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Microbiology

INCIDENCE OF PNEUMOCOCCAL LOWER RESPIRATORY TRACT INFECTION IN CHILDREN

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ABSTRACT **Introduction:** Streptococcus pneumonia is a leading cause of life threatening infections in children. It kills 1 million children under the age of five every year, >70 % of these deaths are in developing countries. So this study aims to know incidence of pneumococcal respiratory tract infection in children <12 years & to find out antibiotic susceptibility patterns.

Methods: Children <12 years old with acute lower respiratory infection attending "Pediatrics OPD" of S.S.G. hospital, Baroda were included in the study. Nasopharyngeal Aspirate (NPA) was collected from the cases for bacteriological analysis. Antibiotics susceptibility tests (AST) were also performed.

Results and Conclusion: 125 children were recruited in to the study. 66 were males and 59 were females. S.pneumoniae was isolated in 24 (19.2%). Highest incidence i.e. 62.5% was found in age group of 1-5 years, followed by 25% in >5 years. Out of 24 cases, 10 were females and 14 males. On AST high resistance of S.pneumoniae to Tetracycline, moderate degree of resistance to Cloxacillin, Co-trimoxazole, Clindamycin and high sensitivity to Ciprofloxacin, Ciphalexin and Amoxyclav was found.

KEYWORDS : Streptococcus pneumoniae, Nasopharyngeal Aspirate, Antibiotics susceptibility test.

INTRODUCTION

S. pneumoniae is part of the commensal flora of the upper respiratory tract, together with Moraxella cattarrhalis, Haemophilus influenzae, Neisseria meningitis, Staphylococcus aureus and various haemolytic Streptococci it colonizes the nasopharyngeal (NP) [1-2,3-5]

The burden of the disease in youngest and oldest sections of the population is more, in both developed and less developed countries[1-4].

AIM & OBJECTIVES

To study incidence of pneumococcal respiratory tract infection in children <12 years & to find out antibiotic susceptibility patterns of pneumococcal isolates & pattern of penicillin resistance amongst these.

MATERIAL & METHODS

Children <12 years old with acute lower respiratory infection attending "Pediatrics OPD" of S.S.G. hospital, Baroda were included in the study. Respiratory symptoms (cough, fever, sore throat, congestion) were the commonest reasons for clinical attendance. The criteria for selection of cases for enrolment in the present study were: temperature ≥ 38° c, fast breathing, and pulse >120/minute, cough, crepitations on auscultation, chest in drawing, poor feeding.

Nasopharyngeal Aspirate (NPA) was collected from the cases for bacteriological analysis.

Bacteriological Study

Gram stained smear were examined for presence of pus cells and bacteria. Presence of S.pneumoniae was searched in each of the smear. The specimen was inoculated on Blood agar, Chocolate agar, Chocolate agar with Gentamycin (5 µg/ml) and MacConkey's agar plates. All culture plates except MacConkey's Agar plate were incubated in CO_2 environment, using a candle jar at 37°C overnight. All the isolates were then identified by Gram stain and biochemical tests were performed as per format. Gram positive cocci that were catalase test negative were further tested for bile solubility, optochin sensitive test, inulin fermentation test.

Antibiotic susceptibility test:

By Kirby Bauer disc diffusion method. Following antibiotics were used as per CLSI guidelines: Amoxyclav, Cephalexin, Ciprofloxacin, Clindamycin, Cloxacillin, Co-trimoxazole, Erythromycin, Tetracycline.

All pneumococcal positive isolates were tested to study pattern of penicillin resistant. This was carried out by using 1 µg oxacillin (Hi Media) disc by Kirby Bauer method, on Chocolate agar.

RESULTS

A total of 125 children were recruited in to the study. 66 were males i.e. (52.8%) and 59 (47.2%) were females (Table -I). The mean age of the children was 4.6 years. Table No. 1 shows age and sex wise distribution of cases. The age of the child at the time of the study enrolment ranged from 4 month to 12 years.

TABLE NO. 1: AGE AND SEX – WISE DISTRIBUTION OF 125 CASES OF THE PRESENT STUDY

AGE GROUP	MALE	FEMALE	TOTAL%
0-1 Year	07	08	15 (12.0)
1-5 Year	41	43	84 (67.2)
>5 Year	18	08	26(20.8)
TOTAL	66 (52.8%)	59 (47.2%)	125

There was a history of fever in over 84.8% of cases in all age groups. As a predictor of pneumonia, as defined by WHO's ARI case Management Guidelines – respiratory rate ≥50 for children below 12 months ; and ≥40 for children aged 12 months – 5 years was present in46.4% of cases. It could be seen from the Table No. 2, that most of the children had fever, tachycardia, cough and fast breathing.

TABLE NO. 2: CLINICAL FINDINGS IN 125 CASES OF LRTI

SYMPTOMS	CASES no. (%)
Fast breathing	58(46.4)
Fever	106(84.8)
Tachycardia	89(71.2)
Cough	70(56.0)
Crepitation on auscultation	73(58.4)
Difficulty in feeding	61(48.8)
Chest in drawing	21(16.8)

Out of 125 specimens cultured, 89 shows growth of various organism,36 specimens did not show any growth.

S.pneumoniae was isolated in 24 (19.2%) of the 125 nasopharyngeal aspirate samples. Table No. 3 shows age and sex-wise distribution of pneumococcal positive cases. It can be seen that highest incidence i.e. 62.5% was found in age group of 1-5 years , followed by 25% in the age group of >5 years. Out of 24 cases, 10 were females and 14 males.

TABLE NO. 3: AGE AND SEX-WISE DISTRIBUTION OF PNEUMOCOCCAL POSITIVE CASES

Antimicrobial tested	No. of isolates Resistant (%)
Sensitive to all drugs	16 (66.6)
Tetracycline	04 (16.6)
Cloxacillin	02 (8.3)

Co-trimoxazole	02 (8.3)
Erythromycin	0
Clindamycin	02 (8.3)
Ciprofloxacin	0
Cephalexin	0
Amoxyclav	0

TABLE NO. 4 : Antibiotic resistance patterns of S.pneumoniae isolates:

AGE GROUP	MALE	FEMALE	TOTAL (%)
0-1 Year	01	01	02(12.5)
1-5 Year	08	09	17(62.5)
>5 Year	05	00	05(25.0)
TOTAL	14 (58.4%)	10 (41.6%)	24

Above table no. 4 shows high resistance of S.pneumoniae to Tetracycline, moderate degree of resistance to Cloxacillin, Co-trimoxazole, Clindamycin and high sensitivity to Ciprofloxacin, Ciphalexin and Amoxyclav. Pneumococcal isolates were screened for penicillin resistance, using 1µg oxacillin disc. In present study, all 24 isolates of pneumococci were sensitive to oxacillin.

DISCUSSION:

Acute respiratory infections along with diarrhea are responsible for majority of mortality and morbidity in children, especially in <5 years of age. Pneumonia is most common cause of death among acute lower respiratory tract infection children. Various studies[3,4,5] have been carried out on different aspect like aetiological agents of community acquired pneumonia & in hospitalized children , clinical predictor and mortality in pneumonia, nasopharyngeal carriage in certain pediatric population, pattern of antibiotic resistance etc.

Industrialized countries like Israel, Finland have reported nasopharyngeal carriage rates ranging from 43-90 per cent[6]. Studies conducted in various regions of India have found similar carriage of 6.5-83 per cent[7].During the period from April 1997 to March 1998, 389 pediatric patients were diagnosed of having respiratory tract infections in S.S.G Hospital, Baroda of which 202 (51.7%) had pneumonia. In present study S.pneumoniae was isolated in only 19.2% (24 out of 125 cases) which reflects the predominance of other etiological agents in pneumonia over S.pneumoniae.

In present study, 125 children with acute lower respiratory tract infection between age group of 4 month to 12 years were subjected to study. Studies suggest the incidence of S.pneumoniae as a causative agent of pneumonia is lower in age group<1 year; whereas the incidence of RSV, H.influenzae, E.coli, and Klebsiella is higher in this age group[8]. In present study also, the incidence of S.pneumoniae in age group <1 year was observed to be low i.e. 12.4% of positive cases. S.pneumoniae is more common aetiological agent in age group 1-5 years[8]. Here in this case also results are similar & S.pneumoniae was found to have higher incidence (62%) in this age group. In age group above 5 years, incidence is relatively less (25%) as compared to age group 1-5 years.

In present study, the incidence of S.pneumoniae was found to be higher in males than in females. Similar pattern was observed in studies by various authors[9, 10]. However, there is no predilection for any sex. Following isolation of pathogen from NPA by culture, sensitivity test of all the positive culture with S.pneumoniae was carried out. It was seen that in 66.6% of cases organism was sensitive to all drugs, resistance to Tetracycline was seen in 16.6% , whereas they were highly sensitive to Ciprofloxacin, Cephalaxin and Amoxyclav. In a study[11]carried out by Woolfson in 1997, antibiotic resistant pattern of S.pneumoniae in Zambian children was determined. It was seen that in 83% of cases, organism was sensitive to all drugs, whereas rest showed moderate degree of resistance to penicillin, Co-trimoxazole and Chloramphenicol. S.pneumoniae was highly sensitive to Cephalaxin and Cefuroxime.

Various authors[12,13] have studied the pattern of penicillin resistance in pneumococci. In present study, no isolates was resistant to penicillin.

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