

*Original Research Article***STUDY OF PRESCRIBING PATTERN OF ANTIBIOTIC IN PEDIATRIC PATIENTS WITH PNEUMONIA*****Khaja Moinuddin¹, MA Altaf², Githa kishore³**

- 1 Department of Pharmacy Practice, Viveswarapura Institute of Pharmaceutical Sciences, Bangalore.
1. Department of Pharmaceutics, IBNSINA National medical college, Jeddah KSA
2. Department of Pharmacy Practice, Viveswarapura Institute of Pharmaceutical Sciences, Bangalore.

ABSTRACT

Pneumonia is a lower respiratory tract infection that specially affects the lungs and is caused by micro-organisms. Pneumonia kills more children than any other illness, more than AIDS, malaria and measles combined. To study the prescribing pattern of antibiotics in pneumonia in pediatric patients. A prospective study was conducted for nine months in inpatients of pediatric department of KIMS hospital and research centre, Bangalore. The review of treatment charts, patient's parents/caregiver interview was conducted to collect the data pertaining to study of prescribing pattern of antibiotics used in the treatment of pneumonia. The collected data was analyzed by the descriptive statistical analysis. In this study, out of 105 patients 62 were males and 43 females.(43%) of inpatients were less than one year in age and 72 patients were not completely immunized. 61 patient diagnosed as pneumonia representing consolidation and 44 with bronchopneumonia. 43% Amox-clav and i.v Ceftriaxone 36% were commonly prescribed antibiotic pneumonia. 73 patients prescribed with single antibiotic. 54% Ceftriaxone was prescribed as empirical antibiotic. Pneumonia is most commonly seen in children who were with incompletely immunized. More male children suffered from pneumonia than females. The most commonly prescribed antibiotic was i.v Amox-clav in patients representing consolidation and i.v Ceftriaxone in bronchopneumonia. Ceftriaxone was the commonly prescribed as empirical antibiotic. Patients who received therapy with cephalosporin derivatives (Ceftriaxone and cefotaxime) had the lower mean duration of hospital stay, less than 7 days

Key words: Pediatrics; Pneumonia; Antibiotics.

Address for correspondence: MA Altaf, Department of Pharmaceutics, IBNSINA National Medical College, Mahjer, Gulail, Jeddah, Kingdom of Saudi Arabia. Email-altafpharm@gmail.com

INTRODUCTION

Pneumonia is an inflammation of parenchyma of the lungs. It is a lower respiratory tract infection that specially affects the lungs and is caused by micro-organisms.¹ Pneumonia kills

more children than any other illness, more than AIDS, malaria and measles combined. Approximately 2 million children under the age of five in developing countries die each year from pneumonia².

Over 1090 Indian children under five years of age die every day Prompt treatment of pneumonia is usually with a full course of appropriate antibiotics.³

According to WHO report 1 in 5 parent/caregiver know about pneumonia disease. In pneumonia not only antibiotics are prescribed but also different other drugs, therefore pharmacists should be able to evaluate the management of such kinds of drug therapy².

viral pneumonia caused by RSV (respiratory syncytial virus) influenza, parainfluenza or adenovirus and accounts for 40% of the cases, In over two third of the cases, common bacteria cause pneumonia, *kelbsiella*, *E-coli* and gram positive organisms like pneumococci and staphylococci, Atypical organisms were *Chlamydia* and *mycoplasma* Can also cause pneumonia. Risk factors associated with pneumonia are low birth weight, malnutrition, vitamin A deficiency, lack of breastfeeding, passive smoking, poor socioeconomic status, large family size, family history of bronchitis, overcrowding, indoor and outdoor air pollution.⁴

Signs and Symptoms of pneumonia are fever, chills, cough, unusually rapid breathing, breathing with grunting or wheezing sounds, vomiting, chest pain and abdominal pain.⁵

Diagnosis of pneumonia can be done by complete blood count, cultures, imaging studies and cold agglutinin test.⁶

Treatment for children with pneumonia should be treated with proper antibiotics like Penicillin, Broad spectrum Penicillin, Cephalosporin's, Macrolides and Amino glycoside. for specific time of period in hospital and also in home

Prevention:

Two vaccines which are available to prevent pneumococcal disease are the Pneumococcal conjugate vaccine (PCV7; prevnar) and the Pneumococcal polysaccharide vaccine (PPV23; Pneumovax). The pneumococcal conjugate vaccine is a part of the routine infant immunization schedule and is recommended for all children less than 2 years age.⁷

MATERIAL AND METHODS

A hospital based prospective study was conducted for 9 months, in the pediatric department of Kempegowda institute of medical sciences (KIMS) and research centre hospital Bangalore. A total of 105 patients were selected for the study. Details of patients like demographic data, drug data, immunization history as per IAP, socio-economic status of patients parents/caregiver were collected by directly interviewing the parents/caregiver. Lab data: Chest X-ray, Hemoglobin and W.B.C count and Blood Culture report were also collected.

Drug data: Brand and generic name of all drugs prescribed, dose frequency, route of administration, duration of administration, duration of hospital stay, were collected and documented in a designed patients data collection form. The parent/caregiver were counseled regarding possible causes of pneumonia and the care to be taken to control the symptoms, prevention, transmission of pneumonia and its therapy. Patient information leaflets were designed in English and the local language in Kannada and distributed to the parents/caregiver.

Descriptive statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean \pm SD (Min-Max) and results on categorical measurements are presented in Number (%). Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups (Inter group analysis). Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two groups. The Statistical software namely SPSS 15.0, Stata 8.0, MedCalc 9.0.1 and Systat 11.0 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables .

RESULTS AND DISCUSSION

The study of prescribing pattern is a component of medical audit, which seeks monitoring, evaluation and necessary modification in the prescribing practice of prescribers to achieve rational and cost effective medical care. It is necessary to define prescribing habits to drive a remedial message to the prescribers.

In our study the mean age of the inpatients of pediatric department diagnosed with pneumonia was 26 months. Most of the patients were infants, and this observation was similar to the study conducted Palikhe N, in pediatric hospital of Katmandu valley.⁸

More male patients seem to have greater susceptibility to pneumonia as compared to females (59% and 41%). Which was also found by James Stephen in his study at Tufts Medical School and New England Medical centre where it was reported that pneumonia incidence is greater in males than in females.⁹

Table 1: Age distribution of pediatric patients studied in Months

Age	Number	%
<12 months	47	44.8
12-24 months	26	24.8
24-36 months	12	11.4
36-48 months	6	5.7
>48 months	14	13.3
Total	105	100.0

44.8% were less than age of 12 months out of 105 and 24.8% were between 12-24 months, Average age in months of pneumonia inpatients was 26.19.

Table 5: Gender distribution

Gender	Number	%
Male	62	59.0

Female	43	41.0
Total	105	100.0

According to gender distribution of patients 62 male inpatients out 105 and 43 female patients were suffering from pneumonia.

Table 8: Immunization history as per IAP

Immunization	Number (n=105)	%
Completely Immunized	33	31.4
Not completely Immunized	72	68.6

Based on immunization history as per IAP (Indian association of pediatric) 72 patients were incompletely immunized and 33 patients were completely immunized.

Table 15: Prescription pattern of antibiotics in pediatric patients

PRESCRIPTION PATTERN	Total (n=105)		Broncho Pneumonia (n=44)		Pneumonia representing consolidation (n=61)		P value	Mean duration of hospital stay (days)
	No	%	No	%	No	%		
Ceftriaxone	38	36.2	13	29.5	25	41.0	0.229	7.66
Cefotaxime	22	21.0	15	34.1	7	11.5	0.005**	7.09
Ceft+Sulb	8	7.6	5	11.4	3	4.9	0.275	7.25
Amox-Clav	46	43.8	14	31.8	32	52.5	0.035*	7.63
Pipe+Taz	1	1.0	0	0.0	1	1.6	1.000	13.00
Amikacin	19	18.1	7	15.9	12	19.7	0.621	8.79
Gentamicin	1	1.0	1	2.3	0	0.0	0.419	7.00
Penicillin	1	1.0	1	2.3	0	0.0	0.419	14.00
Macrolides	4	3.8	1	2.3	3	4.9	1.000	5.25
Vancomycin	1	1.0	0	0.0	1	1.6	1.000	22.00

Among 105 patients, i.v Amoxicillin+clavulanic acid 43.8% was commonly prescribed antibiotic. Ceftriaxone 36.2%, Cefotaxime 21.0%, Amikacin 18.1% and Ceftriaxone + sulbactam in 7.6%

Majority of patients (72) were incompletely immunized. 33 patients were completely immunized at the time of hospital admission. Among the patients who were not completely immunized as per the age, the two vaccines not given were HIB and Hepatitis B vaccines. A report by WHO has mentioned that an important cause of pneumonia is the lack of Haemophilus influenza type B (HIB) and Hepatitis B vaccination.²

Table 18: Prescription pattern of antibiotics according to blood culture findings

Antibiotics	Total (n=35)		Blood culture negative (n=26)		Blood culture positive (n=9)		P value
	No	%	No	%	No	%	
Ceftriaxone	19	54.3	12	46.2	7	77.8	0.135
Cefotaxime	6	17.1	6	23.1	0	0.0	0.304
Ceft+sulb	3	8.6	3	11.5	0	0.0	0.553
Amox-clav	12	34.3	8	30.8	4	44.4	0.685
Pipe+taz	1	2.9	0	0.0	1	11.1	0.257
Amikacin	7	20.0	3	11.5	4	44.4	0.055+
Gentamicin	0	0.0	0	0.0	0	0.0	-
Penicillin	0	0.0	0	0.0	0	0.0	-
Macrolides	1	2.9	1	3.8	0	0.0	1.000
Vancomycin	0	0.0	0	0.0	1	11.1	0.257

Ceft+Sulb → Ceftriaxone and sulbactam.

Amox-clav → Amoxicillin and Calvulanic acid

Pipe+ Taz → Piperacilline tazobactum

Amoxicillin-clavulanic acid (Amox-clav) combination was commonest antibiotic used in our study, (43.8%) followed by Ceftriaxone (36.2%), Cefotaxime (21.0%). Amikacin (18.1%) and Ceftriaxone + sulbactum in (7.6%). Table No.4. This in comparison to study done by Linjie Zhang et al. at Brazil, found penicillin and its derivatives were the most commonly used antibiotics as monotherapy, followed by cephalosporin.¹⁰

73% patients were prescribed with single antibiotic, 26% with two antibiotics, 5 with three antibiotics and 1 patient with four or more antibiotics. Common combination therapy of two antibiotics used was cephalosporin derivatives with amikacin. Such findings are in concordance of other studies by Mariles A in Netherland where a high percentage of patients are prescribed with one antibiotic.¹¹

In our study blood culture was done in 35 cases, among which 9 came positive, and the commonest organism isolated was streptococcus pneumonia in the patients in whom blood culture was positive. Ceftriaxone was commonly used empirical antibiotic followed by amox-clav. In both positive and negative blood culture cases amikacin was additionally prescribed drug. Similar study suggested by Jr. Geroge at university of Texas that commonly used empirical drugs was ceftriaxone and amox-clav.¹²

Table 22: Use of antibiotics according to duration of hospital stay in days

Antibiotics	Total number of patients	Hospital stay in days	
		≤ 7 days	>7 days
Ceftriaxone	38	23(60.5%)	15(39.4%)
Cefotaxime	22	14(63.6%)	8(36.4%)
Ceft+Subl	8	4(50.0%)	4(50.0%)
Amox-Clav	46	27(58.7%)	19(41.3%)
Pipe+Taz	1	0	1(100.0%)
Amikacin	19	11(57.9%)	8(42.1%)
Gentamicin	1	1(100.0%)	0
Penicillin	1	0	1(100.0%)
Macrolides	4	4(100.0%)	0
Vancomycin	1	0	1(100.0%)

Ceft+Salb → Ceftriaxone and sulbactam.

Amox-clav → Amoxicillin and Clavulanic acid

Pipe+ Taz → Piperacilline tazobactam

Cephalosporin derivatives (ceftriaxone and Cefotaxime) were commonly prescribed antibiotic inpatients less than 1 year of age and also in more than 5 years. (Table No.5).

In our study we found that days of hospital stay in patients with pneumonia representing consolidation is mean of 7.39 ± 3.33 days when compared to bronchopneumonia with mean stay of 6.57 ± 2.42 days. Patients who received therapy with cephalosporin derivatives (ceftriaxone and cefotaxime) had mean duration of stay less than 7 days (Table No.6).

The present study assessed the prescribing pattern of antibiotics. This study identified that at KIMS Hospital Bangalore. The antibiotics prescribing pattern in inpatients pneumonia was according to IAP guidelines'. According to Indian pediatrics, Betalactams is a good drug for treatment with non severe pneumonia. For children with severe pneumonia, I.V beta-lactam or a combination of beta-lactam and beta lactamase inhibitor plus a macrolide maybe prescribed.

Young infants should receive a beta lactam and an aminoglycoside because of their tendency to get gram negative infection.

Prompt treatment of pneumonia is usually with a full course of appropriate antibiotics. UNICEF and WHO have published guidelines for treating pneumonia. According to the guidelines, Co-trimoxazole and amoxicillin are effective drugs against bacterial pathogens and are often used to treat children with pneumonia.

ACKNOWLEDGEMENT

- 1 The Almighty for his choicest blessings showered upon me for the success of this dissertation work.
- 2 Mrs.Githa Kishore, Assistant professor, Department of Pharmacy Practice, Visveswarapura institute of pharmaceutical sciences,Bangalore for her excellent guidance, critical evaluation, constant supervision and continuous encouragement throughout my work.
- 3 Dr. *Yashodha H.T, M.B.B.S, DNB (ped)* Associate professor Department of Pediatrics, Kempegowda Institute of Medical Sciences, for his excellent advice and guidance throughout my dissertation work.
- 4 Mrs. Meera N.K,Assistant professor and Head of the Department of Pharmacy Practice, Visveswarapura institute of pharmaceutical sciences ,Bangalore,for her excellent timely advice, constant inspiration and effort which enabled me to complete my project successfully.
- 5 To Teaching and Non teaching staff of Viveswarapura institute of pharmaceutical sciences, KIMS hospital Bangalore.

REFERENCE

- 1 Theodore C, Sectish, Charles GP. Nelson text book of Pediatrics 18th ed. 2008:P. 1795-99.
- 2 UNICEF/WHO Pneumonia the for gotten killer of the children [online] 2006 Sep (cited 2007 may 10); Available from:URL: www.unicef.org.
- 3 State of the World's Children report by UNICEF. 2008 Jan 31.
- 4 Ghai OP, Piysh G, Paul VK. Ghai essential pediatrics. 6th ed.2008:P 348-51.
- 5) Barbara P, Homeier. Pneumonia. [Centers for Disease Control and Prevention \(CDC\)](http://www.cdc.gov) 2005 June. Available from from:URL:www.thechildrenshospital.org.
- 5 Ira S. Pneumonia in children. Pediatric On Call Health Care 2006 July 01.
- 6 George S, Melissa CS. Pneumonia. Medicine Net.Com 2008-July 04.

- 7 Palikhe. N. Prescribing Pattern of antibiotics in pediatrics hospital of Kathmandu Valley. *J Nepal Health Research council* 2004;(2):31-36.
- 8 James S. Pneumonia bacterial. *Journal New England Medical center E-medicine* 2007;2(2):2.
- 9 Zhang et al. Antibiotics in community-acquired pneumonia. *Indian Pediatrics* 2008 July 17;45.
- 10 Marlies A, Van H, Klarieke L. Antibiotic utilization for hospitalized pediatric patients. *International Journal of Antibiotic Agents* 1988;10:161-164.
- 11 George H. Mcracken Jr, Diagnosis ad management of pneumonia in children: judicious use of antibiotics in pediatric respiratory infections 2000. *The Pediatric Infectious Disease Journal* 2000 Sep 19;9:924-28.