Original Article

Microbiological Spectrum in Tubotympanic Type of Chronic Suppurative Otitis Media

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ABSTRACT

OBJECTIVE: The objective of this study was to determine the local pattern of bacterial involvement in tubotympanic type of Chronic Suppurative Otitis Media.

STUDY DESIGN: Descriptive, Cross sectional study.

SETTING & DURATION: Department of ENT, Liaquat University Hospital Hyderabad. Two years from January 2012 to December 2013.

METHODOLOGY: A total of 150 cases presenting with ear discharge for last six months were included in this study, irrespective of age and gender. Operated cases and disease of external ear were excluded from this study. Ear discharge sample (Pus Swab) was taken from deeper part of external auditory canal with sterile cotton swab on stick and sent for bacterial culture and sensitivity to the diagnostic & research laboratory. Statistical analysis carried out using SPSS 16.

RESULTS: This study includes 150 patients of Chronic Suppurative otitis media. Males outnumbered females (M: F = 1.4:1). Result of swab sensitivity for aerobic organism showed growth of single organism in 65%; while 25% showed mixed growth and 10% did not grow any organism. *Pseudomonas aeruginosa*(42%) was the commonest organism isolated, followed by *staphylococcus aureus*(24%), less common organism isolated includes *Proteus mirabilis* 8.7%, *Klebsiella pneumonia* 6.7%, *E. Coli* 5.3% and *Coagulase negative Staphylococci* 3.3%.Sensitivity of *P. aeruginosa* was good to Imipenem (97%), followed by ceftazidime (95%), ciprofloxacin (90%) and tobramycin (90%).

CONCLUSION: It is concluded that gram negative aerobic bacteria especially *pseudomonas aeruginosa* is the most common isolate organism significantly associated with tubotympanic type of CSOM followed by *Staphylococcus aureus*. Periodic monitoring of the microbiological profile along with their sensitivity pattern is essential for formulating an effective antibiotic policy for CSOM.

KEY WORDS: CSOM, Antimicrobial, Tubotympanic, *Pseudomonasaeruginosa*.

INTRODUCTION

Chronic suppurative otitis media (CSOM) is defined as a long standing infection of a part or whole of the middle ear cleft characterized by ear discharge (for 6-12 weeks), perforation and presence of (conductive and/ or sensorineural) hearing impairment. The perforation becomes permanent when its edges are covered by squamous epithelium and it does not heal spontaneously.[1]

CSOM is a common health problem worldwide but is highly prevalent in developing or underdeveloped countries[2].Incidence of CSOM is higher in communities with low socio-economic conditions due to malnutrition, overcrowding and poor hygiene[3].

Etiological factors associated with CSOM include microbiological agent like bacteria; while risk factors include genetic predisposition, environmental and social factors. Bacterial pathogens are both aerobic and anaerobic[4]. Majority of the infection are caused by aerobic bacteria and about 10% of the infections are caused by anaerobic bacteria. Most common aerobic pathogens are *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Proteus* and *Escherichia coli*. Various anaerobic organisms including bacteroides fragilis and anaerobic streptococci are also causative agents[5].

For appropriate microbiological diagnosis and treatment, it is important to assess microbial clarification of the infection and drug sensitivity test for that particular organism. During treatment with antibiotics bacterial resistance and ototoxicity with both topical and systemic antibiotics are important consideration issues[6].

This study was carried out to help us to develop the hospital protocol for empirical therapy to our patient who suffering from tubotympanic type of chronic suppurative otitis media by identifying the microbial pattern in our patients.

METHODOLOGY

This prospective study included 150patients presenting with ear discharge, from a period of two year from January 2012 to December 2013. It was descriptive case series analytical study conducted in department of otorhinolaryngology, head and neck surgery Liaquat University Hospital Hyderabad.

Patients presenting with chronic or recurrent ear discharge and on clinical examination found to have discharging ears with perforation of the tympanic membrane were selected for the study, irrespective of age and gender. Samples were collected before administering any antibiotic therapy and from those patients who had not given any history of recent medication for their ear disease. Operated cases and disease of external ear were excluded from this study.

Specimens for pus culture were collected, under illumination, by swabbing the discharging ears with a sterile cotton swab on stick from deeper part of external auditory canal and sent for bacterial culture and sensitivity to the diagnostic & research laboratory, Liaquat University Hospital Hyderabad without delay. Their demographic details and Culture and sensitivity report was recorded on a Proforma. Statistical analysis carried out using SPSS 16. Frequency was calculated for gender and bacteria culture. Mean and standard deviation was calculated for age.

RESULTS

This study includes 150 patients of Chronic Suppurative otitis media. Out of these 88 (58.7%) were male and 62 (41.3%) were female and male to female ratio was 1.4:1 (Figure I). Mean age was 40.45 years and Std. deviation ±15.063, ranging from 10 – to – 82 years (Figure II). Ninety-seven patients (65%) revealed growth of single organism while thirty-eight patients (25%) showed mixed growth and fifteen patients (10%) did not grow any organism (Table I).

Out of the 97 patients who showed a growth of single organism, *Pseudomonas aeruginosa* was isolated in 51 (52.6%) followed by *staphylococcus aureus* 28 (28.9%), *Proteus mirabilis* 06 (6.2%), *Klebseilla pneumonia* 05 (5.1%), *E.coli* 04 (4.1%) and *Coagulase – negative Staphylococci* 03 (3.1%). Among the 38 patients with mixed growth, *pseudomonas aeruginosa* was seen in 12 (31.6%), *Staphylococcus aureus* in 08 (21%), Proteus mirabilis in 07 (18.4%), *Klebsiella pneumonia* in 05 (13.2%), E. coli in 04 (10.5%) and Coagulase – negative *Staphylococci* were seen in 02 (5.3%) of patients. Out of 150 patients *Pseudomonas aeruginosa* was the commonest found organism 63 (42%) followed by staphylococcus aureus 38 (24%), *Proteus mirabilis* 13 (8.7%), *Klebsiella pneumonia* 10 (6.7%), *E. Coli* 08 (5.3%) and *Coagulase – negative Staphylococci* 05 (3.3%) (Table II).

A large number of the *P. aeruginosa* isolates in the present study were susceptible to all the antibiotics tested. Imipenem (97%), followed by ceftazidime (95%), ciprofloxacin (90%) and tobramycin (85%) and were the most effective antibiotics against *P. aeruginosa (Figure III)*. Cephalosporins (100%), doxycycline (100%) and amoxicillin-clavulanic acid (100%) were the most effective antibiotics against *S. aureus*. Gentamicin was effective against 85% of strains of *P. Aeruginosa* & *S. aureus*.

FIGURE I: GENDER DISTRIBUTION (n=150)

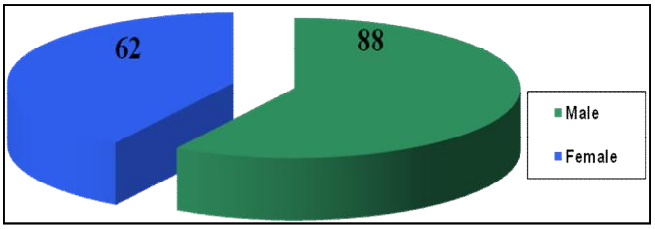

FIGURE II: AGE DISTRIBUTION (n=150)

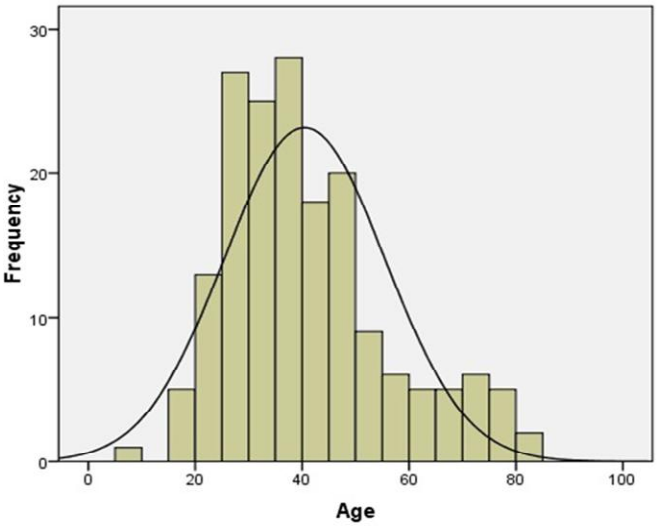

FIGURE III: SENSITIVITY OF PSEUDOMONAS AERUGINOSA (n=150)

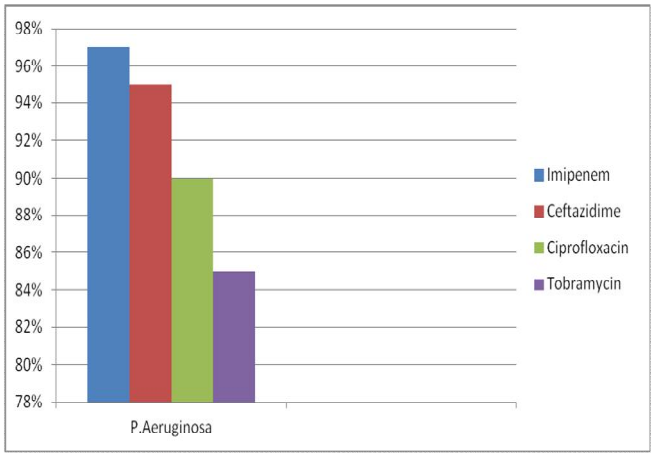

TABLE I: BACTERIAL CULTURE (n=150)

Bacterial Culture	Number	Percentage
Single Organism	97	65%
Mixed organism	38	25%
No Growth	15	10%

TABLE II: DIFFERENT BACTERIAL ISOLATES (n=150)

Bacteria Isolates	Number	Percentage
Pseudomonas aeruginosa	63	42
Staphylococcus aureus	38	24
Proteus Mirabilis	13	8.7
Klebsiella pneumonia	10	6.7
E. Coli	08	5.3
Coagulase-negative staphylococci	05	3.3

DISCUSSION

Suppurative otitis media with its unpleasant symptoms and complications may be a catastrophe for the marvelously structured organ, the ear, on which much of our appreciation of life and human activity depends. Chronic suppurative otitis media (CSOM) is one of the most commonly encountered diseases in otorhinolaryngology practice. Even in this era of powerful antibiotics, CSOM still consumes considerable medical expenditure, especially in the poorer sections of the society [7]. In CSOM, bacteria gain access to the middle ear either from the nasopharynx through the eustachian tube or from the external auditory canal through a non-intact tympanic membrane. Infection of the middle ear mucosa subsequently results in ear discharge [8].

In this study we found male preponderance i.e. 58.7%. The male is to female ratio was found to be 1.4:1. This finding is consistence with the other researchers[9 – 10]. While in contrast to this observation some regional and local studies showed that CSOM were more common in females than in males [1, 11]. As this study involved, a random selection of cases the predominance of male patient over female. Moreover, no knowledge of anatomical differences in the ear structures of male and female has been reported.

In our study, patients presented predominantly between 17-82 years with mean age of 47.02. This finding is consistent with other regional as well as international studies [1, 12]. While other study was reported that CSOM was seen in first and second decade of life [13].

According to this study the commonest bacteria isolated were *Pseudomonas aeruginosa followed by S. aureus, proteus, Klebseilla and E. coli*. This is not different from many other studies, conducted worldwide, in which the commonest organisms implicated in CSOM were P. aeruginosa followed by *S. aureus, proteus* and other enteric bacteria [2,14].

While in Contrast, in the study of Al-Shara M[15] from Jordanian and Rajat Prakash *et al* from India[16] reported that predominant bacterial etiology of CSOM is *Staphylococcus aureus followed by the pseudomonas aeruginosa.* This observation was in line with diversity of microbial flora of CSOM infection in that region.

In this research *Klebsiella pneumoniae* and *Escherichia coli* were isolated from 6.7% and 5.3% cases respectively, and these findings were consistent with Mansoor, *et al*[1] study whereas Poorey and Iyer[12] reported a high-incidence for *klebsiella* in their study.

Anaerobes in CSOM is often questioned, it is often detected in Attico-antral type of CSOM with extensive cholesteatoma or in a case of granulation tissue however, it is advocated that while investigating these organisms must requests for anaerobic culture should be included and the medical therapy should be directed at the eradication of the pathogenic aerobic and anaerobic organisms[17].

Imipenem or ceftazidime for *P. aeruginosa* and amoxicillin-clavulanic acid or cephalosporins for *S. aureus* were found to be the most effective systemic antibiotics in our study. Ciprofloxacin can be used for treating mixed gram-negative bacterial infections, including *P. aeruginosa.* Amikacin was effective (100%) against multi-drug resistant. It is necessary to provide anaerobic coverage for culture proven cases or in cases with no aerobic growth in presence of purulent discharge and no history of prior antibiotic therapy.

In the era of antibiotics the emergence of antibiotic resistance is becoming more common. Human negligence is a factor responsible for the development of antibiotic resistance. As soon as symptoms subside, many patients stop taking antibiotics before completion of therapy and allow partially resistant microbes to flourish. Such practice should be condemned strongly and people should be educated to avoid the same.

CONCLUSION

It is concluded that gram negative aerobic bacteria especially pseudomonas aeruginosa is the most common isolated organism significantly associated with tubotympanic type of CSOM followed by *Staphylococcus aureus*. Imipenem or ceftazidime for *P. aeruginosa* and amoxicillin-clavulanic acid or cephalosporins for *S. aureus* were found to be the most effective systemic antibiotics in our study.Inour region, increasing drug resistance among bacteria, periodic monitoring of the microbiological profile of CSOM along with clinical

correlation is essential as exact choice of antibiotics for empiric therapy depends on the local antibiotic policy, followed by modification in therapy based on the culture and sensitivity results. Before administering antibiotics, either local or systemic, culture of aural discharge should be performed in all CSOM patients.

REFERENCES

1. Mansoor T, Musani MA, Khalid G, Kamal M. Pseudomonas aeruginosa in chronic suppurative otitis media: Sensitivity spectrum against various antibiotics in Karachi. J Ayub Med Coll Abbottabad. 2009;21(2):120–3.
2. Sattar A, Alamgir A, Hussain Z, Sarfraz S, Nasir J, Badar-e-Alam. Bacterial spectrum and their sensitivity pattern in patients of chronic suppurative otitis media.JColl Physicians Surg Pak. 2012; 22 (2):128-9.
3. Kumar H, Seth S. Bacterial and fungal study of 100 cases of chronic suppurative otitis media. J ClinDiagn Res. 2011;5 (6): 1224–7.Journal of Clinical and Diagnostic Research. 2011 November (Suppl-1), Vol-5(6):1224-7.
4. Srivastava A, Singh RK, Varshney S, Gupta P, Bist SS, Bhagat S, et al. Microbiological evaluation of an active tubotympanic type of chronic suppurative otitis media. Nepalese J ENT Head Neck Surg. 2010;1(2):14-6.
5. Agrawal A, Kumar D, Goyal A, Goyal S, Singh N, Khandelwal G. Microbiological profile and their antimicrobial sensitivity pattern in patients of otitis media with ear discharge. Indian J Otol. 2013;19:5-8
6. Osazuwa F, Osazuwa E, Osime C, Igharo EA, Imade PE, Lofor P, et al. Etiologic agents of otitis media in Benin City, Nigeria. N Am J Med Sci. 2011;3(2):95-8.
7. Saini S, Gupta N, Aparna, Seema, Sachdeva OP. Bacteriological study of pediatric and adult chronic suppurative otitis media. Indian J Pathol Microbiol. 2005;48(3):413-416.
8. Khanna V, Chander J, Nagarkar NM, Dass A. Clinicomicrobiologic evaluation of active tubotympanic type chronicsuppurative otitis media. J Otolaryngol. 2000;29(3):148-53.
9. Shim HJ, Park CH, Kim MG, Lee SK, Yeo SG. A pre- and postoperative bacteriological study of chronic suppurative otitis media. Infection. 2010;38(6):447-52.
10. Wariso BA, Ibe SN. Bacteriology of chronic discharging ears in Port Harcourt, Nigeria. West Afr J Med. 2006;25(3):219-22.
11. Loy AH, Tan AL, Lu PK. Microbiology of chronic suppurative otitis media in Singapore. Singapore Med J. 2002; 43(6):296-9.
12. VK Poorey, Arati Lyer. Study of bacterial flora in csom and its clinical significance. Indian J Otolaryngol Head Neck Surg. 2002;54(2):91-5.
13. R Shyamala, P Sreenivasulu Reddy.The study of bacteriological agents of chronic suppurative otitis media–aerobic culture and evaluation. J Microbiol-Biotechnol Res. 2012;2(1):152-62.
14. Sharma K, Aggarwal A, Khurana PM. Comparison of bacteriology in bilaterallydischargingears in chronicsuppurativeotitismedia. Indian J Otolaryngol Head Neck Surg. 2010;62(2):153-7.
15. Al-Shara M. A Five-yearReview on the Etiology and AntimicrobialSusceptibilityPattern of OtitisMediaPathogens in JordanianChildren. Oman Med J. 2012;27(5):358- 63.
16. Prakash R, Juyal D, Negi V, Pal S, Adekhandi S, Sharma M, Sharma N. Rajat Prakash, 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.
17. Brook I. The role of anaerobic bacteria in chronic suppurative otitis media in children: implications for medical therapy. Anaerobe. 2008;14(6):297-300.

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