

Profile of acute lower respiratory tract infection in children under fourteen years of age at Nepal Medical College Teaching Hospital (NMCTH)

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ABSTRACT

The purpose of this study was to find out the current pattern and prevalence of acute lower respiratory tract infections in children at Nepal Medical College Teaching Hospital in Kathmandu, Nepal. A retrospective study was done in 73 children, admitted to the Pediatric ward over a period of one year from January 2010-December 2010. This study showed, 52.0% children below two years of age had acute lower respiratory tract infections, where 68.4% had pneumonia and 31.6% had acute bronchiolitis. The prevalence of infections was 58.9% in male children. The occurrence of infections was common in January and April month. Pneumonia was detected in 37.7% children with malnutrition. The most common presenting symptoms was fever observed in 90.4%, cough in 71.2% and fast breathing in 34.2% children. The WBC count was high in 47.9% children, out of which 43.8% had pneumonia and 4.1% had bronchiolitis. Increased neutrophil count in 36.9% and increased ESR in 50.7% seen in patients only with pneumonia. Chest x-ray showed, lobar pneumonia in 45.2% children where right middle zone was most commonly involved in 42.4% patients. Six (8.2%) children were diagnosed as pulmonary tuberculosis. The average duration of hospital stay was 6 days.

Keywords: Lobar pneumonia, bronchopneumonia, bronchiolitis.

INTRODUCTION

Acute lower respiratory tract infection (ALRTI) is the leading cause of mortality and one of the common causes of morbidity in children under- five years of age. In developing countries, pneumonia kills three million children every year and other acute respiratory infections, principally measles and pertussis kill another million children. ALRTI is responsible for 19.0% of all deaths in children under- five years and 8.2% of all disabilities and premature mortality as measured by disability adjusted life years (DALYS).¹ In Nepal, annual incidence of pneumonia in under- five years children is 90/1000.² Even though the etiology is often undetermined in a clinical situation, the most frequent agents causing pneumonia in children are *Streptococcus pneumoniae*, *Hemophilus influenzae* and to some extent *Staphylococcus aureus*. Evidence for this emerges from using culture of lung aspirate, counter immunoelectrophoresis, blood and pus culture.³⁻⁵ The incidence of pneumonia in developed and developing countries are similar, but mortality is five times higher in developing countries.⁶ Acute bronchiolitis is another, one of the common serious lower respiratory tract infection in infants. *Respiratory syncytial virus* is implicated in most cases.⁷ Other causative organisms include *parainfluenza virus* 3, 1 and 2, *adenovirus*, *influenza viruses* and rarely *Mycoplasma pneumoniae*.

Hence, the present study was conducted to determine the current pattern prevalence and important factors associated with acute lower respiratory tract infections.

MATERIALS AND METHODS

This retrospective study was done for a period of one year from January 2010 –December 2010. All children admitted to Pediatric ward at Nepal Medical College Teaching Hospital were included in this study. NMCTH is situated at Attarkhel of Jorpati village development committee, in Kathmandu, about 11km northeast of Kathmandu city. All the children had come with symptoms related to respiratory system. Every case was subjected to a detailed clinical examination, followed by relevant investigations. The children were divided into four age group < 2years, 2-5 years, 5-10 years and 10-14 years. The respiratory problems were classified according to plain chest x- rays as bronchiolitis,

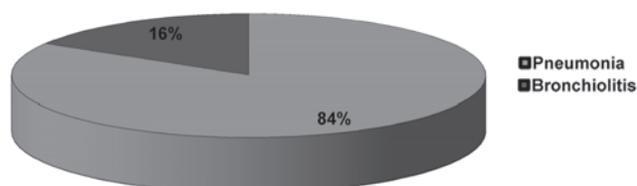


Fig. 1. Number of children with different types of acute lower respiratory tract infections

Table-1: Age distribution of acute lower respiratory tract infections

Age	Below 2year		2-5years		5-10 years		10-14years		Total	
	n.	%	n	%	n.	%	n.	%	n.	%
No.of ALRTI	38	52.0	12	16.4	15	20.5	8	10.9	73	
Bronchiolitis	12	31.6	-		-		-		12	16.4
Pneumonia:	26	68.4	12	100	15	100	8	100	61	83.6
(a) Lobar	7	26.9	5	41.7	14	93.3	7	87.5	33	54.1
(b)Bronchopneumonia	19	73.1	7	58.3	1	6.7	1	12.6	28	45.9

bronchopneumonia, lobar pneumonia, lobar pneumonia with collapse and pleural effusion. The investigations included Hb, TLC, DLC, ESR, blood culture, chest x-ray, and pleural fluid analysis for P^H, proteins, sugar, TLC, DLC, lactate dehydrogenase, adenosine deaminase, acid fast stain, culture and sensitivity, gastric aspirate for acid fast bacilli, mantoux test and other as required.

RESULTS

In present study, 61 (83.6%) children had pneumonia and 12 (16.4%) had acute bronchiolitis shown in Fig. 1. Here, 38 (52.0%) children below 2 years of age had higher incidence of acute lower respiratory tract infection among which 26 (68.4%) had pneumonia and 12 (31.6%) had bronchiolitis. Acute bronchiolitis was observed only in children below 2 years of age. Sixty-one (83.6%) children had pneumonia among which 33 (54.1%) had lobar pneumonia and 28 (45.9%) had bronchopneumonia. Between 5-10 years, 14 (93.3%) children had highest number of lobar pneumonia shown in Table-1. Forty three (58.9%) male and 30 (41.1%) female had acute lower respiratory tract infection shown in Table-2. The incidence of acute lower respiratory tract infection was common in month of January and April shown in Fig. 2. According to Indian academy of Pediatric, 16 (21.9%) had grade I, 6 (8.2%) had grade II, 1 (1.4%) had grade III and 2 (2.7%) had grade IV malnutrition shown in Fig. 3. Out of 61 (83.6%) cases of pneumonia 23 (37.7%) had malnutrition and 38

(62.3%) had no malnutrition. The most common symptoms was fever observed in 66 (90.4%), cough in 52 (71.2%), fast breathing in 25 (34.2%), chest pain in 7 (9.6%) and difficulty in breathing 8 (10.9%) children shown in Table-3. High white blood cell count was observed in 32 (43.8%) children with pneumonia. The high neutrophil count was detected in 27 (36.9%) and increased E.S.R in 37 (50.7%) children with pneumonia shown in Table-4. Chest x-ray revealed, lobar pneumonia in 33 (45.2%), bronchopneumonia in 28 (38.3%) and bronchiolitis in 12 (16.4%) children shown in Table-5. The right sided lobar pneumonia was noticed in 20 (60.6%) and left sided in 13 (39.4%) children. The right middle zone was most commonly involved in 14 (42.4%) and second was left lower zone in 11 (33.3%) cases shown in Table-6. Pleural effusion with consolidation was seen in 6 (8.3%) children. Three (4.1%) children had consolidation with collapse of lung. Out of total 73 cases, 6 (8.2%) were diagnosed as pulmonary tuberculosis where, 3 (50.0%) had positive mantoux test, increased

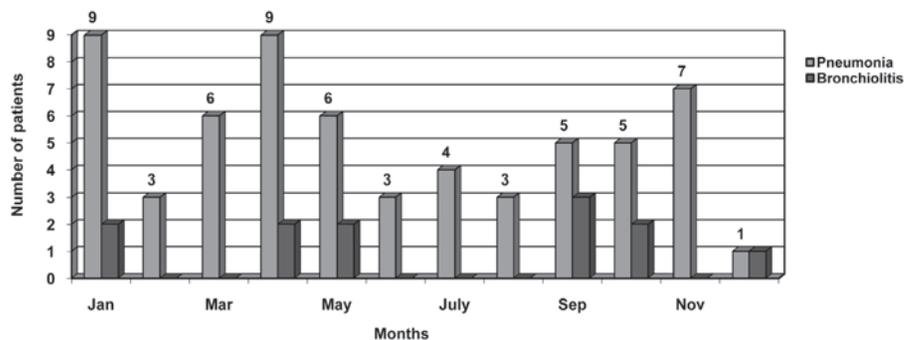


Fig. 2. Season wise distribution of acute lower respiratory tract infections

Table-2: Sex distribution of acute lower respiratory tract infections

sex	Male		Female	
	n	%	n	%
No.	43	58.9	30	41.1

Table-3: Distribution of children according to symptoms

Symptoms	n	%
fever	66	90.4
cough	52	71.2
hurried breathing	25	34.2
difficulty in breathing	8	10.9
running nose	8	10.9
chest pain	7	9.6

Table-4: Distribution of children according to increased WBC count, neutrophil count, lymphocyte count and ESR (Total n = 73)

Types ALRTI	leucocytosis		neutrophilia		lymphocytosis		raised ESR	
	n.	%	n.	%	n.	%	n.	%
Pneumonia	32	43.8	27	36.9	13	17.8	37	50.7
Bronchiolitis	3	4.1	-	-	9	12.3	-	-
Total	35	47.9	27	36.9	22	30.1	37	50.7

ESR in 5 (13.5%) and lymphocytosis in 4 (18.2%) children was observed. Pleural fluid analysis was done in 3 (50%) children, where protein, adenosine deaminase, lactate dehydrogenase and lymphocytes were high in all cases. Average duration of hospital stay was 6 days.

DISCUSSION

This study was undertaken to know the trends in admission, morbidity and the important factors associated with acute lower respiratory tract infections at NMCTH. In our study, 52.0% children below two years of age had higher incidence of acute lower respiratory tract infections whereas, Duarte data showed 70.0%.⁸

In present study, 83.6% had pneumonia where as Berman data showed, 71.0% incidence of pneumonia.⁹ The study done by Sung showed, 56.0% incidence of acute bronchiolitis which was high as compare to our data where 16.4% had acute bronchiolitis.¹⁰ Both bacterial and viral pathogens may be responsible for these infections. In our analysis, a statistically significant difference between male and female was noticed with overall hospitalization rates in male being as much as 58.1% higher than female. Similar study done by Shahzad and Merchi reported, 52.1% and 64.2% incidence of infections in male as compare to female.^{11,12} This could also be due to higher rates of care seeking for male children than for female children, given strong preferences for sons in the south Asian regions.¹³

Table-5: Distribution of ALRTI according to roentgenogram (Total n = 73)

Types of ALRTI	n	%
Bronchiolitis	12	16.4
Pneumonia		
(a) Lobar pneumonia	33	45.2
(b) Bronchopneumonia	28	38.3

Other key issues include, the importance of undernutrition because here, we found 37.7% children with pneumonia were malnourished. Malnourished children have higher livelihood for developing respiratory infection. The relative risk of developing pneumonia was 2.3 times more in malnourished children reported in a study done by Deb.¹⁴ The common symptoms of ALRTI, we found were fever in 90.4%, cough in 71.2%, fast breathing in 34.2%, chest pain in 9.6% and difficulty in breathing 10.9% children. Shamo'on data showed, the most sensitive and specific symptoms for prediction of pneumonia was cough in 71.0%, fever in 70.0% and fast breathing in 65.0% children.¹⁵ Hence, these are the symptoms that bring children to the attention of the Pediatrician. On the basis of roentgenogram, 45.2% had lobar pneumonia, where right lung was involved in 60.6% cases. The right middle zone was most frequently involved in 42.4% children.

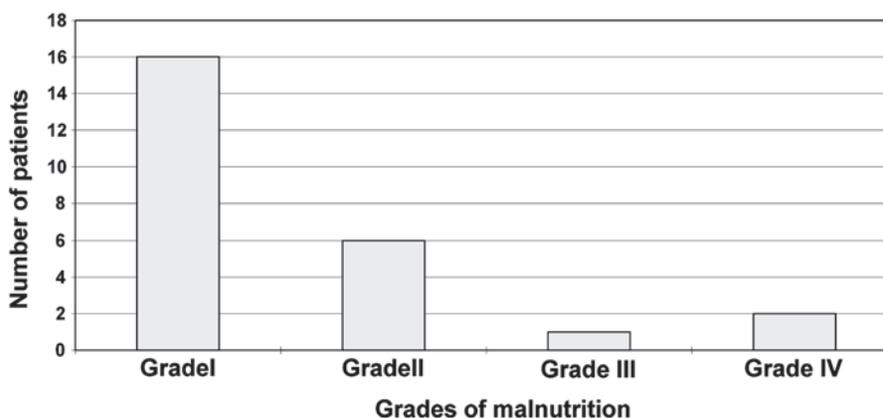


Fig. 3. Distribution of children in different grades of malnutrition.

Table- 6: Distribution of lobar pneumonia according to zone involved in roentgenogram. (Total n = 33)

	n	%
Lobar pneumonia(right)	20	60.6
Upper zone	2	6.1
Middle zone	14	42.4
Lower zone	4	12.1
Lobar Pneumonia(left)	13	39.4
Upper zone	2	6.1
lower zone	11	33.3

This is because; the larger diameter and more vertical directions of the right main bronchus are probable factor. Ude data showed, right lung involvement in 79.0% of children but in contrast right upper zone consolidation was much higher around 37.0% of children.¹⁶ Laboratory examination significantly showed, high white blood cell count in 43.8 %, neutrophil count in 36.9% and ESR in 50.7% children with pneumonia. Pulmonary tuberculosis was also diagnosed in 8.2% children in this study. To achieve further reduction in morbidity and mortality due to acute lower respiratory tract infections in children, there is need for better implementation of acute respiratory infection control program and research.¹⁷ Malnutrition in utero, during infancy and in early childhood is a major culprit. The impaired development of a fully functioning immune system makes young children particularly susceptible to acute lower respiratory tract infections.

This study shows that, basic individual intrinsic factor such as age, malnutrition are independently associated with infections. Therefore, preventive strategies like nutritive education programs are remarkably importance. Further studies, regarding effectiveness of vaccine for the prevention of acute lower respiratory tract infection is also necessary.

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