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Original Research Article

Etiological factors and clinical profile of acute respiratory distress in children age group 2 months to 2 years and prevalence of respiratory syncytial virus in the study population

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ABSTRACT

Background: Acute lower respiratory tract infections are a common cause of morbidity and mortality in children. Respiratory infections in infants and small children are of great importance because of small airways. Infection may cause a further narrowing and may lead to respiratory distress. To evaluate the etiological factors, clinical profile and outcome of acute respiratory distress in the age group 2 months to 2 years.
Methods: This study was conducted in the Paediatric department of Government Mohan Kumarmangalam medical college hospital, Salem, Tamil Nadu, India in the year September 2017-March 2018. Totally 183 cases of acute respiratory distress children were included in the study. A thorough clinical examination was done at the time of admission and management details were recorded into the proforma. Respiratory distress is defined as per WHO protocol as respiratory rate more than 50/minute in infants from 2 months to 12 months of age, and more than 40/minute in children from 13 months to 24 months of age.
Results: Of the 72 cases of bronchiolitis, 32 cases (44%) tested positive for IgM at the time of admission and no cases in the control population tested positive for IgM. Of the 72 cases of bronchiolitis in the study population, 52 cases (72%) tested positive for ELISA IgG at the time of admission and 2 cases among the controls tested positive for ELISA IgG.
Conclusions: Pneumonia was the most common cause of respiratory illness in the study population. Overcrowding was the major risk factor contributing to acute respiratory illness. Incidence of acute respiratory distress was high among undernourished children.

Keywords: Acute respiratory distress, Hyperthermia, IgM, Malnutrition, Pneumonia, Viral infection

INTRODUCTION

Acute respiratory infections (ARI) continue to be a major killer of children in developing countries. It is estimated that 3.9 million children die each year from ARI, most of them in developing countries.[1] Acute lower respiratory tract infections are a common cause of morbidity and mortality in children.[2] Respiratory infections in infants and small children are of great importance because of small airways. Infection may cause a further narrowing and may lead to respiratory distress.[3] 20-25% of paediatric department outpatient visits are for respiratory

distress.[4] Out of all hospital admission in younger children, 15% are for ARI. ARI control programme was initiated for early detection and treatment of pneumonia. The debate regarding the significance of clinical signs and symptoms for its diagnosis has however continued.[5] ARI caused by bacteria and viruses are the important causes of morbidity and mortality in children, while the use of appropriate antibiotic treatment can save many lives. The ultimate objective should be primary prevention by vaccination against vaccine preventable diseases. Promotion of breastfeeding, improvement of nutritional status of the child, reduction of indoor and outdoor air pollution and immunization against measles should lead to a reduction in ARI morbidity and mortality.[6]

METHODS

This study was conducted in the Pediatric department of Government Mohan Kumaramangalam Medical College Hospital, Salem, Tamil Nadu, India in the year 2017-2018. Totally 183 cases of acute respiratory distress children were included in the study. A thorough clinical examination was done at the time of admission and management details were recorded into the proforma. Respiratory distress is defined as per WHO protocol as respiratory rate more than 50/minute in infants from 2 months to 12 months of age, and more than 40/minute in children from 13 months to 24 months of age.

Inclusion criteria

The study population included all children admitted with acute respiratory distress during the same period in the age group of 2 months to 24 months.

Exclusion criteria

Included all children with, prior cardiovascular system and central nervous system problems. Other systemic causes for respiratory distress like septicemia, acidosis due to non-respiratory causes and, children who have been detected with non-respiratory cause for the present illness were also excluded from the study. A thorough clinical examination was done at the time of admission and management details were recorded into the proforma. Respiratory distress is defined as per WHO protocol as respiratory rate more than 50/minute in infants from 2 months to 12 months of age, and more than 40/minute in children from 13 months to 24 months of age. Fever was considered when the axillary temperature was more than 37.2°C or 99°F.

In cases of bronchiolitis, paired samples of venous blood were collected at the time of admission, in sterile tubes, after informed consent along with routine investigations and a second sample was collected 2-3 weeks later. The samples were then transported in ice packs to the laboratory. The contents were stored at - 20°C until they were tested.

Statistical analysis

The Association between study variables and the outcome was tested with the chi-square analysis. The Appropriateness of the model is assessed by Hosmer-Lemeshow summary chi-square test and also by the Receiver Operating Characteristics (ROC) Curve analysis. A p-value <0.05 was considered significant.

RESULTS

The 183 cases with respiratory distress in the age group 2 months to 24 months were admitted during the study period. the sex distribution of the cases. Majority were males 66% and females were 33%. Male female ratio was 1.95: 1. (72%) cases were undernourished and 52 (28%) children belonged to normal nutritional status.

Table 1: Age distribution of the study population.

Age group	Number of cases	%
2 months to 12 months	133	73
13 months to 24 months	50	27

Table 1 depicts, the age distribution in the study population. Infants in age group 2-12 months formed the major group, constituting 133 children (73%) of the study population. The children in the age group 13-24 months were 50 (27%).

Table 2: Etiological factors: distribution of diagnosis in study population.

Etiology	Number of cases	%
Pneumonia	80	43.7
Bronchiolitis	72	39.3
Chemical pneumonitis	21	11.5
Croup	4	2.2
Pneumothorax	4	2.2
Foreign body aspiration	2	1.1

Table 3: Presenting symptoms of various etiologies.

Etiology	Total cases	Cough		Fever	
		+	%	+	%
Pneumonia	80	77	96.2	74	92.5
Bronchiolitis	72	69	95.8	20	27.8
Chemical pneumonitis	21	0	0	0	0
Croup	4	4	100	1	25
Pneumothorax	4	4	100	1	25
Foreign body aspiration	2	0	0	0	0

Table 2 shows, out of 183 cases, 80 cases were diagnosed as Pneumonia (43.7%). 72 cases as Bronchiolitis (39.3%). Chemical Pneumonitis due to accidental kerosene ingestion were 21 cases which constituted

(11.5%). Croup and Pneumothorax were 4 each (2.2%), and 2 cases were Foreign body aspiration (1.1%).

Table 3 depicts, cough was present in 77 cases of Pneumonia (96.2%), 69 cases of Bronchiolitis (95.8%), and all cases of Croup and Pneumothorax (100%). Fever was present in 74 cases of pneumonia (92.5%), 20 cases of Bronchiolitis (27.8%), 1 case of Croup (25%), and 1 case of pneumothorax (25%).

Table 4 depicts, one case of Pneumonia had grunting and altered sensorium. Fever was present in 57 cases (71.2%) of Pneumonia, 8 cases of Chemical pneumonitis (38.1%), 1 case of Croup and Foreign body accounting 25% and 50% respectively. Retractions were observed in 72 cases of Bronchiolitis (100%), 59 cases (73.8%) of Pneumonia, 15 cases (71.4%) of Chemical pneumonitis, 1 case (50%) of Foreign body aspiration, and all the cases of Croup and Pneumothorax (100%).

Table 4: Associated signs of various etiologies.

Etiology	Total cases	Altered sensorium		Fever		Retractions		Grunting	
		+	%	+	%	+	%	+	%
Pneumonia	80	1	1.25	57	71.2	59	73.8	1	1.25
Bronchiolitis	72	0	0	21	29.2	72	100	0	0
Chemical pneumonitis	21	0	0	8	38.1	15	71.4	0	0
Croup	4	0	0	1	25	4	100	0	0
Pneumothorax	4	0	0	0	0	4	100	0	0
Foreign body aspiration	2	0	0	1	50	1	50	0	0

Table 5: RSV antibody IgM results in subjects.

Cases	Total	IgM	
		Positive	Negative
Bronchiolitis	72	32 (44%)	40 (56%)
Control	30	0	30 (100%)

Table 5 depicts, of the 72 cases of bronchiolitis 32 cases (44%) tested positive for IgM at the time of admission and no cases in the control population tested positive for IgM, overall chi-square 19.43, P value <0.001.

Table 6: RSV antibody (IgG) results in subjects.

Cases	Total	IgG	
		Positive	Negative
Bronchiolitis	72	52 (72%)	20 (28%)
Control	30	2 (6.6%)	28 (93.3%)

Table 7: Outcome of RSV positive bronchiolitis.

RSV antibody	Result	Admission	2-3 weeks later
IgM	Positive	32 (44%)	8 (11%)
	Negative	40 (56%)	64 (89%)
IgG	Positive	52 (72%)	41 (57%)
	Negative	20 (28%)	31 (43%)

Table 6 depicts, Of the 72 cases of bronchiolitis in the study population, 52 cases (72%) tested positive for ELISA IgG at the time of admission and 2 cases amongthe controls tested positive for ELISA IgG. Overall chi-square 36.53.P VALUE <0.001.

Table 7, of the 52 cases, which were positive for IgG at the time of admission, 41 cases tested positive for IgG 2-3 weeks later and of the 32 cases, which were positive for IgM at the time of admission, 8 cases tested positive for IgM 2-3 weeks later.

DISCUSSION

In present study, Pneumonia was the major etiology accounting for 43.7% of the cases, followed by Bronchiolitis with 39.3%.[7] All the cases of Chemical pneumonitis were due to accidental kerosene ingestion, accounted to 11.5%. Croup and Pneumothorax accounted for 2.2% each, and foreign body aspiration accounted for 1.1% of cases.[8] Of the environmental factors overcrowding was the most common with 79.8%, which showed similarity with other studies by Henderson FW et al. In this study, housing conditions like children residing in hut also had high association with the presenting illness with 67.5%, attributing to their poor socioeconomic status.[9] Other factors like poor ventilation revealed high associates with 61.2%, and poor sanitation with 65%, passive smokers with 17.5%, pets with 12 %, and people living by nearby pollutant sources with 7.1%. In our study, malnutrition was a significant predictor for respiratory illness similar to other studies which have found malnutrition was a major risk factor for mortality and morbidity.[10] In present study, CRP was raised in 50% of cases with pneumonia, and 37.5% of cases of bronchiolitis cases respectively. Total count was raised in 52.8% of pneumonia cases. 1137 cases of bronchiolitis were treated with antibiotics since they had severe respiratory distress and undernourished. The average duration of hospital stay in various etiologies: In

pneumonia, it was 8.35±3.06 days, bronchiolitis was 9±3.77 days, chemical pneumonitis was 7.33±3.19 days, croup was 7±2.94 days, pneumothorax was 11±2.44 days, and for foreign body, aspiration was 8±1.41 days.[12] In present study, mortality was reported in 2 cases, one pneumothorax and one pneumonia. This contrasts with the high mortality to the cases of pneumonia in a study done by Morrow PW et al.[13,14] A total of 72 cases of Bronchiolitis were tested for Antibodies IgM and IgG for the respiratory syncytial virus (RSV).In our study, IgM tested positive in 32 cases (44%) with bronchiolitis and IgG tested positive in 52 cases (72%) at the time of admission, which showed similar incidences with other studies by Peter D et.al.[15,16] Among the 32 cases, which were IgM positive, 28 of them tested positive for IgG also. The remaining 4 cases were detected by IgM only. A total of 56 cases tested positive for either IgM or IgG at the time of admission which accounted to 77.78% of Bronchiolitis cases.[17] 28 patients who had both IgG and IgM positive had the typical bronchiolitis features and were treated with humidified oxygen and IV fluids and discharged from the hospital with 0% mortality.[18]

Out of 72 cases, 30 cases had severe respiratory distress and they were treated with antibiotics to avoid superadded bacterial infection, in view of their poor nutritional status. [19] Of the 52 cases, which were positive for IgG at the time of admission, 11 cases became negative for IgG 2-3 weeks later.[20] 32 cases, which tested positive for IgM at the time of admission, 24 cases became negative for IgM 2-3 weeks later. 4 cases, which were initially IgG and IgM negative, and 2 cases, which were initially IgG positive, lost follow up. RSV IgM ELISA was useful for early detection of bronchiolitis in the acute stage (44% patients). RSV ELISA had prognostic value i.e ELISA IgG / IgM became negative in 35 cases after 2-3 weeks and correlated with clinical findings.[21]

CONCLUSION

Immunization is an important measure to reduce the cases of pneumonia, immunization against measles and pertussis is an important strategy currently being recommended. Promotion of breastfeeding, improvement of nutritional status, improved living conditions, personal hygiene, and clean habits should lead to a reduction in ARI morbidity and mortality. Prevalence of RSV in Bronchiolitis was 77.78 %. Who were positive for either IgM or IgG. IgM ELISA detected antibody in 44% of patients with bronchiolitis. IgG ELISA detected antibody in 72% of patients with bronchiolitis. RSV IgM ELISA was also found to be useful in early detection of bronchiolitis in the acute stage (44% patients).

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