

SUSCEPTIBILITY PATTERN OF COMMONLY ISOLATED MICROORGANISMS FROM CHRONIC SUPPURATIVE OTITIS MEDIA

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ABSTRACT

Background: The knowledge of the local pattern of infection in chronic suppurative otitis media is essential to enable efficacious treatment for it. The objective of the study was to study the bacterial flora and their antimicrobial susceptibility pattern among isolated pathogens of chronic suppurative otitis media.

Material & Methods: This cross-sectional study was carried out in the Department of ENT, Khyber Teaching Hospital, Peshawar from January 2014 to December 2014. A sample size of 123 patients was selected through consecutive sampling technique. Swabs taken from the ear discharge were subjected to culture and sensitivity tests using modified Kirby Bauer disk diffusion method.

Results: Out of 123 specimens, there were 110 (89.45%) positive cultures for bacteria. The most common causal organisms isolated were *Pseudomonas aeruginosa* in 35 (31.8%) and *Staphylococcus aureus* in 32 (29.1%) followed by *Proteus* species in 16 (14.55%) and *Morganella* in nine (8.25%) cases. Antibiotic sensitivity pattern of *Pseudomonas aeruginosa* showed 100% sensitivity to meronem while *Staphylococcus aureus* were 100% sensitive to vancomycin.

Conclusion: The commonest isolates were *Pseudomonas aeruginosa* and *Staphylococcus aureus* in chronic suppurative otitis media patients. *Pseudomonas aeruginosa* showed 100% sensitivity to meronem while *Staphylococcus aureus* were 100% sensitive to vancomycin.

KEY WORDS: Suppurative otitis media; Culture; Kirby-Bauer disc diffusion method; *Pseudomonas aeruginosa*; *Staphylococcus aureus*; *Morganella morganii*; *Escherichia coli*; Vancomycin; Ceftazidime; Cefotaxime.

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INTRODUCTION

The global prevalence of CSOM is approximately 65-330 million per year, with high prevalence from Southeast Asia, Western Pacific, and African continent.¹ Chronic suppurative otitis media (CSOM) is a commonly encountered infection of middle ear. It is a condition associated with perforated tympanic membrane with persistent discharge from the middle ear that last for more than 6-12 weeks which is relatively difficult to treat.^{2,3} CSOM is usually initiated by an acute episode of infection where inflammation of the middle ear occurs. Thus the knowledge of the local pattern of infection is essential to enable efficacious treatment of CSOM. The most commonly re-

ported microorganism is *Pseudomonas aeruginosa* followed by *Staphylococcus aureus*.^{4,5} Nevertheless, the etiology changes from time to time with changes in the susceptibility patterns of microorganisms to the commonly used antibiotics.

The objective of the study was to study the bacterial flora and their antimicrobial susceptibility pattern among isolated pathogens of chronic suppurative otitis media.

MATERIAL AND METHODS

This cross-sectional study was carried out in the Department of Otolaryngology and Head & Neck Surgery, Khyber Teaching Hospital, Peshawar, Pakistan from January 2014 to December 2014. A sample size of 123 patients was selected through consecutive non-probability sampling technique. An informed consent was taken from each patient. Ethical approval for the study was also taken from Hospital Ethical and Research Committee.

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All patients with perforated tympanic membranes and active purulent discharge were included in the study. Patients who had received antibiotic therapy (topical or systemic) within last five days and patients with cholesteatoma were excluded.

Specimens were collected in sterile containers from the ear discharge using pre-packed cotton swabs and sent to Microbiology Department of Khyber Medical College, Peshawar without delay where they were cultured for 24 hours at 37°C aerobically. Bacteria grown were cultured and identified using gram staining techniques and other relevant biochemical tests. Antibiotic susceptibility was determined by standard Kirby-Bauer disc diffusion method using different antibiotics from different groups of antimicrobial agents. Briefly describing, Mueller-Hinton agar was prepared in distilled water. The mixture was thoroughly mixed with constant agitation. Upon boiling for 1 minute, all the constituents were dissolved, autoclaved for 15 minutes at 121°C and dispensed the sterilized medium to sterilized petri dishes with approximate 4 mm thickness of medium under aseptic condition. Culture sensitivity discs for commonly used antibiotics (cephradine, ceftazidime, cefotaxime, cefexime, ciprofloxacin, levofloxacin, amikacin, tazocin, meronem and gentamicin) were used against the most commonly isolated microorganisms (*Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Proteus* species and *Morganella morganii*). Zone of inhibition was determined.

The demographic variables were sex and age grouping. The research variables were isolation of microorganisms and their susceptibility to various antimicrobials. Age in years was categorized as; < 11 years, 11-20 years, 21-30 years, 31-40 years, 41-50 years, 51-60 years, and > 60 years. Age grouping was ordinal data and the rest were nominal data. Frequency and relative frequency were calculated using SPSS V. 16 (SPSS Inc., Chicago, IL, USA).

RESULTS

Out of 123 specimens, 69 (56.1%) were from male and 54 (43.9%) from female patients. The modal age group was of 11-20 years with frequency of 43 (34.95%). Table 1

Out of 123 specimens, there were 110 (89.45%) positive cultures for bacteria. One hundred & six patients (63.3%) had a single organism isolated from the culture; four (3.25%) patients had two or more organisms isolated, and the remaining 13 (10.56%) patients had sterile cultures. The most common causal organism isolated was *Pseudomonas aeruginosa* in 35 (31.8%). Table 2

Antibiotic sensitivity pattern of *Pseudomonas aeruginosa* showed 100% sensitivity to meronem while *Staphylococcus aureus* were 100% sensitive to vancomycin. Table 3 and Table 4

DISCUSSION

The frequency of complications of CSOM was very high i.e. 2.3% of the cases in the past; it has decreased to 0.15-0.4% with the development of newer antibiotics. But it is still high in the underdeveloped countries like Pakistan because of late presentation and poor socioeconomic status of the people.⁶ The treatment of active stage of chronic suppurative otitis

Table 1: Patients with CSOM in different age groups. (n=123)

Age (years)	Frequency	Relative frequency (%)
<10	10	08.10
11-20	43	34.95
21-30	19	15.45
31-40	22	17.95
41-50	16	13.00
51-60	08	06.55
>60	05	04.00
Total	123	100.00%

Table 2: Isolated microorganisms from the swab of CSOM patients (n=110)

S. No.	Types of organisms	Frequency of isolates	Relative frequency of isolates
1	<i>Pseudomonas aeruginosa</i>	35	31.80
2	<i>Staphylococcus aureus</i>	32	29.10
3	<i>Proteus</i> spp.	16	14.55
4	<i>Morganella morganii</i>	09	08.25
5	<i>Escherichia coli</i>	04	03.65
6	<i>Citrobacter</i> spp.	04	03.65
7	<i>Enterobacter</i> spp.	02	01.80
8	<i>Klebsiella pneumonia</i>	01	00.90
9	<i>Aspergillus</i>	01	00.90
10	<i>Serratia</i>	01	00.90
11	<i>Staphylococcus epidermidis</i>	01	00.90
12	<i>Pseudomonas</i> +- Staph	03	02.70
13	Staph+Enterobacter	01	00.90
	Total	110	100%

Table 3: Sensitivity of *Pseudomonas aeruginosa* to various antibiotics (n=35)

S. No.	Antibiotics	Frequency of sensitive Isolates	Relative frequency
1	Ceftazidim	31	88.55
2	Cefotaxime	13	37.15
3	Cefixime	00	00.00
4	Ciprofloxacin	18	51.40
5	Levofloxacin	09	25.70
6	Amikacin	27	77.10
7	Tazocin (Tazobactam-Piperacillin)	33	94.28
8	Meronom	35	100.00
9	Gentamicin	12	34.00

Table 4: Sensitivity of *Staph. Aureus* to various antibiotics (n=32)

S. No.	Antibiotics	Frequency of sensitive Isolates	No of sensitive Isolates
1	Ceftazidim	23	71.90
2	Cefotaxime	25	78.10
3	Levofloxacin	22	68.74
4	Cefixime	13	40.60
5	Ciproxin	23	71.90
6	Amikacin	30	93.75
7	Tazocin (Tazobactam-Piperacillin)	31	96.85
8	Gentamicin	17	53.10
9	Vancomycin	32	100.00

media needs to be instituted as early as possible to avoid its related complications like labyrinthitis, facial nerve paralysis and intracranial abscesses. In our study majority of the patients were in their second decade of life, which is also supported by another local study.⁷ Contrary to our reports another study has reported majority of the patients in third decade of life.⁸ Our study reveals male predominance, with similar results reported by other studies as well.^{7,8} But on the other hand another local study has reported a female predominance.⁹ The most probable reason for predominance of male patients in our study may be due to reason that female patients are not brought out of their homes in our society, and they do not get the preferential treatment.

Our results showed that active CSOM infection in the tertiary care hospital is mainly due to *Pseudomonas aeruginosa* and *Staphylococcus aureus*.

Almost similar results regarding the pattern of CSOM infection have been reported by other studies.¹⁰⁻¹³ Contrary to our results other studies^{14,15} have reported an isolation of anaerobes in significant number of their patients.

In the present study *Pseudomonas aeruginosa* was shown to be 100% sensitive to meronom; a carbapenem group of antibiotics. Local literature has also reported similar results.^{16,17} Third-generation cephalosporins are most frequently prescribed in active stage of CSOM and displays an extended gram negative coverage. In our study 88% of *P. aeruginosa* isolates were found to be sensitive to ceftazidime which is also supported by another study.¹⁸ On the other hand only 37% of isolates showed sensitivity to cefotaxime in our study; meaning that in our set up, ceftazidim is effective but resistance against cefotaxime has increased in the recent past.

Staphylococcus aureus; the second most common isolate in our study was 100% sensitive to vancomycin, 97% to tazocin, 93% to amikacin, 78% to cefotaxime and 72% to ceftazidim. This susceptibility pattern of *Staphylococcus aureus* found in our study against most of the antimicrobials is almost consistent with local literature.^{13,19,20} The third most commonly isolated organism *Proteus* spp. was sensitive to ceftazidime, cefotaxime, ciprofloxacin, amikacin, tazocin, and ceftriaxone in descending order.

CONCLUSION

The commonest isolates were *Pseudomonas aeruginosa* and *Staphylococcus aureus* in chronic suppurative otitis media patients. *Pseudomonas aeruginosa* showed 100% sensitivity to meronom while *Staphylococcus aureus* was 100% sensitive to vancomycin.

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REFERENCES

1. Acuin J. Chronic suppurative otitis media - burden of illness and management options. 2004. Geneva; World Health Organization.
2. Wright D, Safranek S. Treatment of otitis media with perforated tympanic membrane. *Am Fam Physician* 2009; 79:650-54.
3. Vikram BK, Khaja N, Udayashankar SG, Venkatesha BK, Manjunath D. Clinico-epidemiological study of complicated and uncomplicated chronic suppurative otitis media. *J Laryngol Otol* 2008; 122:442-6.
4. Mawson S, Polack M. Special role of *Pseudomonas aeruginosa* in chronic suppurative otitis media. *Ann Otol Rhinol Laryngol Head Neck Surg* 1988; 97:10-13.

5. Kenna M. Etiology and pathogenesis of chronic suppurative otitis media. *Arch Otolaryngol Head Neck Surg* 1988; 97:16-7.
6. Hussain A, Khan AR. Frequency of intra-cranial complications in chronic otitis media. *J Ayub Med Coll Abbottabad* 2005; 17:75-7.
7. Bento R, de Brito R, Ribas GC. Surgical management of intracranial complications of otogenic infection. *Ear Nose Throat J* 2006; 85:36-9.
8. Baig MM, Ajmal M, Saeed I, Fatima S. Prevalence of cholesteatoma and its complications in patients of chronic suppurative otitis media. *J Rawalpindi Med Coll* 2011; 15:16-7.
9. Memon MA, Matiullah S, Ahmed Z, Marfani MS. Frequency of un-safe chronic suppurative otitis media in patients with discharging ear. *J Liaquat University Med Health Sci* 2008; 7:102-5.
10. Iqbal K, Khan MI, Satti L. Microbiology of chronic suppurative otitis media: experience at Dera Ismail Khan. *Gomal J Med Sci* 2011; 9:189-93.
11. Sabella C. Management of otorrhea in infants and children. *Paediatr Infect Dis J* 2000; 19: 1007-8.
12. Masud-ul-Haq, Tariq TM, Jalil S. Chronic suppurative otitis media: a study in children of female hospital workers. *Pak Pediatr J* 2002; 26: 155-65.
13. Aslam MA, Ahmad Z, Azim R. Microbiology and drug sensitivity patterns of chronic suppurative otitis media. *J Coll Physicians Surg Pak* 2004; 14:459-61.
14. Brook I. Microbiology and management of chronic suppurative otitis media in children. *J Trop Pediatr* 2003; 49:196-9.
15. Kuczkowski J, Samet A, Brzoznowski W. Bacteriologic evaluation of otitis externa and chronic otitis media. *Otolaryngol Pol* 2000;54: 551-6.
16. Gull AA, Ali L, Rahim E, Ahmad S. Chronic suppurative otitis media: frequency of *Pseudomonas aeruginosa* in patients and its sensitivity to various antibiotics. *Professional Med J* 2007; 14: 411-15.
17. Ahmad S, Iqbal MA, Hassan Z, Khurshid T, Ali L, Pervez Q. Spectrum and bacterial isolates in chronic suppurative otitis media in Khuzdar. *Pak J Otolaryngol* 2006; 22: 34-6.
18. Mansoor T, Musani MA, Khalid G, Mamal M. *Pseudomonas aeruginosa* in chronic suppurative otitis media: sensitivity spectrum against various antibiotics in Karachi. *J Ayub Med Coll Abbottabad* 2009; 21: 120-3.
19. 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.
20. Ahmad B, Hydri AS, Afridi AAK, Ejaz A, Farooq S, Zaidi SK. Microbiology of ear discharge in Quetta. *J Coll Physicians Surg Pak* 2005; 15: 583-4.

CONFLICT OF INTEREST
Authors declare no conflict of interest.
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None declared.