performance Standards for AST. CLSI 2012; 31 (1) 22nd Informational Suppl; M100-S22 .

12. National Committee for Clinical Laboratory Standards. Performance standards for antimicrobial disk susceptibility tests. 7th ed. Approved standard M2-A7. Wayne, Pa: The Committee; 2000.
13. World Health Organization. State of hearing and ear care in the South East Asia Region. WHO Regional Office for South East Asia. WHOSEARO. SEA/Deaf/9.
14. Loy AHC, Tan AL, Lu PKS. Microbiology of chronic Suppurative otitis media in Singapore. Singapore Med J 2002;43:296-9.
15. Michael G Li, Peter J H, Jeffrey T V, Donald T D. Is chronic suppurative otitis media a neglected tropical disease? PLOS Neglected Tropical diseases. 2015;9(3):1-6.
16. Mansoor T, Musani MA, Khalid G, Kamar M. Pseudomonas aeruginosa in chronic Suppurative otitis media:sensitivity spectrum against various antibiotics in Karachi. J Ayub Med Coll Abbottabad 2009;21(2):120-23.
17. Bansal S, Ojha T, Kumar S, Singhal A, Vyas P. Changing microbiological trends in cases of Chronic suppurative otitis media patients. International Journal of Current Research and Review.2013;5(15):76-80.
18. Wariso BA, IBe SN. Bacteriology of chronic discharging ears in Port Harcourt, Nigeria. West Afr J Med 2006;25:219-22.
19. Shyamla R, Reddy SP. The study of bacteriological agents of chronic suppurative otitis media-aerobic culture and evaluation. J Microbiol Biotechnol Res 2012;2:152-62.
20. Poorey V K, lyer A .Study of bacterial flora in CSOM and its clinical significance. Indian Journal of Otolaryngology and Head and Neck Surgery. 2002; 54(2):91-95.
21. Arvind N, Chand P and Vishrutha KV. Microbiological profile of Chronic Suppurative Otitis Media. International Journal of Biomedical Research 2014; 05 (03):204-06.
22. Kenna et al. Medical Management of Chronic Suppurative Otitis Media without Cholesteatoma in Children. Laryngoscope, 1986 ; 96 (2) 146-151.
23. Brook I, Gober AE. Microbiological Characteristic of Persistent otitis media. Arch Otolaryngol. 1998;124:1350–1352.
24. Gordon MA, Grunstein E, Burton WB. The effect of the season on otitis media with effusion resolution rates in the New York Metropolitan area. Int J Pediatr Otorhinolaryngol. 2004;68:191–5.
25. Rovers MM, Straatman H, Zielhuis GA, Ingels K, van der Wilt GJ. Seasonal variation in the prevalence of persistent otitis media with effusion in one-year-old infants. Paediatr Perinat Epidemiol. 2000;14:268–74.
26. Lakshmipathi G. and Bhaskaran CS: Bacteriology of chronic suppurative otitis media. J. Ind. Med. Assoc., 45: 436, 1965.
27. Moshi NH, Minja BM. Ole-Lengine L, Mwakagile DS. Bacteriology of chronic ottis media in Dar es Salam, Tanzania. East Afr Med J 2000;77(1):20–2.
28. Mishra A, Shukla G, Nag D Mishra S C. Bacteriological Study of chronic suppurative otitis media. Indian Journal of Otolaryngology and Head and Neck Surgery .1999;59(2): 87-91.
29. Ahmad A, Usman J, Hashim R. Isolates from chronic suppurative otitis media and their antimicrobial sensitivity. Pak Armed Forces Med J 1999;49:82–5.
30. Gulati SK. Investigative profile in patients of chronic suppurative other media. Ind J Otol 1997;3(2):59–62.
31. Vijaya D. Aerobes, anaerobes and fungi in chronic suppurative otits media. Ind J Otol 2000;6(3):55–8.

32. Prakash M, Lakshmi K, Anuradha S, Swathi GN. Bacteriologi- cal profile and their antibiotic susceptibility pattern of cases of CSOM. Asian J Pharm Clin Res 2013;6:210–2.
33. Shrestha BL, Amatya RCM, Shrestha I and Ghosh I. Microbiological profile of chronic Suppurative otitis media. SOL 2011;2(2):6-7.
34. Naz R, Mohammad Khalid Farooqui, Girotra R et al. Bacterial profile and antibiotic sensitivity pattern of CSOM patient in mewat region. J Evid Based Med Healthc 2015; 2(61), 9051-5
35. Nazir A, Kadri SM. Aerobic bacteriology of chronic suppurative otitis media: a hospital based study. Int J Res Med Sci 2014;2:1521-5.
36. Aslam MA, Ahmed Z, Azim R. Microbiology and drug sensitivity patterns of chronic suppurative otitis media. J Coll Physicians Surg Pak. 2004;14:459–61.
37. Sharma S, Rehana HS, Goyal A, Jha AK, Upadhyaya S, Mishra SC. Bacteriological profile in chronic suppurative otitis media in Eastern Nepal. Trop Doct 2004; 34: 102-04.
38. Sharma K, Aggarwal A, Khurana PMS. Comparison of bacteri- ology in bilaterally discharging ears in chronic suppurative otitis media. Indian J Otolaryngol Head Neck Surg 2010;62(2):153–7.
39. Kumar S, Sharma R, Saxena A, Pandey A, Gautam P, Taneja V. Bacterial flora of infected unsafe CSOM. Indian J Otol 2012;18(4):208–11.
40. Lee SK, Lee MS, Jung SY, Byun JY, Park MS, Yeo SG. Antimicrobial resistance of Pseudomonas aeruginosa from otorrhoea of chronic suppurative otitis media patients. Otolaryngol Head Neck Surg 2010; 143(4): 500-05.
41. Ahn JH, Kim MN, Suk IA, Moon BJ. Preoperative, intraoperative, and postoperative results of bacterial culture from patients with chronic suppurative otitis media. Otol Neurotol 2012; 33(1): 54-59.
42. Nia KM, Sepheri G, Khatmi H, Shakibaie MR.Isolation and antimicrobial susceptibility of bacteria from chronic suppurative otitis media patients in Kerman, Iran. Iran Red Crescent Med J 2011; 13(12): 891-94.
43. Yildirim et al. Effect of Climate on the Bacteriology of Chronic Suppurative Otitis Media. Ann Oto Rhino Laryngol 2005; 114(8) : 652-655.
44. Asiri SA, Bangar AA. Microbiological evaluation and the manag- ement of chronic suppurative otitis media among Saudi children. Ind J Otol 1999;5(1):33–6.
45. Sinha A, Kapil A, Gupta V. Aerobic bacteriological study of chronic suppurative otitis media. Ind J Otol 1999;5(4):203–6.
46. Ayson PN, Lopez JEG, Llanes EGDV. Chronic suppurative otitis media: bacteriology and drug sensitivity patterns at the Quirino Memorial Medical Center (2004–2005): a preliminary study. Philipp J Otolaryngol Head Neck Surg 2006;21(1,2):20–3.
47. Gulati SK. Investigative profile in patients of chronic suppurative otitis media. Indian J Otol. 1997;3:59–62.