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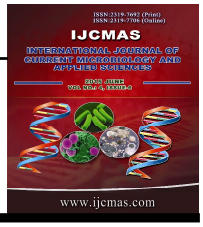

Original Research Article

Bacteriological Profile of Chronic Suppurative Otitis Media

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A B S T R A C T

Chronic suppurative otitis media (CSOM) is a persistent, insidious and potentially dangerous disease because of its various fatal complications. Change in the bacteriological profile with indiscriminate use of antimicrobial agents has been associated with the emergence of multiple drug resistant strains. 100 clinically diagnosed cases of CSOM of all age groups and both the sexes were studied. Two swabs taken from each patient, for Gram staining and for culture onto Blood agar and MacConkey's agar. The bacterial isolates were identified by standard biochemical reactions. Antibiotic susceptibility testing was done by Kirby-Bauer disc diffusion method. 100 CSOM cases were studied, 67 were males and 33 were females. Bacterial isolates showed predominance of *Staphylococcus aureus* 32 (32.65%) followed by *Pseudomonas* spp. 26 (26.53%) & *Klebsiella* spp. 16 (16.32%). Antibiotics like Ciprofloxacin, Gentamicin, Amikacin and Cefotaxime were found to be more effective against all Gram positive and Gram negative isolates. *Staphylococcus aureus* was the predominant organism followed by *Pseudomonas* spp. The most effective drugs were Ciprofloxacin, Gentamicin.

Introduction

Chronic suppurative otitis media (CSOM) and its complications are the bugbear of the otologists, paediatricians and general practitioners. It is a disease of multiple etiologies and is well known for its persistence and recurrence in spite of treatment. Its importance lies in its refractoriness to treatment and chronicity, leading to complications. Rama Rao et al (1980).

Hippocrates stated that "Acute pain of the ear, with the continued fever, is to be dreaded, for there is danger that the man may become delirious and die". Slatter et al. (2003).

CSOM is found to be the single major cause for conductive deafness (66.3%) and it is also responsible for 1.5% of speech disorders. Rama Rao et al (1980).

The hearing loss associated with CSOM leads on to educational backwardness in children that is well recognised by otolaryngologists, paediatricians and

educators. Development of speech, language and learning skills are severely hampered in these children making it difficult for them to achieve full academic potentials. Outdoor activities are also hampered. Goyal et al (2002).

The indiscreminate, haphazard and half hearted use of antibiotics and poor follow up of the patients have resulted in persistent changes in the bacteriological pattern of the disease, the advent of new antimicrobials, anti-inflammatory and anti-histamine agents make an evaluation of bacterial flora of CSOM important. Nandy et al (1991).

It is well known that the complications are the direct result of failure of the body defence mechanisms, giving disease, a chance to spread. With the advent of antibiotics and awareness regarding the disease and availability of technology, the incidence of complications had decreased from 2.3% to 0.04%. However due to unnecessary and improper use of antibiotics, decrease in physicians experience, resistance by bacteria and increase in susceptibility of an individual, complications still occur. Gupta et al (1996).

The study of the micro-organisms commonly associated with CSOM and their in vitro antibiotic sensitivity pattern is very pertinent for the clinician to plan a general outline of treatment for the patient with a chronically discharging ear. Greval et al (1996).

Majority of the patients neglect the disease because of its silent course. Illiteracy and low socio-economic status add to the magnitude. Hiremath et al (2001).

Knowledge of local bacteriological pattern and their antibiotic sensitivity is essential for effective and low cost treatment. Loy et al (2002).

The changing flora of CSOM and emergence of strains resistant to the commonly employed antibiotics stimulated the study. The present study deals with the bacteriological profile of CSOM and to evaluate their antibiotic sensitivity pattern.

Material and Methods

The present study was conducted in the Department of Microbiology, JMF's A.C.P.M. Medical College, Dhule, from January 2013 to June 2014. One hundred patients with CSOM of all age groups and both sexes attending outpatient department and those admitted in ENT wards were selected randomly for the study.

One hundred clinically diagnosed cases of chronic suppurative otitis media of all age groups and both the sexes formed the subject of the study group. Fungal and anaerobic bacteria isolation was excluded from the study.

A proforma was filled for each patient documenting age, sex, address and clinical information, including chief complaints, duration of symptoms, predisposing factors and any previous history of treatment. Other medical history like diabetes mellitus, hypertension and tuberculosis, etc. was noted.

Ear discharge was collected under aseptic precautions in clinically diagnosed cases of chronic suppurative otitis media. Excess discharge was mopped out from external auditory canal and it was cleaned with 70% alcohol first and was allowed to act for 30-40 seconds to achieve sterile area. Then with the two sterile swabs specimen was collected. One was for Gram staining and other one was for aerobic culture. Both the swabs were processed immediately in the laboratory. Mackie and McCartney's (1996),

Gupta et al (1998), Monica Cheesbrough, (1993).

With one swab a thin smear was made on a clean glass slide and was fixed with 95% methanol, by pouring one or two drops on the smear and allowed to act for a minimum of 2 minutes or until the methanol dries on the smear. Gram staining was done for the smears so made and is examined under oil immersion objective to note the various morphological types of bacteria, their number, Gram reaction, presence or absence of inflammatory cells and also to note the numbers of squamous epithelial cells in the sample. Greval et al (1996)**.**

The second swab was used for inoculation on Blood agar, Nutrient agar and MacConkey's agar plates. All plates were incubated aerobically at 37°C and evaluated at 24 hours, 48 hours and 72 hours and the plates are discarded if there was no growth. The specific identification of bacterial pathogens was done based on morphology, staining characteristics, cultural and biochemical properties using standard laboratory procedures. Baily and Scott's (1998), Koneman (1997).

Antimicrobial susceptibility of the bacterial isolates to the commonly used antibiotics was done by Kirby-Bauer disc diffusion method. The strength of the antibiotics used were:

Ampicillin 10 mg, Amikacin 30 mg, Cefotaxime 30 mg, Netilmicin 30 mg, Co-trimoxazole 25 mg, Ciprofloxacin 5 mg, Gentamicin 10 mg, Norfloxacin 10 mg.

Results and Discussion

A total number of 98 bacterial species were isolated from 90 culture positive cases. The most common organism isolated was Staphylococcus aureus 32 (32.65%) followed by Pseudomonas spp. 26 (26.53%) and *Klebsiella* spp. 16 (16.32%).

Out of 90 culture smears, 59 (65.55%) were Gram negative and 31 (34.45%) were Gram positive. Out of 100 ear swabs studied 90 (90%) swabs were culture positive and 10 (10%) swabs were culture negative.

The total numbers of strains isolated were 91, out of which 79 (86.81%) strains were monomicrobial isolates, 12 (13.18%) strains were polymicrobial isolates. The incidence of complications of CSOM, 3 (27.27%) cases had Pyogenic meningitis, 2 (18.18%) cases had Post-auricular fistula, 2 (18.18%) cases had Mastoiditis, 1 (9.09%) case each had Post-auricular abscess, Temporal lobe abscess, Facial nerve palsy and Attico-antral type of CSOM.

The antibiotic susceptibility pattern of organisms isolated from CSOM cases. Out of 91 isolates, 52 (57.14%) were sensitive to Ciprofloxacin followed by 39 (42.85%) were sensitive to Gentamicin, 36 (39.56%) to Amikacin, 21 (23.07%) to Cefotaxime, 17 (18.68%) to Norfloxacin, 10 (10.98%) to Netilmicin, 5 (5.49%) to Co-trimoxazole and 2 (2.19%) to Ampicillin.

In the present study 90 (90%) specimens were positive and 10 (10%) were negative for the culture. The culture results are found correlated with Taneja et al (1995) (84%, 16%), Gulati et al (1969) (78%, 22%), Asiri Saad et al (1999) (80.5%, 19.5%), Hiremath et al. (2001) (84%, 16%) and Gupta et al. (1998) (95.5%, 4.5%).

Negative cultures can be attributed to

Non-bacterial growth
Anaerobic growth
Prior-antibiotic therapy

Presence of antimicrobial enzymes i.e. lysozyme alone or in combination with immunoglobulins that suppress the bacterial growth. Nanady et al (1991), Hiremath et al (2001).

In the present study, monomicrobial etiology was 79 (86.81%) and polymicrobial was 12 (13.18%). Our study is correlated with Rama Rao et al. (1980) found equal incidence of mixed and pure culture and Baruah et al. (1972) found predominance of mixed culture. Availability and use of topical and systemic broad spectrum antibiotics in the period before consultation was probably responsible for the lower incidence of mixed infection.

In the present study, 11 out of 100 cases had complications of various nature. Our study correlated with Gupta et al (1998), Levent Sennaroglu et al (2000) and Brook Itzhak et al (1997).

Staphylococcus aureus was the most predominant organism 32 (32.65%) in the present study. However workers like Arya et al. (1966), Nandy et al. (1991), Grevel et al. (1995), Urmil et al. (1998), Hiremath et al. (2001), Loy A.H.C. et al. (2002) have find Staphylococcus aureus as the second most common organism causing CSOM.

The next predominant organism in the present study was Pseudomonas sp. 26 (26.53%). Our study was correlated with the above workers. However some workers like Ballal et al. (1992), Varshney et al. (1999), Hiremath et al. (2001) and Loy et al (2002) have find Pseudomonas sp. as the predominant organism causing CSOM.

The next most common organism was Klebsiella spp. 16 (16.32%) in the present study. Some workers have got variable results. Proteus sp. was isolated from 7 (7.14%) cases. This finding was correlated with other workers. However, Rama Rao et al. (1980) and Varshney et al. (1999) has find them as the second most leading cause for CSOM. In the present study, Enterococcus sp. were isolated in 5 (5.10%) cases. Other workers who had isolated Enterococci in CSOM are Hiremath et al. (2001) in 0.79% cases and Loy et al. (2002) in 2.2% cases and E. coli was isolated in 5 (5.10%) cases in the present study. Our findings were correlated with other workers. However Rama Rao et al. (1980)1 has reported a high incidence of E. coli (18.7%) cases.

The frequency of Staphylococcus aureus in the middle ear infections can be attributed to their ubiquitous nature and high carriage of resistant strains in the external auditory canal and upper respiratory tract. The organisms like Pseudomonas spp. and Proteus spp. were considered mostly as secondary invaders from external auditory canal gaining access to the middle ear via a defect in tympanic membrane resulting from an acute episode of otitis media. Organisms like E. coli and Klebsiella spp. become opportunistic pathogens in the middle ear when resistance is low.

Antibiotic sensitivity was carried out for 91 isolates by Kirby-Bauer disc diffusion method by using antibiotic discs. In the present study, organisms were sensitive to ciprofloxacin, followed by Gentamicin (42.85%), Amikacin (39.56%), Cefotaxime (23.07%), Norfloxacin (18.68%), Netilmicin (10.98%), Co-trimoxazole (5.49%) and Ampicillin (2.19%). The most effective drugs in the present study were Ciprofloxacin, Gentamicin, Aamikacin and Cefotaxime. Similar sensitivity pattern was reported by Gulati et al. (1997), Varshney et al. (1999) and Hiremath et al. (2001). However Nandy et al. (1991) and Rao et al. (1994) has find Gentamicin as the most effective drug.

Table.1 Showing Bacteriological profile of CSOM

Sr. No.	Organisms	No. of isolates (%)
1	Staphylococcus aureus	32 (35.16%)
2	Pseudomonas spp.	26 (28.57%)
3	Klebsiella spp.	16 (17.58%)
4	Proteus mirabilis	7 (7.69%)
5	Enterococcus fecalis	5 (5.49%)
6	Escherichia coli	5 (5.49%)
	TOTAL	**91 (100%)**

Table.2 Showing incidence of complications

Sr. No.	Complications	No. of patients (%)
1	Pyogenic meningitis	3 (27.27%)
2	Post-auricular fistula	2 (18.18%)
3	Mastoiditis	2 (18.18%)
4	Post-auricular abscess	1 (9.09%)
5	Temporal lobe abscess	1 (9.09%)
6	Facial nerve palsy	1 (9.09%)
7	Attico – antral type of CSOM	1 (9.09%)
	TOTAL	**11 (100%)**

Table.3 Showing antibiotic sensitivity pattern of organisms isolated

Sr. No.	Antibiotics	*Staphylococcus aureus*	*Pseudomonas sp.*	*Klebsiella sp.*	*Proteus mirabilis*
	No. of isolates	32	26	16	7
1	**Ampicillin**	2 (6.25%)	0	0	0
2	**Cefotaxime**	5 (15.62%)	6 (23.07%)	3 (18.75%)	3 (42.85%)
3	**Co-trimoxazole**	3 (9.37%)	0	1 (6.25%)	0
4	**Gentamicin**	15 (46.87%)	15 (57.69%)	5 (31.25%)	2 (28.57%)
5	**Amikacin**	15 (46.87%)	13 (50%)	4 (25%)	1 (14.28%)
6	**Netilmicin**	3 (9.37%)	7 (26.92%)	0	0
7	**Ciprofloxacin**	17 (53.12%)	17 (65.38%)	11 (68.75%)	4 (57.14%)
8	**Norfloxacin**	3 (9.37%)	7 (26.92%)	4 (25%)	2 (28.57%)

Sr. No.	Antibiotics	Enterococcus fecalis	Escherichia coli	TOTAL
	No. of isolates	5	5	**91**
1	**Ampicillin**	0	0	**2 (2.19%)**
2	**Cefotaxime**	2 (40%)	2 (40%)	**21 (23.07%)**
3	**Co-trimoxazole**	0	1 (20%)	**5 (5.49%)**
4	**Gentamicin**	1 (20%)	1 (20%)	**39 (42.85%)**
5	**Amikacin**	3 (60%)	0	**36 (39.56%)**
6	**Netilmicin**	0	0	**10 (10.98%)**
7	**Ciprofloxacin**	1 (20%)	2 (40%)	**52 (57.14%)**
8	**Norfloxacin**	0	1 (20%)	**17 (18.68%)**

In the present study majority of the isolates showed multiple drug resistance for ampicillin, co-trimoxazole and netilmicin. It was correlated with studies of Nandy et al. (1991), Rao et al. (1994), Varshney et al. (1999) and Hiremath S.L. et al. (2001).

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