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ORIGINAL RESEARCH PAPER

Microbiological profile of ear discharge of chronic suppurative otitis media (safe variety) patients

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ABSTRACT

Introduction*: Chronic suppurative otitis media is a notorious infection and a major health problem in developing countries causing serious local damage and threatening complications. Early and effective treatment based on the knowledge of causative micro-organisms and their antimicrobial sensitivity ensures prompt clinical recovery and possible complications can thus be avoided.* ***Aim****: This study was undertaken to identify the microbiological isolates of ear discharge in CSOM cases and their sensitivity to antibiotics.* ***Materials and methods****: A prospective study, a total of 50 patients having ear discharge who attended ENT OPD from Feb 2019 to July 2019 for a period of 6 months were studied. Aural swabs were sent to microbiology lab for gram staining and culture sensitivity.* ***Results****: Out of 50 samples, 32 were culture positive where Pseudomonas aeruginosa (37.5%) was the most common pathogen followed by Staphylococcus aureus (28.12%). Most of the cultured organisms were sensitive to drug Ciprofloxacin.* ***Conclusion****: The outcome of our study enabled us to set an empirical medical treatment for an early resolution of ear discharge and inflammation in our patients with CSOM as we could understand the aetiological pathogens and their susceptibility pattern. Effective medical treatment in obtaining a discharge free ear prior to surgical treatment led us to improve the surgical outcome in our patients with CSOM.*

Keywords: Tubo-tympanic; Pseudomonas aeruginosa; culture and sensitivity.

INTRODUCTION

Chronic Suppurative otitis media (CSOM) denotes chronic inflammation within the mucosa of middle ear and mastoid leading to production of ear discharge via tympanic membrane perforation.[1] CSOM results from long term Eustachian tube dysfunction with poorly aerated middle ear space, multiple bouts of acute otitis media and persistent middle ear infection.[2] Risk factors include mechanical obstruction of Eustachian tube due to adenoid hypertrophy, sinusitis, immunodeficiency and environmental factors such as lack of breast feeding in infancy, passive exposure to smoking and low socio economic status.[3]

Major cause of ear infection are bacterial isolates predominantly aerobic gram-negative bacteria such as Pseudomonas, E. coli, Proteus, klebsiella and gram-positive bacteria Staphylococcus spps. Anaerobic bacteria include bacteroid spps. Frequent upper respiratory tract infections and poor socio-economic status condition, overcrowded housing, poor hygiene, and poor nutrition may be related to development of CSOM.[4]

CSOM has profound impact on society by causing deafness in more than one third of the population in developing countries, and is believed to be responsible for more than two thirds of deafness in children thereby causing intellectual and educational problems. If untreated CSOM may lead to complications including septicemia, meningitis, brain abscess and facial palsy. Therefore, the microbial culture and sensitivity

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will help in appropriate management of otitis media and its complications and thus preventing the emergence of resistant bacterial strains.[5]

The treatment of CSOM is controversial and subject to change particularly in the developing countries, the prevalence and antibiogram of these organisms has been reported to vary with time and geographical area as well as continent to continent, probably due to indiscriminate use of antibiotics. Hence, the periodic update of prevalence and antibiogram of the etiological agents for CSOM would be helpful in therapy and management of patients.[6]

MATERIALS AND METHODS

Present study was carried out in 50 patients attending the Outpatient/in-patientsDepartment of Otorhinolaryngology, between Feb 2019 to July 2019 with clinical evidence of CSOM. A baseline data of cases were recorded including history, general examination, systemic examination, Otorhinolaryngological examination investigations and treatment received in the past.

From each patient of active CSOM, two swabs of the ear discharge are collected under aseptic precautions without surface contamination and are transported to Microbiology department. Only those cases were selected who had not taken any treatment either systemic or local in the form of ear drops for the last seven days. One swab was utilized for Gram's staining and the other was inoculated on Nutrient agar, Blood agar and MacConkey agar for bacterial culture. After overnight incubation at 37°C the culture plates were observed for growth. Single colony was stained by Gram's Method from each culture plate. Hanging drop was done if Gram negative bacilli were seen. The cultured bacteria are subjected to various biochemical tests depending on the organism like catalase test, oxidase test, urea hydrolysis test, phenol red test etc. The organism isolated was tested for antibiotic sensitivity on Mueller-Hinton agar by Kirby-Bauer disc diffusion method according to National Committee for Clinical Laboratory Standards (NCCLS) criteria.

Table 1 List of organisms isolated

Name of bacteria	No. of isolates	Percentage
GRAM NEGATIVE BACTERIA	21	65.62
Pseudomonas aeruginosa	12	37.5
E. coli	4	12.5
Klebsiella	3	9.37
Proteus	2	6.25
GRAM POSITIVE BACTERIA	11	34.38
Staphylococcus aureus	9	28.13
Staphylococcus saprophyticus	2	6.25

RESULTS

In our study out of 50 patients 29 (58%) were males and 21 (42%) were females with male and female ratio 1.38:1. And age range of 10-60 years.

Out of 50 samples collected from patients suffering fromtubo-tympanic CSOM in our study, 32 (64%) samples were culture positive and 18 (36%) were culture negative.

Among the 32 bacterial isolates, *Pseudomonas aeruginosa* was the most common bacterium cultured in 12 (37.5%) samples, followed by *Staphylococcus aureus* in 9 (28.12%), *E. coli* 4 (12.5%), *Klebsiella* 3 (9.37%), *Proteus* 2 (6.25%) and *Staphylococcus saprophyticus* 2 (6.25%) as indicated in **Table 1.**

Among the 12 isolates of *Pseudomonas aeruginosa*, it showed highest sensitivity to Imipenem, i.e. 11 out of 12 isolates were sensitive (92%) followed by Ciprofloxacin, 10 out of 12 (83%), Ceftazidime 10 out of 12 (83%), Levofloxacin 8 out of 12 (67%) as shown in **Table 2**.

Table 2 Antibiotic susceptibility pattern in Pseudomonas aeruginosa

Antibiotic	No. of isolates sensitive/out of	Percentage
Imipenem	11/12	92
Ciprofloxacin	10/12	83
Ceftazidime	10/12	83
Levofloxacin	8/12	67

Among the 9 isolates of *Staphylococcus aureus*, it showed highest sensitivity to Ciprofloxacin, i.e. 8 out of 9 (89%) followed by Gentamicin 6 out of 9 (67%), Ofloxacin 6 out of 9 (67%), Amoxycillin 5 out of 9 (56%), Linezolid 5 out of 9 (56%) as shown in **Table 3.**

Table 3 Antibiotic susceptibility pattern in Staphylococcus aureus

Antibiotic	No. of isolates sensitive/out of	Percentage
Ciprofloxacin	8/9	89
Gentamicin	6/9	67
Ofloxacin	6/9	67
Amoxycillin	5/9	56
Linezolid	5/9	56

Gram negative bacteria other than *Pseudomonas aeruginosa* were mostly sensitive to Ciprofloxacin, i.e. 8 out of 9 (89%), followed by Gentamicin 7 out of 9 (78%), Amoxycillin+Clavulanic acid 7 out of 9 (78%), Ceftazidime 6 out of 9 (67%), Amikacin 5 out of 9 (56%) as shown in **Table 4.**

Table 4 Antibiotic sensitivity pattern in gram negative bacteria other than *Pseudomonas aeruginosa*

Antibiotic	No. of isolates sensitive/out of	Percentage
Ciprofloxacin	8/9	89
Gentamicin	7/9	78
Amoxiclav	7/9	78
Ceftazidime	6/9	67
Amikacin	5/9	56

DISCUSSION

Among 50 samples collected from CSOM patients, 32 samples were bacterial culture positive with a culture positivity of 64%. In studies done by Vikas Khanna et al.,[7] VK Poorey et al.,[8] Tanmoy Dev et al.,[9] and SNikakhlagh et al.,[10] the culture positivity was 84%, 92%, 53% and 82% respectively.

In our study all were monobacterial cultures where as in studies done by Vikas Khanna et al.,[7] VK Poorey et al.,[8] polymicrobial or mixed cultures were obtained in 39% and 10% respectively.

Out of 32 bacterial isolates in the present study *Pseudomonas aeruginosa* was the predominant bacterium in 12 (37.5%) followed by *Staphylococcus aureus* in 9 (28.12%) isolates. Kenna et al.,[11] found that Pseudomonas was the predominant organism (67%) in their study. In study done by Vikas Khanna et al.,[7] the most common bacterial isolate was Pseudomonas aeruginosa (40.57%), followed by Staphylococcus aureus in 36.23% of cases. SNikakhlagh et al.,[10] studied that Staphylococcus aureus is the common isolate in 32.4% followed by 21.69% of Pseudomonas aeruginosa. VKPoorey et al.,[8] observed that Pseudomonas pyocyaneous was the most common organism isolated in 35.2%, followed by Klebsiella aerogenes in 25.4%. The observations made from different studies indicate that there can be variation in causative organism based on ethnic, geographic factors.

In the present study Ciprofloxacin drug has emerged as the most effective antibiotic useful for the patients in our study which is sensitive against more than 80% of *Pseudomonas*, *Staphylococci* and other pathogens. In studies done by Sharma K et al.,[12] and VK Poorey et al.,[8] Amikacin was the most effective drug.

Those patients who were culture negative were successfully treated of their ear discharge by regular dry mopping of ear, a medical treatment with oral ciprofloxacin and ornidazole combination along with topical antifungal ear drops. This observation is suggestive of a role of anaerobes and fungal pathogens in CSOM.

Out of 50 patients in our study more than 38 patients have used antibiotics during some part of their long duration of CSOM before presenting to us. Their drug history included most commonly Cefixime, Amoxicillin with Clavulanic acid and topical Ofloxacin which were not useful for them. After obtaining the culture sensitivity report they were put on oral and topical Ciprofloxacin and we have observed early response as most of the discharging ears were dry by 2 weeks of treatment.

CONCLUSION

Chronic suppurative otitis media has become public health importance in the present days in developing countries like India, mostly seen among people with poor socioeconomic status, poor hygiene, low education and studded habitat.Irregular, haphazard and indiscriminate use of antibiotics has precipitated the emergence of multi resistant bacteria.Proper counselling about hygiene and maintenance of treatment has got an important impact. Culture sensitivity is an important tool to address the problem ethically.

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