

## Original Research Article

# Correlation of weight and hypoxemia in children aged between six months to five years with acute lower respiratory tract infection in a tertiary care hospital

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### ABSTRACT

**Background:** Acute respiratory infections (ARIs) are the leading cause of death among children less than 5 years in India. Poverty and malnutrition underlie both the high incidence and deaths of young children from pneumonia in SEAR countries.

**Methods:** A hospital based prospective observational study was conducted in a tertiary care hospital. A total of 200 children admitted with signs of ALRI were included in the study. A portable oximeter was used to measure oxygen saturation with an appropriately sized sensor on the finger or the toe. Weight was recorded on a standardized digital weighing scale and plotted on standard WHO weight for age chart. Chi-square test was used to test the significance.

**Results:** Out of 200 children studied hypoxemia was present in 90 children with a percentage of 45% and absent in 110 children with a percentage of 55%. Out of 90 children who had hypoxemia, 40 children had weight less than 3rd centile. Out 110 children who had did not have hypoxemia, only 24 children had weight less than 3rd centile. It was observed that children with weight for age less than 3rd centile according to standard WHO charts had higher incidence of hypoxemia. This correlation was statistically significant at p value of 0.001.

**Conclusions:** Based on the results of this study hypoxemia is widely prevalent in children aged between six months to five years presenting with acute lower respiratory tract infection. There was significant correlation with weight and hypoxemia in children aged between six months to five years with acute lower respiratory tract infection.

**Keywords:** Acute lower respiratory tract infection, Hypoxemia, Weight

### INTRODUCTION

Acute respiratory infections (ARIs) are the leading cause of death among children less than 5 years in India. Emergence of newer pathogenic organisms, reemergence of disease previously controlled, wide spread antibiotic resistance, and suboptimal immunization coverage even after many innovative efforts are major factors responsible for high incidence of ARI.<sup>1</sup>

The common LRIs in children are pneumonia and bronchiolitis. Currently, the most common causes of viral

LRIs are respiratory syncytial viruses (RSVs). Acute lower respiratory infection (ALRI), primarily pneumonia and bronchiolitis, is a substantial cause of morbidity and mortality in children younger than 5 years of age, particularly in developing countries.

Worldwide, 20% mortality among children aged less than 5 years is attributed to respiratory tract infections (predominantly pneumonia associated).<sup>2</sup> With neonatal pneumonia inclusive, 35-40% mortality among children aged less than 5 years account for 2.04 million deaths/year.<sup>2</sup> In India, more than 4 lakh deaths every year

are due to pneumonia accounting for 13%-16% of all deaths in the pediatric hospital admissions.<sup>3,4</sup>

Poverty and malnutrition underlie both the high incidence and deaths of young children from pneumonia in SEAR countries.<sup>5</sup>

A systematic review of mortality risk in pneumonia identified 16 studies across several countries and reported that malnourished children had higher mortality; RR 2.9-121.2 with severe malnutrition, and 1.2-36.5 with moderate malnutrition.<sup>6</sup> One of the serious manifestations of pneumonia is hypoxemia and it is a major risk factor for mortality.<sup>7</sup> The most reliable way to detect hypoxemia is an arterial blood gas analysis or the determination of arterial hemoglobin saturation by pulse oximeter.<sup>8,9</sup>

Objective of this study was to determine correlation weight and hypoxemia in children aged between six months to five years with acute lower respiratory tract infection in a tertiary care hospital.

## METHODS

A hospital based prospective observational study was conducted in a tertiary care hospital. Children admitted with an acute history of cough and rapid respiration or difficulty in breathing were enrolled. A total of 200 children admitted with signs of ALRI were included in the study. A portable oximeter was used to measure oxygen saturation with an appropriately sized sensor on the finger or the toe. After stabilizing, a staff nurse recorded the oxygen saturation by keeping pulse oximeter probe at finger/toe. Reading which was stable for at least 3 minutes was noted. Hypoxemia was defined as arterial oxygen saturation (SpO<sub>2</sub>) <90% as this usually indicates clinically significant hypoxemia in most children. Weight was recorded on a standardized digital weighing scale with minimal clothing and was plotted on standard WHO weight for age chart. The data obtained was tabulated on Microsoft Excel spreadsheet. Chi-square test was used to test the significance between association between weight and hypoxemia. At 95% confidence interval, a probability (p) value of ≤0.050 was considered as statistically significant.

Study period and duration this was conducted for a period of one and half year from January 2018 to June 2019.

### Inclusion criteria

Children aged between 6 months to 5 years, with cough or difficult breathing with or without any of the following signs

- Any general danger sign including convulsions, lethargy, unconsciousness, inability to drink, breastfeed, or vomiting,
- Chest indrawing,
- Stridor in a calm child.

### Exclusion criteria

- Children with asthma,
- Congenital heart disease,
- Severe anemia,
- Peripheral circulatory failure,
- Children needing ventilator support,
- Severe dehydration.

## RESULTS

Out of 200 children studied hypoxemia was present in 90 children with a percentage of 45% and absent in 110 children with a percentage of 55%. Out of 90 children who had hypoxemia, 40 children had weight less than 3rd centile. Out 110 children who had did not have hypoxemia, only 24 children had weight less than 3rd centile. It was observed that children with Weight for age less than 3rd centile according to standard WHO charts had higher incidence of hypoxemia. This correlation was statistically significant at p value of 0.001.

**Table 1: Distribution of children according to weight less than third percentile and its association with hypoxaemia.**

Weight less than third percentile	Hypoxaemia				Total	
	Absent		Present			
	No	%	No	%	No	%
Yes	24	37.50	40	62.50	64	32.00
No	86	63.24	50	36.76	136	68.00
Total	110	55.00	90	45.00	200	100.00
C	p=0.001					

## DISCUSSION

In this study hypoxemic children with ALRI had significantly lower weight compared to those children who did not develop hypoxemia (11.26±3.04 versus 12.76±3.05 Kg; p=0.001) suggesting significant association between low weight and development of hypoxemia. Similar observations were documented in a study by Ramawat P and Sharma B.<sup>10</sup> who reported that, the weight was significantly associated (p=0.002) with hypoxemia that is, Children without hypoxemia had significantly (p=0.014) high mean weight (8.08±3.02 kilogram) as compared to mean weight (6.86±2.94 kilogram) of those who had hypoxemia.

## CONCLUSION

Based on the results of this study it may be concluded that, hypoxemia is widely prevalent in children aged between six months to five years presenting with acute lower respiratory tract infection. There was significant correlation with weight and hypoxemia in children aged between six months to five years with acute lower respiratory tract infection. Prevention require more

clinical and research attention to reduce the public health burden of pneumonia among hypoxemic children. Routine screening for weight and educating the mother regarding adequate dietary intake in children with malnutrition can decrease the complications associated with acute lower respiratory tract infection. Such intervention can significantly decrease the burden related to public health.

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