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ORIGINAL ARTICLE

MICROBIOLOGICAL STUDY OF EAR DISCHARGE AND THEIR ANTIBIOTIC SENSITIVITY PATTERN IN CHRONIC SUPPURATIVE OTITIS MEDIA

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ABSTRACT: INTRODUCTION: Chronic Suppurative otitis media (CSOM) is the most common condition encountered by otolaryngologists in day to day practice. The importance of chronic otitis media lies in its dreaded complications and deafness. **AIM:** This study was under taken to identify the microbiological isolates of the ear discharge in CSOM cases and their sensitivity to antibiotics. **SETTINGS AND DESIGN:** Tertiary care hospital in north costal Andhra Pradesh. It was a Prospective study. **MATERIALS & METHODS:** About 100 patients having ear discharge who attended ENT outpatient department from July 2013 to Feb 2014 for a period of 8months were studied. Aural swabs were sent to microbiology lab for culture &sensitivity. **RESULTS:** Culture reports showed aerobic bacterial isolates in 85 cases, fungi in 7 cases and sterile in 8 cases. Of the 85 cases of aerobic bacteria, staphylococcus aureus was isolated in 34 cases (40%) followed by Pseudomonas aeruginosa in 29 cases (34%), klebsiella in 16 cases (18.8%), E.coli in 4 cases (4.7%) and proteus in 2 cases. Antibiotic sensitivity reports showed Staphylococcus was more susceptible to netilmycin (97%), amoxiclav (91.7%) and least sensitive to ceftazidime (64.7%). Pseudomonas was more sensitive to amikacin (96.5%), gentamycin (93.1%) and least sensitive to amoxyclav (79.3%), ampicillin + sulbactum (82.75%). **CONCLUSION:** Mono microbial etiology, especially Staphylococcus species was found to be the most common organism causing chronic otitis media. Knowledge of the prevailing flora and their susceptibility to antimicrobials will guide the clinicians for early and effective treatment thereby avoiding complications.

KEYWORDS: Chronic Suppurative otitis media, culture and sensitivity, Staphylococcus aureus

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[4]. 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.[5-9]

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[10-15]. If untreated CSOM may lead to complications including septicemia, meningitis, brain abscess and facial palsy.[16,17] Therefore, the microbial culture and sensitivity will help in appropriate management of otitis media and its complications and thus preventing the emergence of resistant bacterial strains.

Since no previous similar studies were done in north costal Andhra Pradesh, we undertook this study to identify the microorganisms causing CSOM and to detect antibiotic sensitivity of the isolates in north coastal Andhra Pradesh where prevalence of CSOM is high.

MATERIALS & METHODS: The study design is Prospective. Informed consent was taken from all the patients and the study was approved by institution ethics committee.100 patients with CSOM who presented to ENT outpatient department of our sub urban medical college hospital in north costal Andhra Pradesh from July 2013 to February 2014 were studied for a period of 8months. Ear discharge samples from the clinically diagnosed cases of CSOM who have not taken antibiotics 10 days prior were sent for culture and sensitivity to the microbiology laboratory. Two Sterile cotton swabs were used to collect the samples.

In the laboratory, the first swab was used to make a smear on clean grease-free glass slide for bacterial differentiation by gram stain examination and direct microscopy of specimen in KOH for fungal examination. The second swab was used for the bacterial culture on blood agar, mac Conkey's agar and peptone water for 24hrs at 37^{0}C in incubator. Isolates were identified using colony morphology and standard biochemical tests. After identifying isolates antimicrobial susceptibility test was performed using modified Kirby- Bauer disc diffusion method according to Clinical and Laboratory Standards Institute (CLSI) guidelines on nutrient agar.

Antibiotics tested for gram negative bacteria were cefotaxime (10mcg), amikacin (10mcg), ampicillin+sulbactum (15mcg), amoxiclav (10mcg), cefuroxime (30mcg), Ofloxacin (5mcg), gentamycin (30mcg), ceftriaxone (10mcg), tetracycline (10mcg) and for gram positive bacteria were cefazolin (30mcg), ampicillin + sulbactum (10mcg), ciprofloxacin (10mcg), vancomycin (10mcg), amoxiclav (10mcg), erythromycin (10mcg), ceftazidime (30mcg) and netilmicin (10mcg). A part of the discharge was cultured on Sabouraud's dextrose agar slant (with Chloramphenicol 0.05) and was examined for gross and microscopic morphology of the fungi using lacto phenol cotton blue stain.

RESULTS: In the present study of 100 cases of ear discharge highest incidence of was observed in the age group of 11-20 years (28%) followed by 21-30yr (18%), 0-10yr(13%), 31-40yr(13%), 41-50yr(13%), 51-60yr(10%) and >60yr (5%). Analysis of sex incidence revealed that COM is more common in female population (54%) than males (46%). Out of 100 samples of ear discharge, direct examination revealed the presence of bacteria in 85 cases (85%), fungi in 7 cases (7%) and sterile in 8 cases (8%), as shown in table 1.

Out of 85 bacterial isolates, staphylococcus is isolated in 34 cases (40%) followed by pseudomonas in 29 cases (34%), klebsiella in 16 cases (18.8%), E. coli in 4 cases(4.7%), and proteus in 2 cases(2.3%) as shown in table 2 and figure 1. In the fungus isolates, aspergillus spp. was isolated in 7 cases (87.5%) of which aspergillus Niger is seen in 3 cases (42.85%) followed by aspergillus fumigatus in 2 cases(28.5%), aspergillus flavus in one case (14.28%) and candida albicans in one case (14.28%) as shown in table 3.

Staphylococcus showed highest sensitivity to netilmicin i.e. 33 out of 34 isolates were sensitive (97.05%) followed by amoxiclav 31 out of 34(91.7%), ampicillin + sulbactum 30 out of

34(88.2%), cefazolin (88.2%), ciprofloxacin (88.2%), vancomycin (88.2%) and showed lower sensitivity to ceftazidime 12out of 34 isolates (35%) as shown in table 4, figure 2.

Pseudomonas showed highest sensitivity to amikacin i.e. 28 of 29 isolates (96.5 %) followed by gentamycin 27 of 29(93.1%), ceftriaxone (93.1%), ofloxacin (89.65%), cefotaxime (72.41%), cefuroxime (65.5%) and showed lower sensitivity to tetracycline (10.3 %), ampicillin+sulbactum (17.2%) and amoxiclav (20.6 %).

Klebsiella showed higher sensitivity to ceftriaxone 16 out of 16(100%), gentamycin 16 out of 16(100%), amikacin (93.7%), ampicillin+sulbactum (87.5%), cefotaxime (81.25%), cefuroxime (81.25 %), ofloxacin (68.75%) and lower sensitivity to amoxiclav 7 of 16(43.7%), and tetracycline (43.7%). E.coli showed higher sensitivity to amikacin (75%), ampicillin+sulbactum (75%), cefuroxime (75%), ofloxacin (75%), gentamycin (75%) and showed 0% sensitivity to amoxiclav. Proteus showed sensitivity to amikacin, ofloxocin, gentamycin, ceftrioxone and resistance to ampicillin + sulbactum and amoxiclav.

Distribution of CSOM in north costal Andhra Pradesh showed the disease prevalence more in southern part of the area. Pseudomonas was more common in northern part and staphylococcus was more common in southern part. Analysis of socioeconomic status according to modified Kuppuswamy scale showed the disease more common in rural population and upper lower class.

DISCUSSION: Knowledge of the microorganisms causing CSOM and their antibiotic susceptibility pattern helped us to give appropriate medical treatment there by reducing complications and antibiotic resistance among patients and ultimately reducing the cost of the treatment. Deafness rate can be minimized there by reducing burden on the society.

Overall incidence of COM was found to be higher in females accounting for 54% and male 46%. Majority of cases were of age group 11-20 being 28%.This correlates with the study conducted by, Baruah PC, Gulati et al.[18,19] Analysis of socioeconomic status according to modified Kuppuswamy scale showed the disease is more common in rural population and lower class.

Among the bacterial causes of COM, a single bacterium was found to be the cause. Most common bacteria isolated were staphylococcus aureus (34%) followed by pseudomonas 29%, klebsiella 16%, E.coli 4%, and proteus (2%). This correlates with the study conducted by Prakash R etal.[20-23] In contrary, this observation is different from other studies done by Yeo SG and Poorey VK where Pseudomonas species were isolated commonly.[24,25] Coagulase negative staphylococcus has been excluded, they being the natural commensals of the body.[26,27]

Staphylococcus is universally harbored with in human nares and Pseudomonas is known to reside in the moist environment of ear canal. The proximity of these bacteria reflects the likelihood of their eventual presence in middle ear.[28] In the fungus isolates aspergillus species was found to be most common (85.7%) of which aspergillus Niger had the highest prevalence of 42.85% followed by aspergillus fumigatus, aspergillus flavus and candida albicans.[29, 30]

Unusual prevalence of fungi in this study could be explained by an excessive and uncontrolled use of antibiotics as it was reported by Araiza J etal.[30] Results showed no growth in 8 % of cases and the negative culture could be due to instillation of broad spectrum antibiotics which were used already by the patient. Antibiotic sensitivity pattern showed staphylococcus is more sensitive to netilmycin (97%), amoxyclav (91%), vancomycin (88.2%), and ciprofloxacin (88.2%) and least sensitive to ceftazidime (35.2%) and erythromycin (61.7%).

Pseudomonas showed maximum sensitivity with amikacin (96.5%), gentamycin (93.1%), and ceftriaxone (93.1%) and resistant to ampicillin + sulbactum and amoxyclav. Now with the introduction of newer and higher antibiotics, the complications of otitis media have become less common. But due to increased and irrational use of broad spectrum antibiotics particularly by the registered/private medical practitioners in rural areas like ours, the resistance in the bacterial isolates has become very common.

CONCLUSION: Continuous and periodic evaluation of microbiological pattern and their antibiotic sensitivity pattern of CSOM in local area is necessary in prescribing appropriate antibiotics for successful treatment of otitis media and minimizing its complications and emergence of resistant strains. Mono microbial etiology, especially Staphylococcus species and Pseudomonas aeruginosa, was found to be the most common in our study. Staphylococcus species are highly resistant to ceftazidime and erythromycin. Pseudomonas aeruginosa is becoming less sensitive against commonly used antimicrobials viz. Ampicillin + sulbactum and amoxyclav. We believe that our data may contribute to an effective medical management of chronic supportive otitis media.

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Total no. of cases	**100**
Bacterial isolates	85
Fungal isolates	07
Sterile	08

Table 1: Culture results of ear discharge in CSOM

S. NO.	**Bacteria isolated**	**Number**
1.	Staphylococcus	34 (40%)
2.	Pseudomonas aeruginosa	29 (34%)
3.	Klebsiella	16
4.	E. Coli	04
5.	Proteus	02

Table 2: Incidence of various bacteria isolated in 85 cases of CSOM

Fungal isolate	**Number**	**Percentage**
Candida	01	14.28%
Aspergillus flavus	01	14.28%
Aspergillus fumigatus	02	28.5%
Aspergillus niger	03	42.85%
Total	**07**	**100%**

Table 3: Incidence of various Fungi isolated in cases of CSOM

Bacterial isolates	**Total no.**	**CZ**	**AS**	**CIP**	**VA**	**AC**	**E**	**CAZ**	**NT**	**CTX**	**AK**	**CXM**	**OF**	**G**	**CTR**	**T**
Staph. aureus	34	30 (88.2)	30 (88.2)	30 (88.2)	30 (88.2)	31 (91.1)	21 (61.7)	12 (35.2)	33 (97)	-	-	-	-	-	-	-
Pseudomonas spp	29	-	5 (17.2)	-	-	6 (20.6)	-	-	-	21 (72.4)	28 (96.5)	19 (65.5)	26 (89.6)	27 (93.1)	27 (93.1)	3 (10.3)
klebsiella	16	-	14 (87.5)	-	-	7 (43.7)	-	-	-	13 (81.2)	15 (93.7)	13 (81.2)	11 (68.7)	16 (100)	16 (100)	7 (43.7)
E. coli	4	-	3 (75)	-	-	0 (0)	-	-	-	2 (50)	3 (75)	3 (75)	3 (75)	3 (75)	2 (50)	2 (50)
Proteus	2	-	0 (0)	-	-	0 (0)	-	-	-	1 (50)	2 (100)	1 (50)	2 (100)	2 (100)	2 (100)	1 (50)

Table 4: Antibiotic sensitivity pattern of microorganisms isolated from CSOM

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Cefazolin (CZ), Ampicillin + sulbactum (AS), Ciprofloxacin (CIP) Vancomycin (VA), Amoxiclav (AC), Erythromycin (E), Ceftazidime (CAZ), Netilmycin (NT), Cefotaxime (CTX), Amikacin (AK) Cefuroxime (CXM), Ofloxocin (OF),Gentamycin (G), Ceftriaxone (CTR), Tetracycline (T).

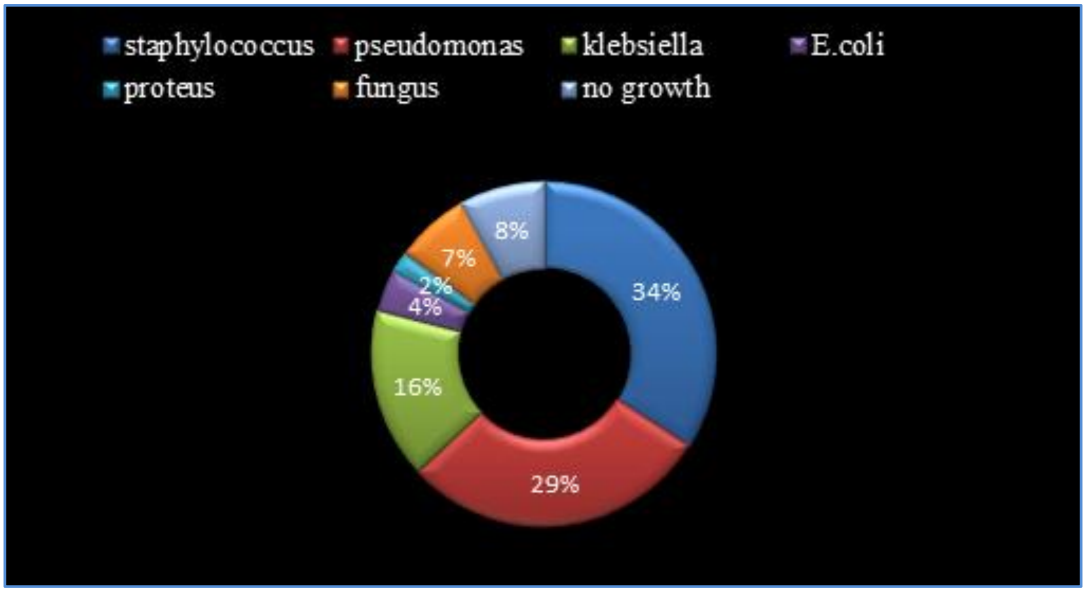

Fig. 1: Incidence of various microorganisms isolated from 100 specimens in CSOM

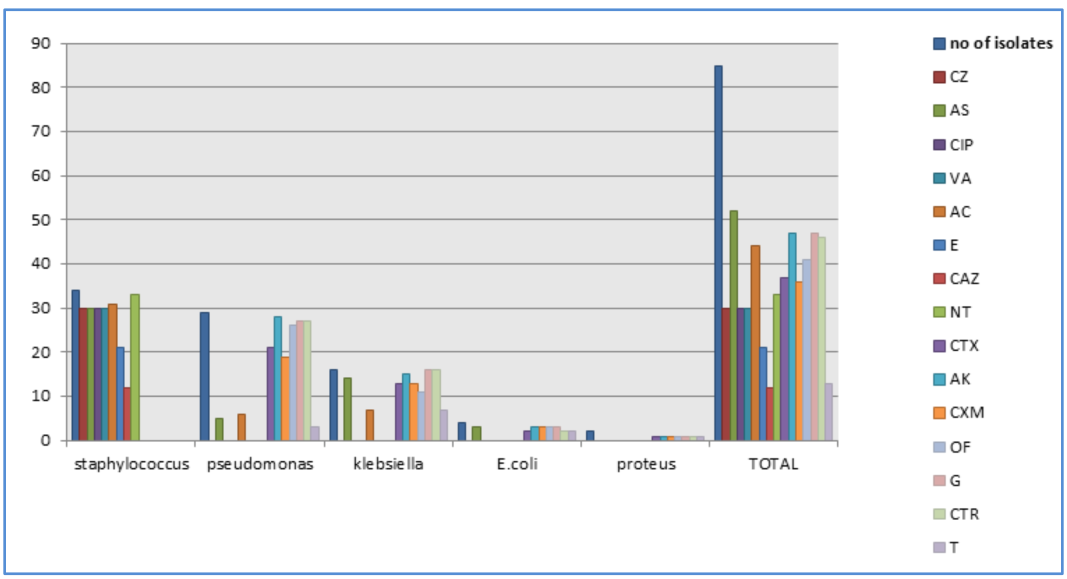

Fig. 2: Antibiotic sensitivity pattern of micro-organisms isolated in CSOM

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