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Current Bacteriological Status of Chronic Suppurative Otitis Media in Tertiary Care Hospital

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Chronic suppurative otitis media (CSOM) is a major health problem in India and a common cause of conductive deafness which may lead to delayed development of speech and language in children. Information regarding the common pathogens and their antibiotic sensitivity is essential for the proper choice of antibiotics. A total of 150 CSOM cases were studied, of which 79 males and 71 females. Majority of the patients were in the age group of 9 months to 20 years. Unilateral infection was more common than bilateral. *Pseudomonas aeruginosa* (34.93%) was the commonest isolated bacteria followed by *Staphylococcus aureus* (19.86%) and members of Enterobacteriaceae. Most effective antibiotics were ciprofloxacin (80.14%), gentamicin (71.92%) & amikacin (66.44%) but amoxicillin-clavulanate (6.85%) as least effective.

Keywords: Chronic suppurative otitis media, *Pseudomonas aeruginosa*, Ciprofloxacin.

Chronic suppurative otitis media (CSOM) is an inflammation of the mucoperiosteum of middle ear cleft which is associated with recurrent ear discharge through tympanic membrane perforation and deafness[1]. CSOM is distributed worldwide, but more common in underdeveloped & developing countries due to poor hygienic practices, lack of health care system and recurrent upper respiratory tract infection. The conductive deafness caused by chronic suppurative otitis media has a negative effect on children's speech, language & cognitive development and on school performance[2]. Intra and extra cranial complications of CSOM occurs as a result of spread of infection from middle ear to vital structures such as mastoid, facial nerve, labyrinth, lateral sinus, meninges and brain[3].

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Irrational, indiscriminate and haphazard use of antibiotics has lead to emergence of multi-drug resistant bacterial strains, therefore the present study was done to know the aerobic bacteriology of CSOM and their antibiotic susceptibility pattern to guide the clinicians for appropriate treatment and to prevent or minimise the occurrence of complications.

MATERIALS AND METHODS

A total of 150 clinically diagnosed cases of CSOM attending outpatient department and those admitted in ENT wards over a period of one year from 1st November 2014 to 31st October 2015, not taking antibiotics for the last 10 days were considered for the study, after permission of the ethical committee of our institute. We did not use anaerobic and fungal culture media, therefore anaerobic & mycological studies were excluded.

Specimen collection

The external auditory canal was cleaned

with 70% alcohol and wait for 30-40 seconds to get sterile area. Ear discharge was collected from each patient with the help of two sterile swabs under aseptic precautions after taking an informed written consent, of which one was used for smear preparation and other for culture.

Specimen transport

The swabs were brought to the Microbiology Laboratory of Sri Aurobindo Medical College and Post Graduate Institute Indore, immediately and processed within 30 minutes of collection.

Culture methods

The ear discharge swabs were inoculated onto blood agar, nutrient agar & mac conkey agar and incubated at 37°C for 24 hours in 7-10 % CO_2 concentration. The isolated organisms were identified by standard microbiological techniques[4]. All the isolates were tested for antimicrobial susceptibility (Hi-Media Mumbai) by Kirby-Bauer disk diffusion method on Mueller- Hinton agar[5].

RESULTS

A total of 150 cases were included in the present study, 79 (52.67%) were males and 71(47.33%) females. Amongst them 108 (72%) were under 20 years and 5 (3.33%) were aged > 41 years. Out of 150 cases, 112 (74.67%) cases from rural and 38 (25.33%) cases from urban area. Unilateral infection was in 142 (94.67%) cases and bilateral in 8 (5.33%) cases, therefore out of 158 ear swabs, 135 (85.44%) were culture positive and 23(14.56%) culture negative.

Among 135 culture positive swabs, a total of 146 bacterial isolates were identified (Table-1), of which 125 (79.11%) monomicrobial and 10 (6.33%) were polymicrobial (Table-2). Gram negative organisms (72.6%) were more accounted than gram positive organisms (27.4%), but most common bacteria was *Pseudomonas aeruginosa* (34.93%) followed by *Staphylococcus aureus* (19.86%) including 9 (6.16%) isolates of Methicillin Resistant and members of Enterobacteriaceae (Table-1).

Table 1. Aerobic bacteria isolated from CSOM

S. No.	Organisms	Total no. of isolates	Percentage (%)
1.	*Pseudomonas aeruginosa*	51	34.93
2.	*Staphylococcus aureus*	29	19.86
3.	*Proteus mirabilis*	19	13.01
4.	*Klebsiella pneumoniae*	14	9.59
5.	*Escherichia coli*	10	6.85
6.	*Coagulase negative Staphylococci* (CoNS)	7	4.80
7.	*Citrobacter freundii*	6	4.11
8.	*Acinetobacter spp.*	4	2.74
9.	*Enterococcus faecalis*	4	2.74
10.	*Serratia spp.*	**2**	1.37
	Total	146	100.00

Table 2. Polymicrobial pattern of CSOM

S. No.	Type of Bacteria	Numberof cases	Total n. of mixed isolates
1.	*Klebsiella pneumoniae* + *Escherichia coli*	2	4
2.	*Klebsiella pneumoniae* + *Citrobacter freundii*	2	4
3.	*Klebsiella pneumoniae* + *Pseudomonas aeruginosa*	1	2
4.	*Klebsiella pneumoniae* + *Escherichia coli* +*Serratia spp.*	1	3
5.	*Pseudomonas aeruginosa* + *Proteus mirabilis*	1	2
6.	*Pseudomonas aeruginosa* + *Staphylococcus aureus*	1	2
7.	*Pseudomonas aeruginosa* + *Acinetobacter spp.*	1	2
8.	*Enterococcus faecalis* + *Escherichia coli*	1	2
	Total	10	21

Table 3. Antibiotic sensitivity pattern of aerobic bacteria

S. No.	Organisms	Total no. of isolates	AMC. %	Cefta. %	COT. %	GEN. %	AK. %	IMP. %	CIP. %	Of. %
1	*Pseudo.*	51	NT	17(33.33)	NT	38(74.51)	40(78.43)	44(86.28)	43(84.31)	11(21.57)
2	*Staph.*	29	5(17.24)	13(44.83)	10(34.48)	22(75.86)	21(72.44)	NT	17(58.62)	9(31.04)
3	*P.mirabilis*	19	2(10.53)	7(36.84)	7(36.84)	14(73.68)	11(57.90)	15(78.95)	17(89.47)	8(42.11)
4	*Kleb.*	14	1(7.14)	4(28.57)	5(35.71)	9(64.29)	8(57.14)	12(85.71)	12(85.71)	3(21.43)
5	*E.coli*	10	1(10)	3(30)	4(40)	6(60)	5(50)	8(80)	9(90)	3(30)
6	*CoNS*	7	NT	3(42.86)	3(42.86)	5(71.43)	4(57.14)	NT	5(71.43)	2(28.57)
7	*Citro.*	6	NT	2(33.33)	1(16.67)	5(83.33)	4(66.67)	5(83.33)	6(100)	2(33.33)
8	*Acineto.*	4	NT	2(50)	1(25)	4(100)	3(75)	4(100)	4(100)	NT
9	*Entero.*	4	1(25)	NT	NT	NT	NT	NT	2(50)	0
10	*Serratia.*	2	NT	1(50)	0	2(100)	1(50)	1(50)	2(100)	0
	Total	146	10(6.85)	52(35.62)	31(21.23)	105(71.92)	97(66.44)	89(60.96)	117(80.14)	38(26.03)

Pseudo.=Pseudomonas aeruginosa, Staph.=Staphylococcus aureus, P.mirabilis=Proteus mirabilis, Kleb.=Klebsiella pneumoniae, E.coli=Escherichia coli, CoNS=Coagulase negative Staphylococci, Citro.=Citrobacter freundii, Acineto.=Acinetobacter spp., Entero.=Enterococcus faecalis, Serratia=Serratia spp. AMC.=Amoxicillin-Clavulanate, Cefta.=Ceftazidime, COT.=Cotrimoxazole, GEN.=Gentamicin, AK=Amikacin, IMP=Imipenem, CIP.=Ciprofloxacin, Of=Ofloxacin, NT=Not Tested

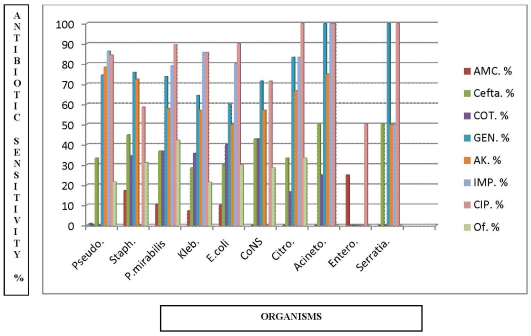

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Fig. 1. Antibiotic sensitivity pattern of aerobic bacteria

All the isolates showed low sensitivity to amoxicillin-clavulanate, cotrimoxazole, ofloxacin and ceftazidime. *Pseudomonas aeruginosa* showed good sensitivity to imipenem, ciprofloxacin and amikacin. However, most effective antibiotic in the present study was ciprofloxacin (80.14%) followed by gentamicin (71.92%) and amikacin (66.44%) {Table-3}.

DISCUSSION

In the present study maximum numbers of patients were in the age group of 9 months to 20 years, which is similar to previous study[6]. CSOM is more common in paediatric age group which can be explained by the fact of increased risk of respiratory tract infection, decreased immunocompetence, short and straight eustachian tube, malnutrition and use of oil leading to multiplication of opportunistic bacteria & blockage of eustachian tube[7]. Males and females were involved in almost equal numbers as there is no anatomical difference in the ear structure. Incidence of CSOM cases was more common in rural area [112 (74.67%) cases] compared to urban area [38 (25.33%) cases] because of lack of education, awareness & availability of trained specialists, swimming in polluted water and ear discharge tolerance[2,8]. Majority of cases were unilateral (94.67%) corresponding to other studies[9,10]. In the present study 14.56% cases were negative for the culture which is compatible with Chakraborty et al report[11]. Higher percentage of negative cultures may be because of anaerobic & fungal aetiology, prior use of antibiotics either self or prescription of unqualified medical practitioners.

Gram negative bacteria were 2.65 times more common than gram positive bacteria. The most common isolated bacteria was *Pseudomonas aeruginosa* followed by *Staphylococcus aureus* similar to several reports[12-15] and contrast to others[1,6,16,17] who found *Staphylococcus aureus* as the commonest isolate. Variable isolation rate of bacteria might be related to population, individual immunity, geographical and temperature variation.

Imepenem, ciprofloxacin and amikacin were showed highest sensitivity to *Pseudomonas aeruginosa*. Overall, most effective antibiotic was ciprofloxacin followed by gentamicin and amikacin but ciprofloxacin preferred over aminoglycosides as there is no ototoxic risk. Amoxicillin-Clavulanate combination showed lowest sensitivity but highest prescribed antibiotic by clinicians, therefore its use should be restricted to susceptible isolate only.

CONCLUSION

Majority of cases of CSOM were due to ciprofloxacin sensitive gram negative bacteria in our setup but it should be used judiciously. As microbial flora & antibiotic sensitivity change overtime, therefore studies at frequent interval are required to prevent development of resistant strains and minimising occurrence of complications.

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