**Original article:**

**Assessment of bacteriology and drug susceptibility in chronic suppurative otitis media in ENT outpatients**

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**Abstract:**

**Aim:** To assess bacteriology and drug susceptibility in chronic suppurative otitis media in ENT outpatients.

**Methodology:** One hundred five adult patients of CSOM in age ranged 20-40 years of either sex was enrolled. The ear discharge is collected using sterile cotton wool swabs under aseptic precautions. Swabs are then transported to the laboratory. The first swab was used to make a smear on a glass slide for direct smear examination by Gram's stain. The second swab was processed for the isolation of aerobic bacteria. The swab on reaching laboratory was inoculated on the following culture media: MacConkey agar and Blood agar. Antibiotic sensitivity testing is performed by Kirby-Bauer disc diffusion method according to CLSI guidelines.

**Results:** Out of 105 patients, males were 65 and females were 40. Organisms isolated were Stap. Aureus in 38, Pseudomonas in 30, E. coli in 22, Klebsiela in 8 and Proteus mirabilis in 5 cases. Antibiotic susceptibility pattern in Staphylococcus aureus and Pseudomonas against cotrimoxazole was 100% and 30%, Teicoplanin was 95% and 90%, Cefotaxime was 94% and 42%, Oxacillin was 100% and 25%, ciprofloxacin was 91% and 45%, erythromycin was 65% and 82%, levofloxacin was 26% and 80%, linezolid was 92% and 74% and azithromycin was 56% and 45%. A significant difference was observed (P< 0.05).

**Conclusion:** S. aureus, Pseudomonas and E. coli were the most frequently isolated organisms in patients with ear infection.

**Key words:** Chronic suppurative otitis media, ear infection, Pseudomonas, Staphylococcus Aureus

**Introduction**

The diagnosis of chronic suppurative otitis media (CSOM) implies a permanent abnormality of the pars tensa or flaccida, most likely a result of earlier acute otitis media, negative middle ear pressure, or otitis media with effusion.1 Chronic otitis media (COM) equates with the classic term chronic “suppurative” otitis media that is no longer advocated as COM is not necessarily a result of “the gathering of pus.” The prevalence of disease is approximately 7.2%.2

The disease usually occurs after upper respiratory viral infections followed by invasion of pyogenic organisms. Many studies have showed that the common organisms isolated from cases of CSOM are found to be Pseudomonas spp, Staphylococcus aureus, Klebsiella pneumoniae, and Proteus spp.3 It is calculated that about 13.8%–36.2% of the people have hearing impairment due to CSOM. The classic type of hearing loss described for this condition is conductive. However, several investigators have reported sensorineural hearing loss do occur concomitantly or as sequelae of CSOM.4

Frequent upper respiratory tract infections and poor socioeconomic conditions (overcrowded housing and poor hygiene and nutrition) are often associated with the development of CSOM.5 The deafness caused by CSOM of safe type was usually considered to be purely of conductive type. In unsafe type of CSOM, the sensorineural deafness is known usually due to labyrinthitis and cholesteatoma.6 Occasionally, in fatal condition, CSOM can lead to fatal intracranial infections and acute mastoiditis. Because of misuse and overuse of antibiotics, antibiotic drug resistance (ADR) is increasing among the pathogens causing CSOM which makes this mandatory for periodic surveillance of microbiological and sensitivity profile of CSOM.7 Considering this, we attempted present study to assess bacteriology and drug susceptibility in chronic suppurative otitis media in ENT outpatients.

**Methodology**

After considering the utility of the study and obtaining approval from ethical review committee of the institute, we selected one hundred five adult patients of CSOM in age ranged 20-40 years of either sex. Cases having symptoms of active ear discharge for more than 6 weeks were considered as CSOM. Patients suffering from SOM who are on systemic antibiotics and on topical medications to the ear were excluded.

The ear discharge is collected using sterile cotton wool swabs under aseptic precautions. Swabs are then transported to the laboratory. The first swab was used to make a smear on a glass slide for direct smear examination by Gram's stain. The second swab was processed for the isolation of aerobic bacteria. The swab on reaching laboratory was inoculated on the following culture media: MacConkey agar and Blood agar. Antibiotic sensitivity testing is performed by Kirby-Bauer disc diffusion method according to CLSI guidelines. The results were compiled and subjected for statistical analysis using Mann Whitney U test. P value less than 0.05 was set significant.

**Results**

**Table I Patients distribution**

|  |  |  |
| --- | --- | --- |
| **Total- 105** | | |
| **Gender** | **Male** | **Female** |
| Number | 65 | 40 |

Out of 105 patients, males were 65 and females were 40 (Table I).

**Table II Organisms isolated from patients**

|  |  |  |
| --- | --- | --- |
| **Organisms** | **Number** | **P value** |
| Stap. Aureus | 38 | <0.05 |
| Pseudomonas | 30 |
| E. coli | 22 |
| Klebsiela | 8 |
| Proteus mirabilis | 5 |

Organisms isolated were Stap. Aureus in 38, Pseudomonas in 30, E. coli in 22, Klebsiela in 8 and Proteus mirabilis in 5 cases. A significant difference was observed (P< 0.05) (Table II, graph I).

**Graph I** **Organisms isolated from patients**

**Table III Antibiotic susceptibility pattern**

|  |  |  |  |
| --- | --- | --- | --- |
| **Drug** | **Staphylococcus aureus** | **Pseudomonas** | **P value** |
| Cotrimoxazole | 100% | 30% | <0.05 |
| Teicoplanin | 95% | 90% |
| Cefotaxime | 94% | 42% |
| Oxacillin | 100% | 25% |
| ciprofloxacin | 91% | 45% |
| erythromycin | 65% | 82% |
| levofloxacin | 26% | 80% |
| linzolid | 92% | 74% |
| azithromycin | 56% | 45% |

Antibiotic susceptibility pattern in Staphylococcus aureus and Pseudomonas against cotrimoxazole was 100% and 30%, Teicoplanin was 95% and 90%, Cefotaxime was 94% and 42%, Oxacillin was 100% and 25%, ciprofloxacin was 91% and 45%, erythromycin was 65% and 82%, levofloxacin was 26% and 80%, linezolid was 92% and 74% and azithromycin was 56% and 45%. A significant difference was observed (P< 0.05) (Table III, graph II).

**Graph II** **Antibiotic susceptibility pattern**

**Discussion**

Chronic suppurative otitis media (CSOM) is characterized by repeated otorrhea via tympanic membrane perforation.8,9 Chronic suppurative otitis media often leads to conductive hearing loss and constitutes a risk factor for permanent sensorineural hearing loss because of inner ear injury as well as intracranial complications.10,11 Chronic suppurative otitis media is a major public health problem in poor and developing countries like India. According to a report by WHO, India belongs to the highest (>4%) CSOM-prevalent countries.12,13 Thus, early diagnosis, knowledge of regional etiological agents and an effective antibiotic policy can curtail the development of CSOM in fatal cases.14,15 We attempted present study to assess bacteriology and drug susceptibility in chronic suppurative otitis media in ENT outpatients.

Our results showed that out of 105 patients, males were 65 and females were 40. Organisms isolated were Stap. Aureus in 38, Pseudomonas in 30, E. coli in 22, Klebsiela in 8 and Proteus mirabilis in 5 cases. Mirza et al16 in their study a total of 178 patients with unilateral or bilateral active chronic suppurative otitis media attending the outpatient clinic were included in the study. All the patients were evaluated through detailed clinical history and clinical examination. Pus samples were collected from the discharging ear(s) and sent to microbiology section of hospital laboratory where aerobic cultures were done. Antibiotic sensitivity testing was done with standard antibiotic discs using Kirby-Bauer disk diffusion method as per National Committee for Clinical Laboratory Standards recommendations. From the clinical specimens of 178 patients enrolled in the study, microbiological culture was yielded from 130 (73%) specimens. There were 116, (89%) bacterial isolates and 14, (11%) fungi. Pseudomonas aeruginosa 58 (45%) was the most common isolate, followed by Staphylococcus aureus 52 (40%) including two isolates of Methicillin resistent Staphylococcus Aureus (MRSA). Antibiotic sensitivities of Pseudomonas aeruginosa showed that 100% isolates were sensitive to Piperacillin/Tazobactam, where as 86% isolates were sensitive to ceftazidime and 83% to ciprofloxacin. Only 45% of Pseudomonas aeruginosa isolates were sensitive to gentamicin and 48% to amikacin. For Staphylococcus aureus (other than MRSA), 100% isolates were sensitive to cloxacillin, 80% to ciprofloxacin and 68% to gentamicin. Only 60% isolates were sensitive to chloramphenicol and 32% to cotrimoxazole.

Our results showed that organisms isolated were Stap. Aureus in 38, Pseudomonas in 30, E. coli in 22, Klebsiela in 8 and Proteus mirabilis in 5 cases. Loy et al17 assessed the microflora and the antibiograms of patients with chronic suppurative otitis media (CSOM) in Singapore. Ninety patients with CSOM were prospectively studied. They had chronic ear discharge and had not received antibiotics for the previous five days. Swabs were taken, and cultured for bacteria. Antibiotic testing was done using modified Kirby Bauer disk diffusion method. In addition to the usual antibiotics, the three most common topically available antibiotics (chloramphenicol, gentamicin and neomycin) were tested. There were 135 positive cultures for organisms from the 90 patients. The most common causal organisms isolated were Pseudomonas aeruginosa (33.3%) and Staphylococcus aureus (33.3%) followed by coagulase negative Staphylococcus (21.1%). Fungi accounted for 8.8% of isolates while 6.6% were anaerobes. Of the three antibiotics commonly available as topical eardrops, gentamicin has the highest susceptibility rate (82.6%), followed by neomycin (67.8%) and chloramphenicol (62.8%).

We observed that antibiotic susceptibility pattern in Staphylococcus aureus and Pseudomonas against cotrimoxazole was 100% and 30%, Teicoplanin was 95% and 90%, Cefotaxime was 94% and 42%, Oxacillin was 100% and 25%, ciprofloxacin was 91% and 45%, erythromycin was 65% and 82%, levofloxacin was 26% and 80%, linezolid was 92% and 74% and azithromycin was 56% and 45%. Attallah18 reported the result of causative organisms in chronic suppurative otitis media with cholesteatoma. Eighty- eight patients clinically diagnosed with chronic suppurative otitis media with cholesteatoma, and confirmed intra-operatively and by histological examination were pre-operatively studied for the causative bacteria and fungi. A single isolate was obtained in 42 (48%) cases, no growth was isolated in 11 (12.5%) cases. Most common bacteria isolated were, Pseudomonas aeruginosa in 51%, Staphylococcus aureus in 31%, and Proteus species in 17%. Among the 15 fungal isolates, 9 (10%) were Aspergillus species and the remaining 6 (7%) were Candida albicans. Conventional ear swabs taken under direct vision using an operating microscope are reliable in establishing the microbiological profile of chronic suppurative otitis media.

**Conclusion**

S. aureus, Pseudomonas and E. coli were the most frequently isolated organisms in patients with ear infection.

**References**

1. Taj Y, Essa F, Kazmi SU. Pathological analysis of 596 cases of chronic suppurative otitis media in Karachi. J Coll Physicians Surg Pak. 2000; 10: 33-5.
2. Hivemath SL, Kanta RC, Yeshwanthrao M, Vasantha kumar CM. Aerobic bacterial isolates of CSOM and their antibiotic sensitivity pattern. Ind Pract 2001; 54(7): 486-89.
3. Poorey VK, Lyer A. Study of bacterial flora in CSOM and its clinical significance .Ind J Otolaryngol and Head & Neck Surg 2002 ; 54(2) : 91-8.
4. Altuntas A, Aslam A, Eren A, Unal A, Nalca Y. Susceptibility of microorganisms isolated from chronic suppurative otitis media to ciprofloxacin. Eur Arch Oto-rhino-laryngol 1996; 253: 364-66.
5. Jang CH, Park SY. Emergence of ciprofloxacin resistant pseudomonas in chronic suppurative otitis media. Cli Otolaryngol 2004; 29:321-23.
6. Kardar AA, Usman M, Tirmizi S. Topical quinolones versus topical aminoglycosisdes in the medical management of chronic suppurative otitis media; A comparative trial. J Surg Pakistan 2003; 8; 4: 6-9.
7. Couzos S, Lea T, Mueller R, Murray R, Culbong M. Effectiveness of ototopical antibiotics for chronic suppurative otitis media in aboriginal children: A community-based, multicentre, double-blind randomised controlled trial. Med J Aust 2003;179:185-90.
8. Srivastava A, Singh R, Varshney S, Gupta P, Bist S, Bhagat S, et al. Microbiological evaluation of an active tubotympanic type of chronic suppurative otitis media. Nepal J ENT Head Neck Surg 2011;12:14-6.
9. World Health Organization. Chronic Suppurative Otitis Media: Burden of illness and Management Options. Geneva: World Health Organization; 2004.
10. Ogisi FO. Impedance screening for otitis media with effusion in Nigerian children. J Laryngol Otol 1988;102:986-8.
11. 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;21:120-3.
12. Ahmed A, Usman J, Hashim R. Isolates from chronic suppurative otitis media and their antimicrobial sensitivity. Pak Armed Forces Med J 1999;49:82-5.
13. Fatma AA, Assiry S, Siraj MZ. Microbiological evaluation and aspects on management of chronic suppurativotitis media in Riyadh. Indian J Otol 1998;4:11520.
14. Vijaya D. Aerobes, anaerobes, and fungi in chronic suppurative otitis media. Indian J Otol 2000;6:558.
15. Abera B, Kibret M. Bacteriology and antimicrobial susceptibility of otitis media at dessieregional health research laboratory, Ethiopia. Ethiop J Health Dev 2011;25:161-7.
16. Mirza IA, Ali L, Arshad M. Microbiology of chronic suppurative otitis media-experience at Bahawalpur. PAFMJ. 2008 Dec 31;58(4):372-6.
17. Loy AHC, Tan AL, Lu PKS. Microbiology of chronic suppurative otitis media in Singapore. Singapore Med J 2002; 43(6): 296-99.
18. Attallah MS. Microbiology of chronic suppurative otitis media with cholesteatoma. Saudi medical journal. 2000 Oct 1;21(10):924-7.