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Original Article

Bacteriological And Resistance Profile In Isolates Of Chronic Suppurative Ottitis Media

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ABSTRACT

OBJECTIVE: The objective of the study was to study the micro-flora and antibiotic pattern of the bacteria causing middle ear infection in order to provide a guideline for empirical antibiotic therapy. MATERIALS & METHODS: This is a cross sectional study performed in 100 cases of middle ear infection attending the outpatient department of ENT (CAIMS ,Karimnagar) from September 2014 to November 2014.Patients of clinically suspected middle ear infections are included in this study. Specimens were collected under sterile precautions and processed in microbiology department. RESULTS: Among the 100 samples, there were 56 isolates. Pseudomonas aeruginosa 33 (58.92%) was found to be a predominant pathogens followed by Staphylococci aureus 15(26.78%), Klebsiella pneumoniae 3(5.35%), CONS 2(3.57%), Proteus 2(3.57%) and Escherichia coli 1(1.78%). Among them 8 specimens were polymicrobial (14.28%). The antibiogram revealed Pseudomonas aeruginosa is multiple drug resistant. Out of 33 Pseudomonas aeruginosa 6 were ESBL and 2 were MBL producers .Among the 15 isolates of Staphylococci aureus 3 were found to be MRSA. Among the 5 Klebsiella pneumoniae 1 is ESBL producer. CONCLUSION : Because of the variation in climate, community and inadvertent use of antibiotics , the pattern of bacterial flora vary in middle ear infection .So it is useful and helpful to identify the microorganism as it gives us the clue regarding the use of correct antibiotics.

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1. Introduction

Chronic suppurative otitis media (CSOM) is defined as a chronic inflammation of the middle ear and mastoid cavity, which presents with recurrent ear discharges or otorrhoea through a tympanic perforation. The disease usually begins in childhood[6] as a spontaneous tympanic perforation due to an acute infection of the middle ear, known as acute otitis media (AOM), or as a sequel of less severe forms of otitis media (e.g. secretory OM)[4,16]. The point in time when AOM becomes CSOM is still controversial. Generally, patients with tympanic perforations which continue to discharge mucoid material for periods of from 6 weeksto 3 months, despite medical treatment, are recognized as CSOM cases[9]. The WHO definition requires only 2 weeks of otorrhoea[14], but otolaryngologists tend to adopt a longer duration, e.g. more than 3 months of active disease[5].

Untreated CSOM leads complications as facial nerve paralysis, lateral sinus thrombosis, labyrinthitis, meningitis and brain abscess [13].So the knowledge of the local pattern of infection is essential to enable efficacious treatment of this disorder. The goal of management is to achieve a safe,dry ear,eradicate disease and improve hearing. The objective of this study was to determine the aerobic bacterial profile and the antibiogramof active CSOM patients.

MATERIALS AND METHODS

This study was conducted on Outpatient basis in Department of ENT (CAIMS, Karimnagar) from September 2014 toNovember 2014.All patients had perforated tympanic membranes with active purulent discharge. Detailed clinical history regarding age,sex,duration of discharge and antibiotic treatment were taken.Only patients who had not received antibiotic therapy (topical or systemic) for the previous five days were included in the study.The ear discharge was collected using two sterile cotton swabs under aseptic precautions with the aid of an aural speculum, prior to the instillation of any topical medication (The patient's consent was taken before collection of samples). All care was taken to avoid surface contamination and the swabs were taken to the microbiology laboratory for further bacteriological processing. The first swab was used to make a smear on a clean glass slide for direct smear examination by Gram's stain.The second swab was processed for the isolation of aerobic bacteria by inoculating in Blood agar, MacConkey's agar, Chocolate agar, Nutrient agar.All organisms isolated were identified according to standard microbiological methods .The isolated pathogens were tested for their antibiotic susceptibility by Kirby–Bauer disk diffusion method on Muller Hinton agar, and the interpretation of results was done by using standard guidelines (CLSI).

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All the staphylococci isolates are tested for MRSA (Methicillin resistant staphylococcus aureus)by Cefoxitin disc diffusion test using a 30µg disc.A 0.5 McFarland Standard suspension of the isolatewas made andlawn culture was done on MuellerHinton Agar. Plates were incubated at 37°C for 18 hours and Zone diameter was measured.An inhibition zone diameter of <19mm was reported as Oxacillin resistant and ≥20mm was considered as Oxacillin sensitive.[8]

Phenotypic detection of ESBL (Extended spectrum beta lactamase) is done on Muller Hinton Agar by using Ceftazidime (30 µg) and Ceftazidime+ Clavulunic acid (20 µg + 10 µg) were placed at the distance of 20mm from center to center. Plates were incubated at 37°C overnight.A > 5mm increase in zone diameter for the antimicrobial tested in combination with clavulanic acid versus its zone when tested alone confirmed ESBL production[3].

MBL(Metallo beta lactamase) is tested by Imipenem-Ethylene diamine tetra acetic acid (EDTA) double disc synergy test .Test organisms were inoculated on the plates with Muller Hinton Agar .An Imipenem (10 microgram) disc was placed 20mm centre to centre from blank disc containing 10 microL of 0.5M EDTA (750 microgram). Enhancement of the zone of inhibition in the area between Imipenem and the EDTA discs in comparison with the zone of inhibition on the far side of the drug was interpreted as positive[7].

Results and Discussion:

The incidence of CSOM is peak among the age group 19 - 40 years. The distribution among different sexes (male 57.14 % and female 42.86 %) (Table1).Among the 100 samples, there were 56 isolates. . The types of microorganisms distribution is shown in chart 1.Pseudomonas aeruginosa 33 (58.92%) was found to be a predominant pathogens followed by Staphylococci aureus 15(26.78%), Klebsiella pneumoniae 3(5.35%),CONS 2(3.57%) , Proteus 2(3.57%) and Escherichia coli 1(1.78%).Among them 8 specimens were polymicrobial (14.28%).Since the proportion of different organisms isolated vary from study to study, like in our study the most common bacterial isolate was Pseudomonas aeruginosa followed by Staphylococcus aureus which is similar to other studies which reported Pseudomonas aeruginosa as major causative organism[1,11,12]. But contrast with other studies which reported staphylococcal aureus as predominant pathogen 2,10,15 .This variation in results could be due to effect of climate and variation of organisms in different community and locality.

Our study has shown that Pseudomonas aeruginosa is the major pathogen involved in the etiology of CSOM. The sensitivity pattern of pseudomonas shows that it is increasingly becoming more resistant to the common and routine antibiotics used in the ENT OPD. One reason for this could be the fact that most of these patients usually present in the ENT OPD after the previous treatments have failed and another important factor is that the cultures are mostly requested when commonly used drugs have failed to eradicate past infection. The antibiogram revealed Pseudomonas aeruginosa is multiple drug resistant. Out of 33 Pseudomonas aeruginosa 6 were ESBL and 2 were MBL producers .Among the 15 isolates of Staphylococci aureus 3 were found to be MRSA. Among the 5 Klebsiellapneumoniae 1 is ESBL producer.

The rapid and irrepressible increase in antimicrobial resistance of pathogenic bacteria is widely accepted as a major problem that has been observed over the last decade. Our results also show that incidence of MRSA in Staphylococci aureus and production of ESBL and MBL in gram negative bacterial population. Further this study also proves that simple phenotypic screening test using disc diffusion methods can be used in low resource settings where molecular methods like PCR is not available. The detection of various resistance mechanisms by phenotypic methods are easy to interpret, reproducible and inexpensive and can be included as routine testing protocol in clinical samples. This will allow the clinician to reevaluate their empirical therapy policies.

Table: 1 AGE & SEX WISE DISTIBUTION OF CSOM

SEX	AGE (YEARS)	NUMBER OF ISOLATES	PERCENTAGE
MALE	1-18	12	37.5%
	19-40	16	50%
	>40	4	12.5%
Total		32	100%
FEMALE	1-18	8	33.33%
	19-40	11	45.84%
	>40	5	20.83%
Total		24	100%

Chart 1

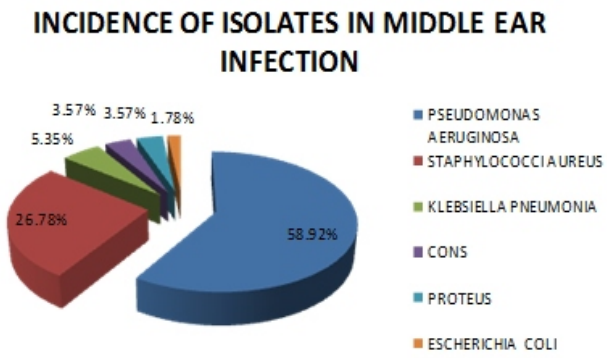


CHART 2: ANTIBIOTIC SUSCEPTIBILITY PATTERN IN PSEUDOMONAS AERUGINOSA

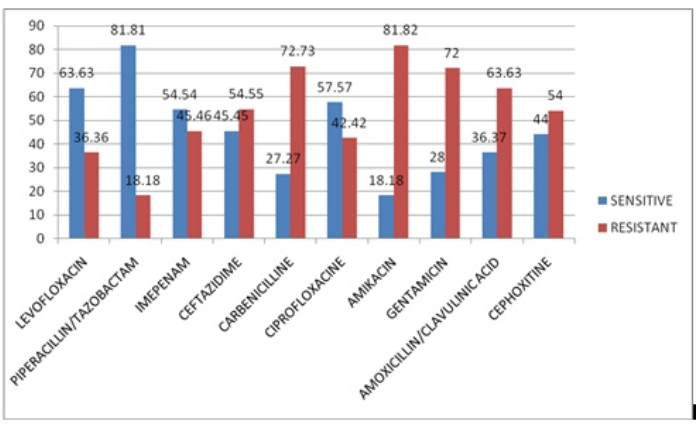


CHART 3: ANTIBIOTIC SUSCEPTIBILITY PATTERN IN STAPHYLOCOCCUS AUREUS

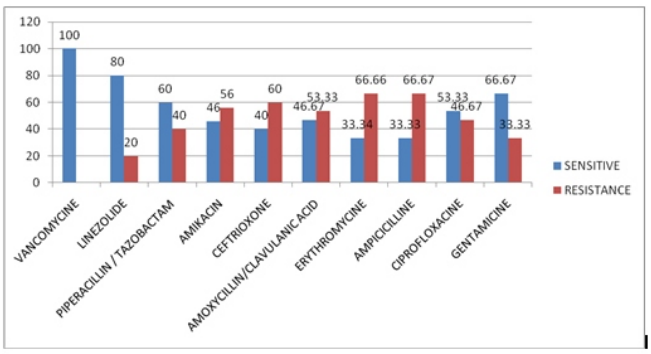
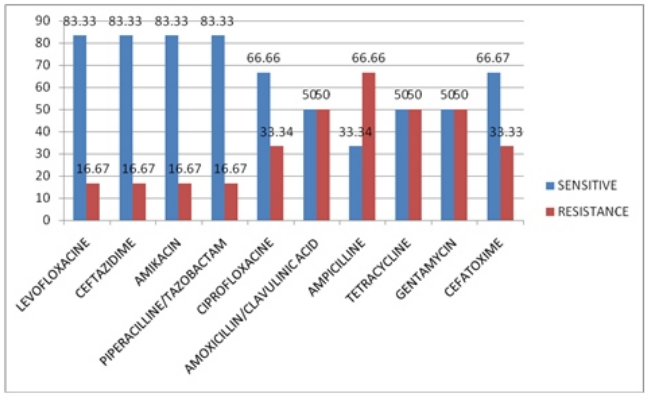


CHART 4: ANTIBIOTIC SUSCEPTIBILITY PATTERN IN GRAM NEGATIVE BACTERIA OTHER THAN PSEUDOMONAS AERUGINOSA



CONCLUSION

In summary, the results of this study showed high resistance rate of Staphylococci and Pseudomonas isolates from middle ear infection patients to ß- lactam and other commonly used antimicrobials. Pseudomonas aeruginosa is sensitive to Piperacillin/Tazobactam(81.81%) , Levofloxacine(63.63%) and resistant towards drugs such as Gentamicine(72%), Amoxicilline/Clavulinic acid (63.63%)(Chart 2) . Staphylococcus aureus showed more sensitive towards Vancomycine(100%) , Linezolide(80%) and resistant to Erythromycin(66.66%) , Ampicilline(66.67%) (Chart 3).Other gram negative bacteria's (other than pseudomonas) shows more sensitive to ceftazidime(83.33%), Piperacilline/Tazobactam(83.33%), Levofloxacine(83.33%) and resistant to drug such as Ampicilline(66.66), Tetracycline(50%) ,Gentamycin(50%) (Chart 4) .

When the results of various workers [1,2,10,11,12,15] were compared, one fact became obvious that the bacteriology and antibiotic sensitivity pattern of C.S.O.M. has been changing from time to time. The strains of yesterday which were sensitive to Amoxicillin, Gentamicine, Tetracycine and Chloramphenicol no longer exhibit the old sensitivity pattern today. These drugs have been replaced by Quinolones and Cephalosporines, Therefore, an appropriate knowledge of antibacterial susceptibility of microorganisms may contribute to rational antibiotic use and the success of treatment for middle ear infection. Continuous and periodic evaluation of microbiological pattern and antibiotic sensitivity of CSOM is necessary to decrease the potential risks of complications by early institution of appropriate treatment. We believe that our data may contribute to an effective medical management of CSOM.

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