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Bacteriological Study of Discharge in Patients of Chronic Suppurative Otitis Media Attending a Tertiary Care Hospital

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ABSTRACT
Chronic Suppurative Otitis Media (CSOM) is the most common illness in ENT practice. It affects all age groups and most commonly presents as ear ache and chronic ear discharge. It may even cause hearing impairment and may lead to complications so must be treated with caution. The study was undertaken to know the aerobic microbiological/bacteriological profile of ear discharge and variations in sensitivity pattern to treat the patients efficiently. A total of 86 patients who had discharging ear infection were included in this study. The most common microorganisms isolated were Pseudomonas aeruginosa and Staphylococcus aureus followed by Coagulase-Negative Staphylococci (CONS), Klebsiella spp, Proteus spp and Escherichia coli. Among the commonly used topical antibiotics, Ciprofloxacin appear to be first line antibiotic to treat CSOM.
Keywords- *Chronic suppurative otitis media, Bacteriology, Culture and sensitivity, Psuedomonas aeruginosa*.

Introduction

An ear infection (medically termed Otitis Media) generally refers to an infection of the middle part of the ear that lies behind the eardrum. Ear infections are common in babies and young children, especially those aged six to 18 months. Most children will have an ear infection before the age of five.[1] Chronic Suppurative Otitis Media (CSOM) is chronic inflammation of middle ear, which affects the tympanic membrane, middle ear mucosa and other middle ear structures. Clinically, CSOM presents with ear discharge and conductive deafness.[2] CSOM is one of the most common problems related to ear in developing and developed countries, if left untreated causing more severe loss of hearing. It is characterized by persistent otorrhea for more than 6-12 weeks, through perforated tympanic membrane, usually resulting from previous acute infection.[3] The infection is due to the bacteria coming from nasopharynx via Eustachian tube, and cause inflammation in mucoperiosteum of middle ear cleft, resulting in ear discharge.[4] CSOM is a global problem and affects all ages but especially prevalent in children younger than 7 years due to horizontal, wider and short Eustachian tube.[5] Inadequate antibiotic treatment and poor hygienic conditions are related to the development of CSOM. Most of the studies on the microbiology of CSOM have revealed that the most common bacteria associated with CSOM are Pseudomonas, Staphylococcus, Proteus spp., and Klebsiella.[6] A few other studies showed Staphylococcus aureus as the most common bacteria, especially if cholesteatoma was present. [7] Bacterial

predominance and their antibiotic sensitivity pattern change over time. So, knowledge of the local pattern of infection is essential to enable efficacious treatment of this disorder. As topical antibiotic treatment is often effective and seldom harmful, most experts would start with a wide-spectrum antibiotic on an empiric basis and make a request for cultures if drug resistance is suspected. The aims of the present study is to know the bacteriological profile of ear infection in patients attending tertiary care hospital and to study the antimicrobial sensitivity pattern of the above isolates.

Materials and Methods

The study was undertaken over period of one year, with an aim to study the bacterial flora and their sensitivities to a series of antibiotics in patients with ear infections. Samples of patients with unilateral or bilateral discharging ear sent to microbiology lab for microbiological studies in the department of microbiology. The included in the study were having active purulent discharge at the time of examination, patients who did not have any antibiotic treatment recently and who had taken multiple treatments but had persistent ear discharge. Patient of any age, both genders having discharging ear were included. Aural swabs were collected from each patient before staring medical treatment. Swabs were processed for the isolation of aerobic bacteria using standard bacteriological procedures, and the organisms grown were identified according to the standard bacteriological methods.[8] All cases showing growth on culture media after 72 hours of inoculation were subjected antibiotic sensitivity testing by modified Kirby - Bauer disk diffusion method, and the interpretation of results was done by using standard guidelines.[9]

Results

A total of 86 ear swabs were collected from 86 patients over the period of one year. Out of these 86 patients 51 patients were males (59.3%) and 35 females (40.7%). The ratio being 1.46.

Figure 1. Sex wise distribution of patients.

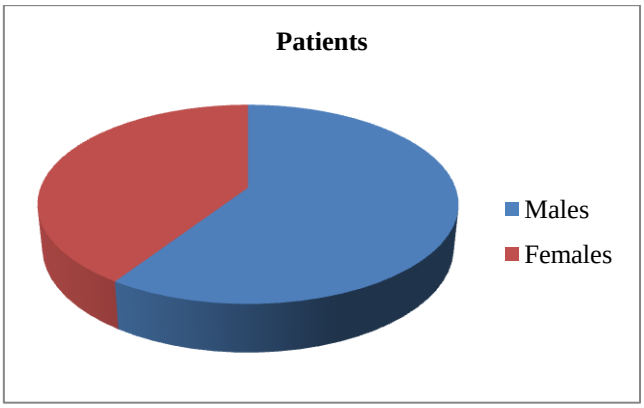


Table 1. Age wise distribution of patients.

Age (years)	Total (n=86)	Percentage
0-10	5	5.8
11-20	12	13.9
21-30	19	22.1
31-40	16	18.7
41-50	12	13.9
51-60	8	9.4
>60	14	16.2

In our study maximum patients were in age group of 21-30 that is 19 patients (22.1%)

All the isolates in these samples were single organism isolates. Also out of these 86 samples sent no growth of organism was seen in 33 samples. Only bacteriological profiles were taken into consideration nevertheless 3 fungal isolates were also identified out of which 2 were Aspergillus species and 1 was Candida albicans.

Table 2 Aerobic bacteria isolated from ear discharge

No.	Organism		Isolated (n=50)	Percentage
1	Gram Negative Bacteria n=32 64%	Psuedomonas spp	18	36
		E. Coli	6	12
		Acinetobacter spp.	3	6
		Proteus spp.	2	4
		Klebsiella spp.	2	4
		Enterococcus spp.	1	2
2	Gram positive Bacteria n=18 36%	Staph aureus	15	30
		CONS	3	6

Out of these remaining 53 sample isolates the occurrence of gram negative organisms (GNB) was higher than for gram positive (GPC) with GNB 32/50(64%), GPC 18/50 (36%). Out of 86 specimens, 33 specimens show no growth of organism and 3 isolate showed fungi. In our study out of 50 bacterial isolated, Pseudomonas, Proteus, Acinetobacter, Klebsiella & Enterobacter species were the most common Gram–negative bacteria isolated followed by Staphylococcus aureus, Coagulase negative staph aureus Gram–positive bacteria.

Figure 2. Antibiogram of Pseudomonas aeruginosa.

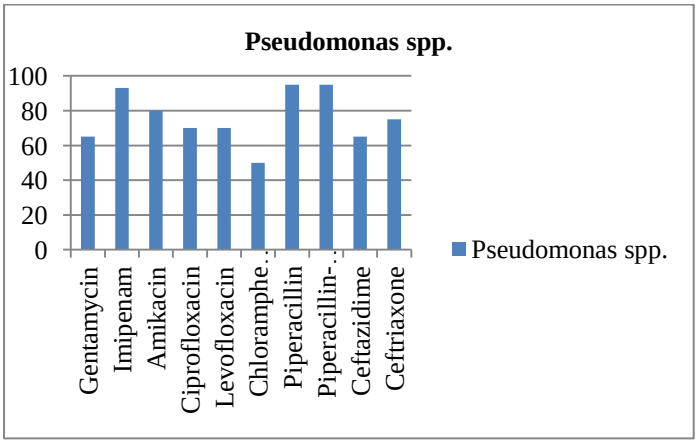
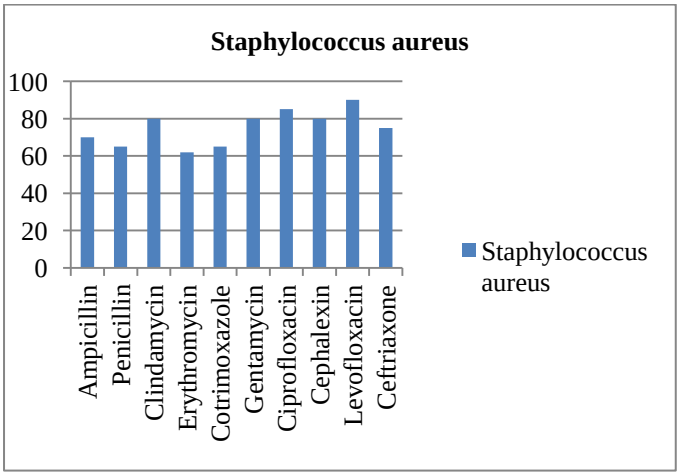


Figure 3. Antibiogram of Staphylococcus aureus



Discussion

Ear infections occur in all age groups. Among the various ear infections, CSOM is a very common infection. Chronic suppurative otitis media is a chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent ear discharges through a tympanic perforation. Through the perforation bacteria gain entry into the middle ear. Infection of the middle ear mucosa subsequently results in ear discharge. Untreated cases of CSOM can result in a broad range of complications like persistent otorrhea through a tympanic perforation, with conductive hearing loss of varying severity, mastoiditis, labyrinthitis, meningitis, and facial nerve paralysis. This disease is notorious for causing irreversible destruction of middle ear structures and also very serious intracranial complications. Hence, treatment needs to be instituted early and effectively to avoid such complications. Ear infections can occur in any age but common in babies and young children, especially those aged six to 18 months. Most children will have an ear infection before the age of five.[1] Chronic Suppurative Otitis Media (CSOM) is chronic inflammation of middle ear, which affects the tympanic membrane, middle ear mucosa and other middle ear structures.[2] Since India is a developing country and majority are still living under poverty level activities such as swimming, washing clothes etc. in contaminated water supply, pouring oil in the ear due to traditional beliefs also attribute to ear infections.

In our study group maximum numbers of cases were from the male group 51 cases (59.3%) and females were 35 (40.7%). Humera Rashid et al shows 54% male and 46% females were found infected by P. aeruginosa.[10] In our study maximum number of infection was from the age group 21 to 30 years 19 cases (22.1%). The ear infection rate in our study is similar to that of Raakhee T et al. 2014, which shows majority of the patients who had ear discharge was between 16-25 years. This was followed by the age group between 6-15 years but their study shows that females were most commonly affected than males.[11] Pseudomonas aeruginosa (36%) was the most common aerobic isolate in ear discharge which was very closely followed by Staphylococcus aureus (30%). Sharma et al.[12] reported that aural swabs collected from patients of CSOM showed Pseudomonas in 36% cases, followed by S. aureus in 30% of cases. Similar conclusion was drawn by another study [13] who

found Pseudomonas as the most common organism in CSOM. Pseudomonas aeruginosa is a non-fermenting gram negative bacillus which is a water bacteria and isolation of coagulase negative Staphylococci is insignificant. The frequent isolation of water bacteria Pseudomonas aeruginosa indicates that individuals are at high risk of infection due to poor hygiene conditions.[14] Pseudomonas showed sensitivity to ciprofloxacin (70%), gentamicin (65%), imipenem (93%), piperacillin (95%). High fluoroquinolones antibacterial activity against Pseudomonas isolates was reported by others, although resistant strains of Pseudomonas isolates to fluoroquinolones were detected in other studies.[15][16] Staphylococcus aureus was sensitive to gentamicin (80%), ciprofloxacin (85%), clindamycin (80%) and cephalexin (80%) Majority of CONS were resistant to ampicillin and penicillin. Clinical resistance of Staphylococci spp. to penicillin and other antimicrobial agents is now a problem throughout the world. [17][18] Staphylococci spp. sensitivity to ciprofloxacin is in agreement with other reports and most of the investigators reported high sensitivity rate for Staphylococci spp. to fluoroquinolones such as ofloxacin and ciprofloxacin.[19] CONS is a normal skin flora so it might be a contaminant. However majority of them were sensitive to almost all the antibiotics used. Highest sensitivity was shown towards ciprofloxacin followed by gentamicin, clindamycin, c-sulbactam, cefotaxime.

Iqbal et al examined 200 ear swabs the bacterial isolates were P.aeruginosa 41.5% staphylococcus 19%, Proteus mirabilis 18%, Klebsiella pneumonia 10.5%, E.coli 4% & Beta-hemolytic streptococcus 5%. [20] In another study, Gul et al found that the frequency of P.aeruginosa in chronic suppurative Otitis media was 52.2%, S. aureus 15%, Proteus species 6.5% and Klebsiella species 2.6%.[21] Humera Rashid et al shows 54% male and 46% females were found infected by P. aeruginosa. ceftazidime is 100%, amikacin 78.3%, gentamicin 81%, cefipime 91.89%, aztreonam 94.5% and ciprofloxacin 78.3 % sensitive, these studies shows close similarity in sensitivity pattern.[10] R Shyamala et al revealed that otitis media was found to be more common in males (57%) than in females (43%). The bacteriologic study of otitis media revealed the isolation of a variety of organisms. Pseudomonas aeruginosa is the most prominent organism being isolated in 40 (40%) of the cases followed Staphylococcus aureus in 31 (31%) cases, E.coli is 21 (21%) cases, Proteus mirabilis in 5 cases (5%) & Klebsiella pneumonia in 5 cases (5%). As regards the antibiotic sensitivity Amoxiclav, Amikacin, Gentamycin & Erythromycin has proved to be the most effective drug for aerobes.[22] These results support our study with slight difference in sensitivity pattern however different workers showed different sensitivity patterns.

Conclusion

As seen in our study in comparision to various other studies we see that there can be a variation in the organisms infecting and their susceptibility pattern. In our study Pseudomonas aeruginosa and Staphylococcus aureus were the most important organisms associated with ear discharge-CSOM. Appropriate antibiotics should be prescribed after knowing the causative organism and its antimicrobial susceptibility pattern. Ciprofloxacin appear to be first line antibiotic to treat CSOM. Ciprofloxacin is also much safer without side effects. The patients should also be advised to take the drugs for the complete prescribed duration without stopping in the middle. This will not only help in minimizing the complications, but also help in preventing the emergence of resistant strains. The antibiotic susceptibility patterns must be continuously and periodically evaluated to decrease the risk of resistant strains. Continuous and periodic evaluation of microbial pattern and antibiotic sensitivity of CSOM helps to decrease the potential risk of complications.

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