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Original Article

Microorganism and Anti-Microbial Resistance of Bacterial Agents in Chronic Suppurative Otitis Media Patients at Abbasi Shaheed Hospital

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ABSTRACT: OBJECTIVES: To evaluate the microbiologic profile and their sensitivity spectrum and resistance pattern against the various antibiotics in chronic suppurative otitis media. STUDY DESIGN: A retrospective study. DURATION AND PLACE OF STUDY: The study was conducted at the department of ENT and head and neck surgery, Abbasi Shaheed hospital, Karachi from April 2009 to June 2010. SUBJECTS AND METHOD: A total of 146 clinically diagnosed cases of chronic suppurative otitis media (CSOM) were included in the study. Their informed and written consent was taken prior to their inclusion. Cases operated previously for the management of CSOM were excluded. The pus was collected on a sterile cotton swab and sent to laboratory for bacterial culture and sensitivity. Prior to taking the swabs the patients were kept away from the use of antibiotics (both topical and oral) for 3-5 days. The results (antibiograms) were analyzed for the most common isolates and their sensitivity spectrum and resistance pattern was recorded. RESULTS: The most common isolated organism was Pseudomonas Aeruginosa whereas Proteus species was least reported. However organisms were resistant to most of the commonly available drugs, except quinolone and aminoglycoside group.
Key Words: Chronic Suppurative Otitis Media, Microbes, Anti-microbial Profile, Otorrhoea.

INTRODUCTION: Chronic suppurative otitis media (CSOM) is a disease which is characterized by persistent discharge through a perforated ear drum lasting for 03 months or more, however there is no widely agreed definition of this disease[1]. The incidence apparently depends upon race and socioeconomic factors. Poor living conditions, overcrowding, poor hygiene, malnutrition, improper treatment by primary physician or treatment by the quacks are the basis for a wide spread prevalence in our country[2]. CSOM is divided in to following types according to Browning. Mucosal (active, inactive), Squamosal (active, inactive) and Healed[3]. Recent evidences indicate that the risk of complications is present with both the squamosal and mucosal types[4]. Prevalence surveys shows that the global burden of illness from CSOM involves 65-350 million individuals with draining ears, 60% of which suffers from hearing damage. In 1993 World Development Report estimated that about[5]. 12 million disability-adjusted-life-years (DALYs) were lost from otitis media, 91% of which comes from the developing world.5 Later it scaled down to 20163 million DALYs in 1996; 94% of which still comes from the developing world[6]. Chronic discharging ear is a major health problem in Pakistan[7]. It is one of the most common presenting complain of most of the patients with CSOM in outpatient ENT clinics[8]. The microflora or bacteriologic spectrum differs in both acute and chronic otitis media and because of unjustified use of different antibiotics, emerging clinical resistance is getting more and more prevalent among the cases of CSOM; making the treatment prolong and cost exuberant[9]. Microbiology cultures yield many, frequently multiple organisms and these vary depending on the climate, patient population and whether antibiotics have or have not recently been used. The studies therefore report different isolates in different proportions of which Pseudomonas aeruginosa and Staphylococcus aureus are the most commonly reported pathogens, while most of the other organisms are being gram-negative coliforms[10].

SUBJECTS AND METHODS: Out of 198 cases of CSOM patients, 146 were selected having their consent. The study was conducted from April 2009 to June 2010 at outpatient clinics of ENT, Abbasi Shaheed hospital. The discharge was either frankly purulent, muco-purulent, serous (wet) type or blood stained on occasions. The samples were collected after discarding pus from external auditory canal on a sterile cotton swab and was sent for culture and sensitivity to the hospital's laboratory or outside to a private laboratory too, depending upon the circumstances and availability of resources. The results were recorded and analyzed using SPSS system for the most common isolates and their sensitivity spectrum and resistance pattern.

RESULTS: A total of 146 cases were randomly selected (n=146) among which the males were 121 (83%) and females were 25 (17%). Out of 146 patients, 49 (33.56%) had bilateral and 97 (66.43%) had unilateral ear discharge. The total number of discharging ears were 195 out of which 38% were frankly purulent; 35% muco-purulent; 21% wet ear and 06% blood stained (fig. 1). The most common organism cultured were: Pseudomonas aeruginosa, 75 ears (38.46%); Streptococcal Pneumoniae and Escherichia Coli, 26 ears each (13.33% each); Staphylococcal species -

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coagulase positive, 13 ears (6.66%); Klebsiella species, 12 ears (6.15%); Proteus species, 18 ears (9%) and 25 ears (12.8%) were negative for any organism (table 1). The antibiograms obtained were different in the sense that the drugs tested in majority of the reports were not uniformly the same. The most common organisms and their sensitivity and resistance to group of drugs are as shown in table 2 & 3. Individual pathogens and their resistance and sensitivity for different drugs observed is shown in table-4.

DISCUSSION: The pathogenesis of CSOM is multi-factorial, environmental versus genetically determined factors as well as anatomical and functional characteristics of eustachian tube are involved. In CSOM the bacteria can reach the middle ear either from the nasopharynx through the Eustachian tube or from the external auditory canal through the non-intact ear drum[1,12,13]. In the studies of Argeudas et. al and Kenna MA et. al, the aerobic organisms frequently cultured were Pseudomonas Aeruginosa (18-67% of cases)] Staphylococcus Aureus (14-33% of cases) followed by Proteus species, Klebsiella species and Escherichia coli[14,15]. This is in slight similarity with our study, where we found Pseudomonas aeruginosa to be the commonest but the order that follows is different from the above (table1). A local study revealed Pseudomonas aeruginosa to be the most common organism followed by Staphylococcus aureus, Proteus species, Escherichia Coli and Klebsiella species[9]. Here again the order that follows after the Pseudomonas is different from our study (table 1). A study from India documented; Pseudomonas pyocyaneus followed by Klebsiella species, Staphylococcus aureus, Proteus species, Escherichia coli, Staphylococcus albus and hemolytic Streptococci as frequently involved microbes[16]. Another study from Singapore showed the most common isolated organisms to be Pseudomonas aeruginosa (33.3%), Staphylococcal aureus (33.3%) followed by coagulase negative staphylococcus (21.1%)[8]. The slight differences observed in the isolates and species may be because of geographical and/or ethnic variations. The current study includes the drug sensitivity and resistance patterns and it was observed that some drugs/drug groups were not effective for almost all of the organisms cultured as evident from the table 4. A local study has found imipenem to be the most effective drug for Pseudomonas aeruginosa followed by ciprofloxacin, ofloxacin and cephaolsporins[9]. Other studies also have the similar conclusions[17,18]. In other study conducted at Dera Ismail Khan showed the similar results with predominance of Pseudomonas aeruginosa in CSOM followed by Staphylococcus aureus and they found 100% sensitivity of Pseudomonas to tazocin/piperacillin and 88% to levofloxacin[19]. An other international study found Staphylococcus aureus to be the commonest isolate (32.2%) followed by Pseudomonas aeruginosa (26.9%) and Klebsiella (10.4%)[20]. It seems that empiric therapy with topical ciprofloxacin and ofloxacin have an effective, safe and relatively inexpensive treatment for otorrhea in reducing the duration of illness and avoiding the complications of CSOM. The same study found that imipenem, ciprofloxacin, ofloxacin, amikacin and co-amoxiclave are effective against Staphylo aureus[9]. Based on the results the authors recommend that fosfomycin to be used as first line drug (oral preparation) for CSOM with an addition of either gentamycin, ciprofloxacin or ofloxacin (topical preparation) while the injectables preparations

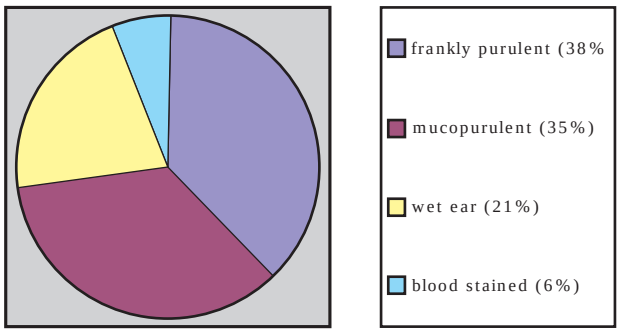

Figure 1: Percentages of different ear discharge.

ORGANISMS CULTURED (TOTAL DISCHARGING EARS=195)	
PSEUDOMONAS AERUGINOSA	75 EARS (38.46%)
STREPTOCOCCAL PNEUMONIAE	26 EARS (13.33%)
ESCHERICHIA COLI	26 EARS (13.33%)
STAPHYLOCOCCAL coagulase positive SP.	13 EARS (6.66%)
KLEBSIELLA SP.	12 EARS (6.15%)
PROTEUS SP.	18 EARS (9%)
NEGATIVE FOR ANY ORGANISM	25 EARS (12.8%)
TOTAL DISCHARGING EARS	195 EARS

Table 1: Cases and %s of organism cultured.

MOST COMMON DRUGS FOR WHICH RESISTANCE OBSERVED FOR CULTURED ORGANISMS (TOTAL POSITIVELY CULTURED EARS=170)	
CEPHALOSPORIN GROUP (most of them except Cefoperazone/Sulbactam)	71 EARS (41.76%)
MACROLIDE GROUP (Erythromycin/Azithromycin/Clarithromycin)	31 EARS (18.23%)
PENICILLIN GROUP (except Co-amoxicalve, Tazocin)	26 EARS (15.29%)
CHLORAMPHENICOL	22 EARS (12.94%)
TETRACYCLINE GROUP (Doxycycline)	20 EARS (11.76%)

Table 2: Drug resistance observed in antibiograms.

MOST COMMON DRUGS FOR WHICH SENSITIVTY OBSERVED FOR ORGANISMS CULTURED (TOTAL POSITIVELY CULTURED EARS=170)	
Most of QUINOLONES	49 EARS (28.82%)
CARBAPENEMS (Imipenem, Meropenem)	38 EARS (22.35%)
VANCOMYCIN	31 EARS (18.23%)
CEPHALOSPORIN GROUP (Cefoperazone/Sulbactam)	29 EARS (17.05%)
AMINOGLYCOSIDE GROUP (Amikacin, Tobramycin)	13 EARS (07.64%)
FOSFOMYCIN	10 EARS (05.8%)

Table 3: Drugs sensitivity observed in antibiograms.

INDIVIDUAL PATHOGENS' SENSITIVITY AND RESISTANCE TO DIFFERENT DRUGS

ORGANISM	SENSITIVITY	RESISTANCE
PSEUDOMONAS AERUGINOSA	Ceftazidime, Cefoperazone/Sulbactam, Cefepime, Amikacin, Fosfomycin, Quinolone goup, Carbapenems	Chloramphenicol, Co-trimoxazole, Gentamycin, Tobramycin, most of Cephaolsporins
E COLI	Cefoperazone/Sulbactam, Amikacin, Gentamycin, Tazocin, Quinolones, Carbapenems	Tetracyclines, Macrolides, Cefexime, Cefuroxime, Cefepime
STREPTOCOCCAL PNEUMONIAE	Penicillin, Tazocin, Quinolones, Ceftriaxone, Cefoperazone/Sulbactam, Fosfomycin, Azithromycin, Clarithromycin	Most of Aminoglycosides, Cephradine, Cefuroxime, Cefixime, Tetracyclines
STAPHYLOCOCCAL AUREUS	Co-amoxiclave, Fosfomycin,Vancomycin, Quinolones & Aminoglycosides,	Macrolides, Cefuroxime, Ceftazidime
KLEBSIELLA SPP.	Most of Quinolones, Fosfomycin, Cefoperazone/Sulbactam	Most of Cephalosporins, Macrolides, Tetracyclines
PROTEUS SPP.	Carbapenems, Quinolones Cefoperazone/Sulbactam, Tobramycin, Gentamycin, Amikacin	Most of Macrolides, Tetracyclines & Cephalosporins

Table 4: Individual pathogens' sensitivity and resistance spectrum to various drugs/drug groups.

(carbapenems, vancomycin, cefoperazone/sulbactam, co-amoxiclave and quinolones) may be reserved for the severe infections.

CONCLUSION: The authors conclude that although the pattern of isolated organisms were not different from that published in literature, however, unjustified use of anti-microbial agents without culture and sensitivity is responsible for the emerging resistance of the involved pathogens. It is thereby recommended that the correct management is with an early culture and sensitivity that would control this rapid trend of emerging resistant organisms.

REFERENCES

1. Roland PS. Chronic suppurative otitis media: a clinical review. Ear Nose Throat J 2008;81: 8-10.
2. Alam J, Udaipurwala IH, Jalisi M. Surgical management of CSOM: experience at Civil hospital Karachi. Pakistan J Otolaryngol 2000;16: 36-9.
3. Browning GG. Aetiopathology of inflammatory conditions of the external and middle ear. In Kerr AG, editor. Scott Brown's Otolaryngology. Vol 3. London: Arnold;1997: 1-37.
4. Chronic suppurative otitis media: Burden of illness and management options. World Health Organization, Geneva 2004.
5. World Development Report 1993: Investigating in health. Wahsington DC, World Bank/World Health Organization 1993.
6. Murray CJL, Lopez AD. DALYs by age, sex and cause (thousands), 1990. In: Murray CJL, Lopez AD. Global burden of disease. Geneva, World Health Organization 1996: 541-67.
7. Otirombe KN, Ugutu B. Intention-to-treat analysis in the chronic suppurative otitis media trials. East Afr Med J 2003;80: 300-11.
8. Loy AH, Tan AL, Lu PK. Microbiology of chronic suppurative otitis media. Singapore Med J 2002;43: 296-9.
9. Ahmed S, Iqbal MA, Hassan-ul-Zaheer, Tassuduq K, Ali L, Pervaiz Q. Spectrum and bacterial isolates in chronic suppurative otitis media in Khuzdar. Pak J Otolaryngol 2006;22: 34-6.
10. Browning GG, Merchant SN, Kelly G, Swan IRC, Canter R, McKerrow WS. Chronic otitis media. In Gleeson M, editor. Scott Brown's Otolaryngology and Head and Neck Surgery. Vol 3. London: Hodder Arnold: 2008: 3395-445.
11. Bluestone CD. Epidemiology and pathogenesis of chronic suppurative otitis media: implications for prevention and treatment. Int J Pediatr Otorhinolaryngol 1998;42: 207-33.
12. Bluestone CD. Pathogenesis of otitis media: role of eustachian tube. J Pediatr Infect Dis 1996;15: 281-91.
13. Argeudas A, LoaizaC, Herrerra JF, Mohs E. Antimicrobial therapy for children with chronic suppurative otitis media without cholesteatoma. J Pediatr Infect Dis 1994;13: 872-82.14. Kenna MA, Bluestone CD, Reily JS, Lusk RP. Medical management of chronic suppurative otitis media without cholesteatoma in children. Laryngoscope 1986:96: 146-51.
15. Khemani A, Akhund AA, Shaikh RB. Bacteriology and its effect on clinical presentation and treatment results of CSOM. Med Channel 1999;1: 35-8.
16. Poorey VK, Iyer A. A study of bacterial flora in CSOM and its clinical significance. Indian J Otolaryngol Head Neck Surg 2002;54: 91-5.
17. Grewal DS, Hathiram BT, Dwivedi A, Kumar L, Seth K, Srivartava S. Labyrinthine fistula: a complication of chronic suppurative otitis media. J Laryngol otol 2003;117: 353-7.
18. Paap Z, Rezes S, Jokay I, Szikai I. Sensorineural hearing loss in chronic suppurative otitis media. Otol Neurotol 2003;24: 141-4.
19. Iqbal K, Khan MI, Satti L. Microbilogy of chronic suppurative otitis media: experience at Dera Ismail Khan. Gomal J Med Sci 2011;9: 189-93.
20. Shrestha BL, Amatya RCM, Shrestha I, Ghosh I. Microbiological profile of chronic suppurative otitis media. Nepalese J ENT and Head Neck Surg 2011;2: 6-7.