Study of Aerobic Bacterial Isolates in Chronic Suppurative Otitis Media with Antibiotic Susceptibility Pattern of the Isolates

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ABSTRACT

Introduction: Chronic suppurative otitis media (CSOM) is a chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent otorrhoea through a tympanic perforation. Identification of the aetiological organisms not only aids in the diagnosis and improves the management of patients. Study aimed to identify the etiological flora (both bacterial and fungal) which are responsible for chronic suppurative otitis media and, to determine their antibiotic susceptibility pattern.

Materials and methods: 100 clinically diagnosed cases of chronic suppurative otitis media from the ENT outpatient department, Government General Hospital, Guntur were studied prospectively.

Results: Out of 100 patients 60% were males and 40% were females. The maximum number of patients with CSOM belonged to the age group 21-30 (28) years followed by 1-10 (22 years. Out of 100 samples 97 (97%) yielded growth and 3 (3%) yielded no growth. Out of 97 samples 63 (64.9%) were pure bacterial isolates, 34 (35.1%) mixed bacterial isolates. In this study the predominant organisms isolated were Pseudomonas aeruginosa 42 (43.2%), Staphylococcus aureus 29 (29.8%), Proteus species 17 (17.5%), Klebsiella species 6 (6.18%) and Escherichia coli 3 (3.09%). Most of the isolates were sensitive to Amikacin, Gentamycin and Piperacillin.

Conclusion: This study reveals that the treatment of ear infection is better done when causative agents and their antibiotic susceptibility pattern are known and properly administered.

Keywords: CSOM, Antibiotic Susceptibility Pattern

INTRODUCTION

Chronic suppurative otitis media (CSOM) is a chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent otorrhoea through a tympanic perforation[1].This disease is common in all age groups but prevalent mainly in childhood belonging to lower socioeconomic group[2].It causes conducting and sensori neural hearing loss and adverse affects on child development[2]. It is a slowly progressive and destructive disease of the middle ear cleft capable of destroying soft and hard tissue surrounding it, thus producing extra-cranial and intra-cranial complications[3] like septicaemia, meningitis, brain abscess, facial paralysis and mental retardation and it is believed to be responsible for more than two-thirds of deafness in children[4]. India is one of the countries with highest CSOM prevalence where urgent attention is needed (WHO, 2004)[1]. The cause and pathogenesis of CSOM is multifactorial. The single most important factor is upper respiratory tract viral and bacterial infection. CSOM is a sequel of acute otitis media[5]. Inadequate antibiotic treatment and poor hygiene conditions are related to the development of CSOM (WHO, 2004)[1].This disease is mainly classified into two types: tubotympanic and atticoantral, depending upon whether the disease process affects the pars tensa or the pars flaccida of the tympanic membrane[6].

The wide spread use of antibiotics has precipitated the emergence of multiple resistant strains of bacteria which can produce both primary and post operative infections[6]. Identification of the aetiological organisms not only aids in the diagnosis and improves the management of patients, but also assists in advising the patients about the modes of spread, methods of prevention and anticipating the possible complications. Also, as certain aetiological agents are more common in healthcare settings, the healthcare institutions can be directed regarding appropriate hygiene and sterility practice when relevant[4]. Bacterial predominance and their antibiotic sensitivity pattern change over time (Yeo et al., 2007). So, knowledge of the local pattern of infection is essential to enable efficacious treatment of this disorder[1].

Study aimed to identify the etiological flora which are responsible for chronic suppurative otitis media and to determine their antibiotic susceptibility pattern.

MATERIAL AND METHODS

This study comprised of 100 clinically diagnosed cases of chronic suppurative otitis media from the ENT outpatient department, Government General Hospital, Guntur over a period of one year(January 2013 to January 2014) and these were processed in the Department of Microbiology, Guntur Medical College, Guntur.

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Inclusion Criteria

1. The patients diagnosed as suffering from CSOM after thorough clinical evaluation by an ENT surgeon.
2. Patients of both sexes and all age groups.
3. Patients with ear discharge of more than 3months duration.
4. Patients who were not on antibiotic treatment for minimum of seven days.

Exclusion Criteria

1. Patients suffering from Otitis media, who have taken systemic antibiotics.
2. Patients who have administered local applications to the ear
3. Patients with ear discharge of less than 3months duration.
4. Patients with ear discharge with intact tympanic membrane.

Sample collection

The sample was collected by pulling the pinna of the ear outward, laterally and backwards after which a sterile swab stick was gently introduced in to the external auditory meatus and then gently rotated and the pus specimen was collected[7]. 2 sterile swabs were used to collect the discharge from the affected ear.

1. One swab used for Grams staining.
2. One swab was used for streaking Mac conkey agar, Blood agar, Nutrient agar.

Sample processing

The inoculated Mac Conkey agar, Nutrient agar & Blood agar plates were incubated at 37°C. After 24 hours of incubation the plates were examined for growth. If there was no growth, the plates were further incubated for 48 hours and discarded if there was still no growth. . The organisms grown were identified according to the standard bacteriological methods (Duiguild et al., 2006; Forbes et al., 2007). The pathogens were tested for their antibiotic susceptibility by modified Kirby–Bauer disk diffusion method, and the interpretation of results was done by using standard guidelines (Clinical and Laboratory Standard Institute, 2012)[1].

The isolates from pus sample were identified by colony morphology, gram staining, motility and biochemical reactions as per the standard procedures.

RESULTS

In the present study a total of 100 patients with chronic suppurative otitis media were studied. Among them 60% were males and 40% were females, the male to female ratio being 1.5:1 (Table I).

CSOM occurred in wide range of age groups from less than 1year to more than 60years. The maximum number of patients with CSOM belonged to the age group 21-30 (28) years followed by 1-10 (22) years

Sex	Number	Percentage	Total no. of samples
Male	60	60%	100
Female	40	40%	

Table-1: Sex wise distribution in CSOM(n=100)

	Number	Percentage
Total no .of samples	100	100
Culture positive	97	97%
Culture negative	3	3%

Table-2: Distribution of culture positives and negatives in CSOM (n=100)

Isolates	Number	Percentage
Pure bacterial	63	64 .9%
Mixed bacterial	34	35.1%

Table-3: Distribution of isolates in CSOM (n=97)

Organism	Number	Percentage
Pseudomonas aeruginosa	42	43.2%
Staphylococcus aureus	29	29.8%
Proteus mirabilis	17	17.5%
Klebsiella sps	6	6.18%
E.coli	3	3.09%

Table-4: Distribution of organisms in CSOM (both pure and mixed isolates,n=97)

Antibiotics	P.aeruginosa		P.aureus		Proteus spp		Klebsiella spp		E.coli	
	N	%	N	%	N	%	N	%	N	%
Gentamycin	52	80	43	91.4	26	86.6	9	90	3	60
Amikacin	59	90.7	39	82.9	19	63.3	6	60	3	60
Cefataxime	6	17.1	5	10.6	4	13.3	2	20	0	0
Ceftriaxone	36	55.4	29	61.7	22	73.3	2	20	2	40
Ciprofloxacin	49	75.4	29	61.7	18	60	6	60	4	60
Imipenem	60	92.3	-	-	-	-	7	70	-	-
Piperacillin	63	97	-	-	-	-	-	-	-	-
Ceftazidime	29	44.6	30	63.8	19	63.3	4	40	2	40
Vancomycin	-	-	37	78.8	-	-	-	-	-	-
Ampicillin	18	27.7	25	53.2	8	26.6	0	0	0	0
Linezolid	-	-	40	85.1	-	-	-	-	-	-
Cotrimoxazole	22	33.9	34	74.3	18	60	3	30	3	60

N= no of isolates sensitive to that particular antibiotic

Table-5: Antibiotic sensitivity pattern of the isolates

Out of 100 samples 97 (97%) yielded growth and 3 (3%) yielded no growth. (Table II) Out of 97 samples 63 (64.9%) were yielded pure bacterial isolates, 34 (35.1%) yielded mixed bacterial isolates. (table III).

In the present study the predominant organism was found to be Pseudomonas aeruginosa which was isolated in 42 isolates i.e., 43.2% followed by Staphylococcus aureus in 29 isolates i.e., 31.8%, Proteus species 17 (17.5%), Klebsiella 6(6.17%), Escherichia coli 3 (3.09%) (Table IV). Most of the isolates were sensitive to Amikacin, Gentamycin and Piperacillin (Table V).

DICUSSION

Out of 100 patients 60 (60%) were males and 40 (40%) were females. It correlates with studies of Dawit Ferede et al[8] (2001) with males 56.3% and females 43.7%, Dayasena RP[4] (2011) with males 55.1% and females 44.9%. The male predominance may have been because of the more exposed way of lifestyle of the males[6]. In some studies females were more affected than males, Shreshta BL[2] (2011) males 44.8% and females 55.2%, Rajat Prakash et al (2013) males 46.08% and females 53.92%, Ghulam Fatima et al[9] (2013) males 46.21% and females 53.78% (Table I)

In the present study maximum incidence of cases occurred in the age group 21 to 30 yrs (28) followed by 1-10 years (33).CSOM is more prevalent in the age group of children and young adults. There are multiple reasons behind this, like the Eustachian tube is short and wider in children and infants. This study nearly similar to studies done by Dawit Ferede et al[8] (2001), Gh.Ettehad et al[5] (2007), Shreshtha BL[2] (2011), Harvinder Kumar[6] (2011), Dayasena et al[4] (2011), Rajat Prakash et al[10] (2013), Suman Yeli[11] (2014), Geetha S.H[12] (2014) (Table II).

In the present study the total percentage of positive cultures was 97%. It was similar to studies done by Rajat Prakash et al[10] (2013) 91.8%, Bansal Sulabh et al[13] (2013) 91.6%, Suman Yeli[11] (2014) 97.2%, Geetha S.H[12] (2014) 86%, Harvinder Kumar[6] (2011) 84%. In a study done by Gh. Ettehad et al[5] (2007) it was 100% and in a study done by Dayasena et al[4] (2011) the percentage of culture positives is 76.9%.

In the present study the percentage of culture negatives was 3%. It was similar to studies done by Suman Yeli[11] (2014) 2.8%, Malakappa et al[14] (2014) 3.08%, A.H.Singh[1] (2012) 5.33%, Bansal Sulabh et al[13] (2013) 8.4% where as it was contrast to the studies done by Geetha S.H[12] (2014) 14%, Harvinder Kumar[6] (2011) 16%, Dayasena et al[3] (2011) 23.1%. this may be due to effect of prior antibiotic therapy and poor techniques of obtaining the ear swabs[4] (table III).

In the present study monomicicrobial growth is seen in 64% of the isolates. It is nearly similar to studies done by Sudhindra et al[15] (2014) 82%, A.H.Singh[1] (2012) 64%. In some studies like Dawit Ferede et al[8] (2001) it was 57.6%, Rajat Prakash et al[10] (2013) it was 57.84% and in Geetha S.H[12] (2014) it was 49.6%. In studies done by Gh.Ettehad et al[5] (2007) and Malakappa et al[14] (2014) it was 100%.

In the present study polymicrobial growth was obtained in 36% isolates. It was similar to studies by Aslam et al[16] (2004), A.H.Singh[1] (2012) 30.67%, Rajat Prakash et al[10] (2013) 33.33%. More percentage of polymicrobial growth was observed in studies done by Dawit Ferede et al[8] (2001) 42.4%, Geetha S.H[22] (2014) 50.4%. Less percentage of polymicrobial growth was observed in studies done by Saraswathi Jayanthi et al[9] (2013) 12%, Sudhindra et al[15] (2014) 3% (table III).

In the present study the organisms isolated were Pseudomonas aeruginosa 43.2%, Staphylococcus aureus 29.8%, Proteus 17.5%, Klebsiella 6.18%, Escherichia coli 3.09%. From this it is evident that the most common organisms implicated in CSOM were Pseudomonas aeruginosa followed by Staphylococcus aureus and Proteus. It was nearly similar to many studies like Alsaimary et al[17] (2010), Shreshtha BL[2] (2011), Harvinder Kumar[6] (2011), Dayasena et al[4] (2011), A.H.Singh[1] (2012), Ghulam Fatima et al[9] (2013), Saraswathi Jayanthi et al[7] (2013), Sudhindra et al[15] (2014), Geetha S.H[12] (2014). The increased rate of isolation of Pseudomonas aeruginosa has its own implications, as this organism is an important cause of nosocomial infections and has developed resistance to even many potent antibiotic drugs[7]. More frequent isolation of fecal bacteria like Proteus and water bacteria like Pseudomonas indicates that individuals are at high risk of infection due to poor hygiene conditions[1]. In a study done by Dawit Ferede et al[8] (2001) predominant organism isolated was Proteus.

CONCLUSION

Chronic otitis media is major health problem in many populations around the world and is a significant cause of morbidity and mortality. It is particularly common in developing countries. It is a major global cause of hearing impairment and the effect is major concern particularly in children, because it may have long-term effects on early communication, language development, auditory processing, psychosocial and cognitive development and educational progress.

The aim of this study was to identify, potential causative agents associated with ear infection especially in an environment where antibiotics are commonly abused. Based on the findings from this study, it is therefore recommended that treatment of ear infection is better done when the causative agents as well as the drug sensitivity patterns are known and properly administered. Also the role of fungi should be studied. This will enhance better treatment and reduce the burden of the infection on the patients and in the long term, it may reduce the cost of treatment.

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