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Original Research Article

A retrospective study of clinical profile of acute lower respiratory tract infections in children between 2 and 60 months

B. K. Soundarya*, G. M. Pranam, Usha Hirevenkanagoudar, Sanjeev Chetty

Department of Paediatrics, Navodaya Medical College, Hospital and Research Centre, Raichur, Karnataka, India

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***Correspondence:**
Dr. B. K. Soundarya,
E-mail: soundhujully@gmail.com

ABSTRACT

Background: Acute lower respiratory tract infections (ALRTI) is one of the main causes of illness and mortality in children under 5, especially in developing nations like India. The most common illness that necessitate hospitalizations are pneumonia, bronchiolitis and wheeze associated LRTI.
Methods: This retrospective observational study was conducted at a tertiary care teaching hospital. The study was conducted at a tertiary care teaching hospital, where medical records of children aged 2 months to 60 months admitted with ALRTI were reviewed over the study period. Demographic details, clinical features, nutritional and immunization history, laboratory findings, treatment modalities and outcomes were all carefully analyzed.
Results: The study involved ninety children. Overall, infants were commonly involved, with male predominance. The most frequent diagnosis was pneumonia, which was followed by WALRTI and bronchiolitis. Cough, fever, tachypnea and respiratory distress are the common presenting symptoms. Risk factors that are often noted was overcrowding, exposure to biomass burning, malnutrition and incomplete immunization. While a small proportion of children required acute care and ventilator support, majority children recovered with proper care.
Conclusions: ALRTI remain a significant cause of hospitalization in children until 5 years of age. Pneumonia remains the predominant clinical entity. Early diagnosis, prompt treatment and addressing modifiable risk factors can significantly improve outcomes.

Keywords: Acute lower respiratory tract infections, Pneumonia, Under five children, Risk factors, Outcomes, Retrospective study

INTRODUCTION

Acute lower respiratory tract infections (ALRTIs) remain a serious global public health concern, carrying significant morbidity and mortality among children under five. Pneumonia alone accounts for a large share of deaths in this age group, particularly across low- and middle-income countries a burden the World Health Organization has long highlighted.[1,2] The category includes pneumonia, bronchiolitis, bronchopneumonia, wheeze-associated lower respiratory tract infections and croup. Since many of these conditions share overlapping clinical features, early and accurate diagnosis and treatment is critical. Malnutrition, low birth weight, incomplete immunization, overcrowding and indoor air pollution all play a role, cutting across host, environmental and socioeconomic dimensions.[7] In India, ALRTIs continue to drive a substantial proportion of pediatric hospital admissions, even as healthcare access and immunization coverage have improved over the years. Understanding the current clinical profile and outcomes of these infections is essential both for designing effective preventive strategies and for refining how cases are managed on the ground level.[7,8] Hence the objective of the study is to assess the risk factors and clinical characteristics of children under 5 diagnosed with ALRTIs, evaluating the outcomes in terms of recovery, severity classification, need for clinical interventions, to

inform health care practitioners by highlighting key areas for community education and early intervention strategies.

METHODS

Study design

A retrospective observational study was conducted.

Study setting

Department of Pediatrics, Navodaya medical college hospital and research center, Raichur, Karnataka, India.

Study duration

The study was conducted from March 2025 to June 2025.

Study population

Children aged two-sixty months admitted with a diagnosis of acute lower respiratory tract infection.

Sample size

90 patients diagnosed with acute lower respiratory tract infection. p=68.83%=0.6883, 1-p=1-0.6883, n=sample size, Z_α=1.96 standard normal variate at 95% confidence level., e=9.6922% precision. The formula used for sample size calculation is,

$$n = \frac{(Z_\alpha)^2(p)(1-p)}{E^2}$$

$$n = \frac{[\,(1.96)^2 x\ 0.6883\ x\ (1\ -\ 0.6883)]}{(0.096922)^2}$$

n=87.737 [~88 samples (rounded off to 90)].

Therefore, minimum sample size is 90 patients.

Inclusion criteria

Children had to be between two and sixty months of age and carry a confirmed diagnosis of ALRTI whether classified as no pneumonia, pneumonia or severe pneumonia.

Exclusion criteria

Children younger than 2 months or older than 60 months were not enrolled. Those with pre-existing conditions including chronic lung disease, cardiac illness, or known immunodeficiency disorders were also left out, as these could confound the clinical picture.

Data collection

Medical records were reviewed for demographic details, presenting symptoms, nutritional status, environmental risk factors, laboratory parameters, treatment interventions and outcomes.

Statistical analysis

Data were analyzed using appropriate statistical methods. A p value<0.05 was considered statistically significant.

RESULTS

Ninety children between the ages of 2 months to 60 months were included. Infants made up the majority (60%), followed by children between ages 1-5. with a male-to-female ratio of 1.3:1, male outnumbering females.

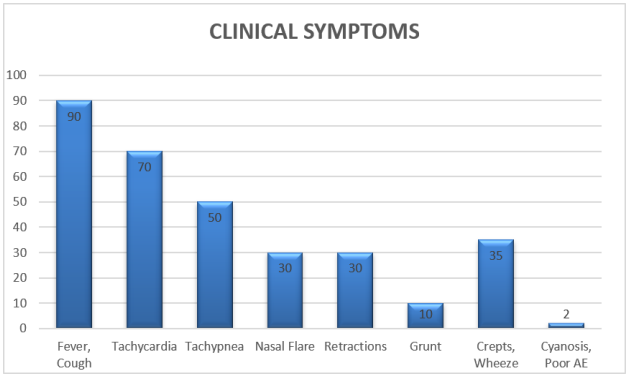

Figure 1: The clinical symptoms with predominance of fever cough (100%) and tachycardia (70%).

The most common presenting symptoms were cough and fever, which were observed in all children (100%), followed by tachycardia in 70 children (77%), tachypnea in 50 children (55%), nasal flaring in 30 children (33%), chest retractions in 30 children (33%), grunting in 10 children (11%), cyanosis and reduced air entry in 2 children(2.5%), 35 children (38%) had wheezing, which was primarily seen in cases of bronchiolitis and wheeze associated lower respiratory tract infections.

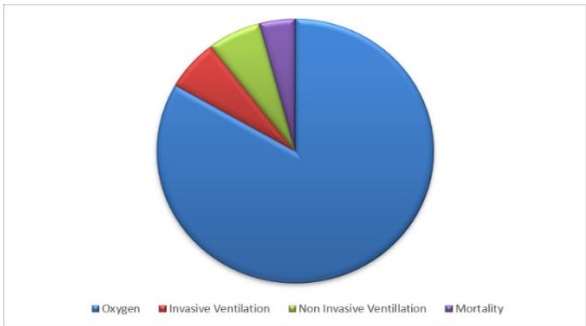

Figure 2: Oxygen therapy required by 40 (44%) children overall.

Pneumonia was the most frequent diagnosis, followed by bronchiolitis, bronchopneumonia and WALRTI. Oxygen therapy was required in 40 children (44%) with O^2 saturation less than 92% in room air. 6 children among 40 children (15%) required intensive care and mechanical ventilation, out of which 3 children required non-invasive ventilation via CPAP and 3 required invasive ventilation. The majority of children improved and were discharged. The mortality rate was approximately around 2.5%, with the probable reason being respiratory failure.

Malnutrition, incomplete immunization, exposure to biomass fuel and overcrowding were commonly observed among these children. These factors showed a strong association with the severity of disease.

DISCUSSION

The present study highlights that cough and fever were the most common presenting symptoms, followed by tachycardia, respiratory distress. These findings are consistent with previous studies by Desouza et al and Kushwaha et al where cough, fever, respiratory distress and fast breathing were most frequent presenting symptoms.[3,5]

Respiratory distress signs such as nasal flaring, chest indrawing, grunting, cyanosis were observed in the study reflecting the disease severity. Previous studies by Kannam et al and Bainade et al, showed these findings was associated with severe pneumonia and increased need of supportive care.[4,6]

Oxygen therapy was required in 44% of children due to low oxygen saturation on room air as comparable to studies by Kushwaha et al and Kannam et al where a substantial population hospitalized for ALRTI required supplemental oxygen.[5,6]

15% of children receiving oxygen therapy required intensive care and mechanical ventilation including non-invasive and invasive ventilation. Similar observations have been reported in previous hospital-based studies where children with severe pneumonia and bronchiolitis progressed to respiratory failure requiring ventilatory support.[5,9] The mortality rate of 2.5% observed in this study was comparable to recent Indian studies, showing improvement on availability of oxygen therapy, emergency services and treatment protocols.[5,9]

Several modifiable risk factors were identified among the affected children, including malnutrition, incomplete immunization, exposure to biomass fuel and overcrowding. These factors showed association with disease severity, emphasizing the role of environmental and nutritional determinants in the occurrence and progression of ALRTI.

Limitations

It is a retrospective-based study performed in a single tertiary care hospital.

CONCLUSION

Acute lower respiratory tract infections remain one of the most common reasons young children end up in hospital. Infants made up the bulk of cases here, which is not surprising, but it is still a sobering reminder of how exposed the youngest children are. Most recovered well with standard treatment and supportive care and mortality was low. Still, a meaningful number arrived already in moderate to severe distress evident from how many needed oxygen therapies. Only a small fraction required intensive care or mechanical ventilation. Malnutrition, incomplete vaccination, exposure to biomass fuel smoke and overcrowded living conditions all emerged as key risk factors each one independently linked to worse outcomes.

Recommendations

Addressing these risk factors through improved nutrition, vaccination coverage and better living conditions may significantly reduce the burden and severity of ALRTI among young children. Even modest improvements in housing and air quality could go a long way toward reducing how often ALRTI strikes. Early identification and prompt management resulted in favorable outcomes in most cases. Strengthening primary healthcare services and community education can further reduce disease burden.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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