MEDICAL CHANNEL

Original Article

BACTERIAL PATHOGENS AND THEIR DRUG SENSITIVITY PATTERN IN ACUTE OTITIS MEDIA IN CHILDREN AT CHILDREN HOSPITAL CHANDKA MEDICAL COLLEGE LARKANA.

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ABSTRACT

Background: his study provides an update on etiologic agents and their drug sensitivity pattern causing acute otitis media in children of Larkana region.
Objective of Study: To find out pathogens causing acute otitis media in children and their drug sensitivity:
Material and Methods: This is a descriptive type and prospective study carried out at out patient department of pediatric department of CMC Larkana from January 2007 to December 2009. Ear swabs of patients having acute otitis media were sent for identification of organism and their drug sensitivity.
Results: 484 samples were sent for culture, out of these 307 (63.429%) were culture +ve and 177 (36.3%) were culture –ve. Majority of patients 149 (48.5%) were between 1-5 years and there was male predominance 257 (83.7%). Staphylococcus aureus was predominant organism 114 (37.2%), other organisms were Klebsiella 71 (23.15%), Streptococcus Pneumoniae 63 (20.5%), Haemophillus Influenzae 22 (7.15%), Streptococcus Pyogenes 19 (6.15%), Escherichia Coli (E-Coli) 11 (3.55%) and Pseudomonas 7 (2.25%). Gram +ve organisms were sensitive to Amoxicillin+Clavulanic acid and gram –ve organisms were sensitive to third generation Cephalosporins like Ceftriaxone, Cefotaxime and Ciprofloxacin.
Conclusion: In our study majority of patients were between 1–5 years and males were predominant. Commonest organism was Staphylococcus aureus which was highly sensitive to Amoxicillin+Clavulanic and Ampicillin+Cloxacillin.

Key words: Organism, Drug Sensitivity, Otitis Media.

INTRODUCTION

Otitis media is inflammation of middle ear. This is commonly caused by the build up of fluid behind the ear drum as a result of blockage of eustachian Otitis media is inflammation of middle ear. This is commonly caused by the build up of fluid behind the ear drum as a result of blockage of eustachian tube. It is more common in children as their Eustachian tube is shorter and more horizontal than adults and is made of more flaccid cartilage which can impair its opening[1]. Otitis media is second only to the common cold among illnesses that bring the child to the physician. The peak incidence and prevalence is from 6 – 20 months of age[2]. An important characteristic of otitis media is propensity to become chronic and recurrent. Children with otitis media present with ear ache (crying), fever and ear discharge. Otitis media can give rise to serious infectious complications like meningitis or brain abscess, hearing impairment and indirect impairment of speech, language, cognitive and psychologic development. Bacteria are cultured from middle ear fluid of approximately 70% of children with acute symptomatic otitis media. A compilation of 4157 cases in 13 studies[3-15] published between 1970-1986

shows that Streptococcus pneumoniae, Haemophilus influenza are predominant bacterial species cultured; other bacteria isolated less often include Branhamella (Neisseria) Catarrhalis, Streptococcus pyogenes & Staphylococcus aureus. In a large prospective study in North Carolina, one fourth to one third of respiratory syncytial virus, adenovirus and influenza virus were associated with acute otitis media, whereas otitis media was no more common after rhinovirus infection than in children without viral infection[16]. Antimicrobial therapy is indicated for the management of patients with otitis media and selected patients with otitis media with effusion. Because selection of antibiotic for use in the treatment of otitis media is based on specific pathogens that commonly cause the illness, it is important that clinicians who treat this condition have knowledge of the organisms responsible for infection and this may vary from one place to another place and even the sensitivity pattern of same pathogens may differ between different centers. Hence this study was planned.

MATERIALS AND METHODS

This is a descriptive type prospective study carried out at out patient Department of Paediatrics at Chandka Medical College Hospital Larkana from January 2007 to December 2009. Patients of 0-15 years' age with ear discharge for less than 14 days and whose parents gave an informed verbal consent to participate in this study were included. Whereas those cases having a history of ear discharge for more than 14 days and those cases whose parents did not opted to get the ear swab done for culture and sensitivity were excluded from this study. Ear swabs were taken under sterile conditions and transferred immediately to laboratory by brain heart broth for aerobic bacteria, thioglycolate for anaerobic bacteria and cultured on suitable media at 37^0C for 24 – 48 hours. Primary isolation was done on (blood agar, chocolate agar, nutrient agar) and then on selective media. Sensitivity of bacterial isolates was done by modified Kirby – Baur disk diffusion method[17]. Sensitivity was given as S (highly sensitive) I (Intermediate sensitivity) R (Resistant). The results were analyzed using SPSS 12.

RESULTS

Total of 484 patients were included in study, out of these 307 (63.429%) were culture +ve and 177 (36.6%) were culture –ve (Fig-1). Regarding age, majority of patients 149 (48.5%) were between 1 – 5 years, 52 (16.9%) <1 year, 86 (28%) 6 – 10 years and 20 (6.5%) 11 – 15 years (Table-1). Majority of patients were males 257 (83.7%), while females were only 50 (16.3%) (Fig-2). Regarding pathogens, Staphylococcus aureus was predominant organism 114 (37.2%), other pathogens were Klebsiella 71 (23.15%), Streptococcus pneumoniae 63 (20.55%), Haemophillus influenzae 22 (7.15%), streptococcus pyogenes 19 (6.15%), Escherichia coli 11(3.55%) and Pseudomonas 7 (2.25%) (Fig-3). Drug susceptibility of these organisms is shown in Tables 2, 3, 4, 5, 6, 7 and 8. Staphylococcus Aureus was highly sensitive to Ampicillin+Cloxacillin, Cephalexin and Amoxicillin+Clavulanic acid, while it was resistant to Amoxicillin, Cefaclor, Cefixime, Chloramphenicol, Fosfomycin, Ceftriaxone and Cefotaxime (Table 2).Klebsiella was sensitive to Ceftriaxone, Cefotaxime and Amoxicillin+Clavulanic acid but resistant to commonly used antibiotics like Amoxicillin, Ampicillin+Cloxacillin, Cefaclor, Cefixime, Cephalexin, Chloramphenicol, Fosfomycin and Cephradine (Table-3).Streptococcus Pneumoniae was sensitive to Amoxicillin, Ampicillin+Cloxacillin, Amoxicillin+Clavulanic acid, Cefaclor, Cefixime, Cephalexin, Ceftriaxone and Cefotaxime, whereas it was resistant to Chloramphenicol and Fosfomycin (Table-4).Haemophilus Influenzae was highly sensitive to ceftriaxone, cefotaxime, cefixime and Amoxicillin+Clavulanic acid but resistant to Ampicillin+Cloxacillin, Cephalexin, Chloramphenicol, Cephradine and Fosfomycin (Table-5).Streptococcus Pyogenes was sensitive to Amoxicillin, Ampicillin+Cloxacillin, Amoxicillin+Clavulanic acid, Cefaclor, Cefixime, Cephalexin, Cephradine, Ceftriaxone and Cefotaxime but resistant to

TABLE – 1

AGE OF CULTURE +VE PATIENTS

n= 307

Age	No	%
<1 year	52	16.9
1 – 5 years	149	48.5
6 – 10 years	86	28
10 – 15 years	20	6.5
Total	**307**	**100**

TABLE – 2.

DRUG SENSITIVITY OF STAPHYLOCOCCUS

n= 114

Drug	Sensitive	Intermediate	Resistant
Amoxicillin	18	33	63
Ampicillin+Cloxacillin	82	14	18
Amoxicillin+ Clavulanic acid	56	24	34
Cefaclor	3	6	105
Cefixime	28	37	59
Cephalexin	71	20	23
Chloramphenicol	0	5	109
Fosfomycin	5	6	103
Ceftriaxone	24	30	60
Cephradine	13	15	86
Cefotaxime	12	15	87

TABLE – 3.

DRUG SENSITIVITY OF KLEBSELLA

n= 71

Drug	Susceptible	Intermediate	Resistant
Amoxicillin	05	18	48
Ampicillin+Cloxacillin Amoxicillin+	01	07	63
Clavulanic acid	27	22	22
Cefaclor	08	15	48
Cefixime	10	16	45
Cephalexin	4	10	57
Chloramphenicol	0	02	69
Fosfomycin	07	08	56
Ceftriaxone	53	14	04
Cephradine	04	11	56
Cefotaxime	50	13	08

TABLE – 4.

DRUG SENSITIVITY OF STREPTOCOCCUS PNEUMONIAE

n= 63

Drug	Susceptible	Intermediate	Resistant
Amoxicillin	50	08	05
Ampicillin+Cloxacillin Amoxicillin+	47	08	08
Clavulanic acid	52	06	05
Cefaclor	25	27	11
Cefixime	21	25	17
Cephalexin	22	30	11
Chloramphenicol	2	05	56
Fosfomycin	11	12	40
Ceftriaxone	27	29	07
Cephradine	11	37	15
Cefotaxime	23	35	05

Chloramphenicol and Fosfomycin (Table-6).Escherichia Coli was highly sensitive to Ceftriaxone and Cefotaxime and cephalexin, but maximum number of cases were found to be resistant to Ampicilin+cloxacillin, Chloramphenicol, Cefaclor and Fosfomycin (Table-7).Pseudomonas was highly sensitive to Ciprofloxacin but resistant to Amoxicillin, Ampicillin+Cloxacillin, Cefaclor, Cephalexin, Chloramphenicol, Fosfomycin, Cephradine and Cefotaxime (Table-8).

TABLE – 5.

DRUG SENSITIVITY OF HAEMOPHILUS INFLUENZA

n= 22

Drug	Susceptible	Intermediate	Resistant
Amoxicillin	05	10	07
Ampicillin+Cloxacillin Amoxicillin+	04	06	12
Clavulanic acid	17	04	01
Cefaclor	05	8	09
Cefixime	18	03	01
Cephalexin	04	05	13
Chloramphenicol	02	03	17
Fosfomycin	03	04	15
Ceftriaxone	20	01	01
Cephradine	4	05	13
Cefotaxime	19	01	02

TABLE – 6.

DRUG SENSITIVITY OF STREPTOCOCCUS PYOGENES

n= 19

Drug	Susceptible	Intermediate	Resistant
Amoxicillin	12	05	02
Ampicillin+Cloxacillin Amoxicillin+	11	05	03
Clavulanic acid	15	02	02
Cefaclor	09	06	04
Cefixime	10	07	02
Cephalexin	07	08	04
Chloramphenicol	01	04	15
Fosfomycin	05	05	09
Ceftriaxone	10	06	03
Cephradine	10	05	04
Cefotaxime	11	03	05

DISCUSSION:

Otitis media is a serious health problem for infants and young children. Antimicrobial therapy is indicated for the management of patients with acute otitis media and in selected patients with otitis media with effusion. Because the selection of an antibiotic for use in treatment of otitis media is based on specific pathogen that commonly cause the illness, it is important that clinicians who treat patients with this condition have knowledge of organisms most likely to cause this infection.In our study 484 ear

TABLE – 7. DRUG SENSITIVITY OF E-COLI

n= 11

Drug	Susceptible	Intermediate	Resistant
Amoxicillin	02	03	06
Ampicillin+Cloxacillin	01	01	09
Amoxicillin+ Clavulanic acid	06	04	01
Cefaclor	02	03	06
Cefixime	04	05	02
Cephalexin	08	02	01
Chloramphenicol	01	01	09
Fosfomycin	02	03	06
Ceftriaxone	09	01	01
Cephradine	04	05	02
Cefotaxime	09	01	01

TABLE – 8. DRUG SENSITIVITY OF PSEUDOMONAS

n= 07

Drug	Susceptible	Intermediate	Resistant
Amoxicillin	0	0	07
Ampicillin+Cloxacillin	0	0	07
Amoxicillin+ Clavulanic acid	02	02	03
Cefaclor	0	01	06
Cefixime	03	03	01
Cephalexin	0	0	07
Chloramphenicol	0	0	07
Fosfomycin	0	0	07
Ceftriaxone	03	02	02
Cephradine	0	0	07
Cefotaxime	0	0	07
Ciprofloxacin	05	01	01

swabs were sent for culture, out of these 307 (63.429%) were culture +ve and 177 (36.6%) were culture –ve. In a study at Pittsburg otitis media research centre 25% of cultures from patients with acute otitis media were negative for aerobic bacteria [18]. In another study[19] 27% of effusion cultures were negative for bacteria. In our study majority of patients were in age group of 1–5 years, mean age was 54.91 months (± 42.6 SD). Peak prevalence of acute otitis media in children aged 6 – 8 months,

FIG-1.
PIE CHART OF CULTER+ AND CULTURE–VE CASES FROM EAR SWABS
NO=484

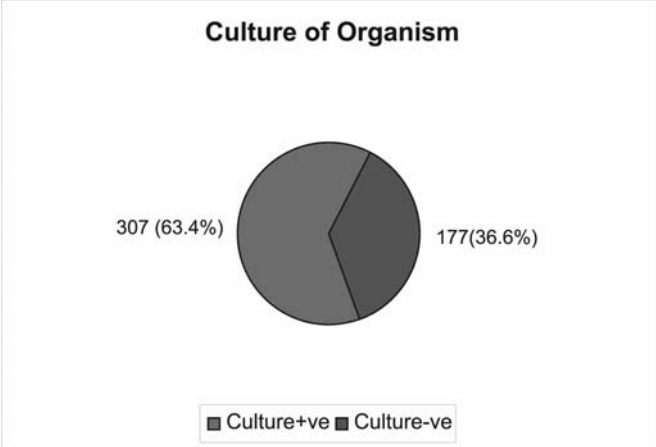


FIG-2. SEX OF CULTURE +VE PATIENTS

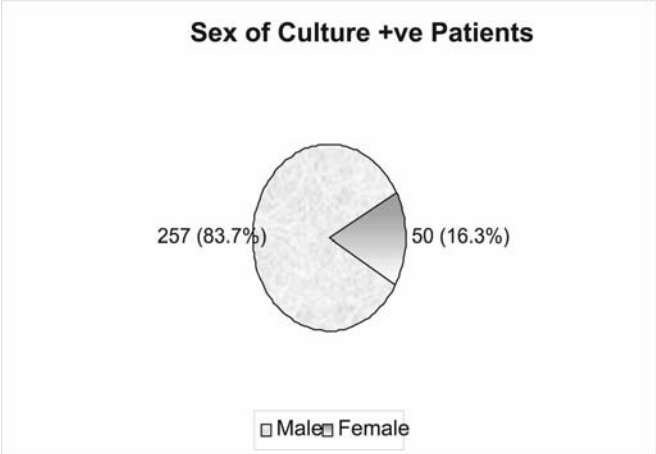
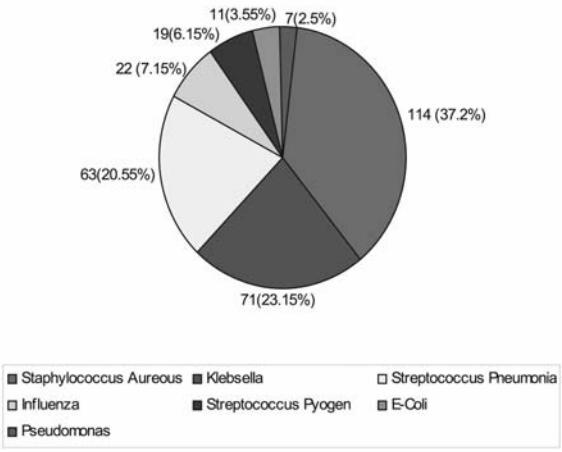


FIG-3.
PIE CHART SHOWING VARIOUS ORGANISMS CULTURED FROM EAR SWABS



although it can occur at any age; 80 – 90% of cases occur in 4 – 5 years[20]. In another study mean age of patients with acute otitis media was 17 months[21], whereas mean age of patients in our study was 5.491 months. Majority of our patients 257 (83.7%) were males. Many studies have shown that otitis media is predominant in males[20,22,23] which are in agreement with the present study (males 83.7%). In our study predominant cultured organisms were Staphylococcus aureus, Klebsiella, Streptococcus pneumoniae and Streptococcus pyogenes. Escherichia coli and Peseudomonas were less common. In a study from Israel[24] Streptococcus pyogenes, Haemophilus influenzae, Streptococcus pneumoniae and Moraxalla catarhalis were reported as causative organisms from patients with acute otitis media. A compilation of 4157 cases in 13 studies[3-15] show that Streptococcus pneumoniae and Haemophilus influenzae were predominant organisms, other less common cultured organisms were Branhamella catarrhalis, Streptococcus pyogenes and Staphylococcus aureus. In a study from Nigeria[23] organisms responsible for otitis media were Staphylococcus aureus, Proteus mirabilis, Pseudomonas, Streptococcus pneumoniae and Klebsiella. In Niger[25] organisms found in patients with otitis media were Pseudomonas, Klebsiella, Proteus, Escherichia coli and Staphylococcus aureus. In a study from Bratislava[20], most frequent organism cultured in patients with acute otitis media was streptococcus pneumoniae 48%, other less frequent organisms were Haemophilus influenzae, Staphylococcus aureus, Streptococcus pyogenes, Moraxalla catarrhalis, and Cornebactrium.

In Pitsburg study[18], Streptococcus pneumoniae and Haemophilus influenzae were predominant organisms; other less common organisms were Moraxalla catarrhalis, Staphylococcus aureus, Group A Streptococcus and Pseudomonas. The present study has shown almost same organisms to that of other studies except Moraxella Caterhallis which has not been found even in single case, thereby showing that probably this is very rare in acute otitis media in Larkana region. Drug sensitivity pattern is also slightly different from other centers. In our study we found highest sensitivity to Amoxicillin+Clavulanic acid which is in agreement with study from Nigeria[23] and highest resistance was seen with Fosfomycin & Chloramphenicol. In Nigeria[23], majority of organisms were sensitive to Amoxicillin+Clavulanic acid, Gentamycin, Ofloxacin, Amoxicillin, Tetracycline, Chloramphenicol and Erythromycin, resistance was seen with Ampicillin, Cotrimoxazole, Cefixime and Ciprofloxacin. In another study from Niger[25] most organisms were sensitive to Gentamycin and Ampicillin; however they were resistant to Trimethoprim-Cotrimoxazole and Chloramphenicol. In a study from Bratislava[20] most common organism was Streptococcus pneumoniae, 68% were resistant to Pencilllin. In another study[21] Streptococcus pneumoniae was resistant to pencillin in 16.9% and 54% to Macrolides, 24.7% of Haemophilus influenzae and 100% of Moraxalla catarrhalis were beta-lactamase producers. In a study from Brazil[26], resistance to Pencillin was as follows: M. Catarrhallis 100%, Streptococcus pneumoniae 62.5% and Haemophilus influenzae 23%. In Khatmandu[27], majority of pathogens were sensitive to Amikacin and Ciprofloxacin. In Pitsburg[18], there was high incidence of beta-lactamase production by Haemophilus influenzae and Moraxalla Catarrhalis.

CONCLUSION:

In our study majority of patients were males and between 1–5 years age. Common organisms cultured were Staphylococcus aureus, Klebsiella and Streptococcus pneumoniae and less common organisms were Haemophilus influenzae, Streptococcus Pyogenes, Escherichia coli & Pseudomonas. Highest sensitivity was seen with Amoxicillin+Clavulanic acid and then with Ampicillin+Cloxacillin and Cefotaxime.

RECOMMENDATIONS

Any child presenting with acute otitis media should be initially treated with Augmentin until the results of the culture and sensitivity become available.

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