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Original Research Article

A STUDY OF CLINICAL PROFILE AND OUTCOME OF LOWER RESPIRATORY TRACT INFECTIONS IN CHILDREN BELOW 5 YEARS ADMITTED IN A TERTIARY GOVERNMENT HOSPITAL

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ABSTRACT

Background: Lower respiratory tract infections (LRTIs) encompass infections affecting the airways below the larynx, including conditions like pneumonia and bronchitis. According to World Health Organization (WHO), LRTIs are the leading cause of morbidity and mortality in children under five years of age globally. **Materials and Methods:** This was a prospective observational study from July 2023 to January 2025 in children aged 1 month to 5 years admitted with Lower respiratory tract infections. Demographic data, clinical details, labs, treatment data were collected. The data was tabulated and examined in SPSS software. **Result:** Study was done in 439 children with mean age in months being 24.22 and SD 17.1. Incidence of LRTI was more in the age group of 1-12 months with 38.3%, Most common symptom of presenting illness was shortness of breath seen in 93.4% children. Fever was the symptom reported in 91.3% of children, cold/cough in 87%, Pneumonia (41.7%) was the most common condition diagnosed. Other conditions include bronchiolitis, croup, severe pneumonia, very severe pneumonia and WALRI in 12.3%, 5.0%, 4.8%, 13.9% and 12.3% respectively. Mortality was seen in 32(7.3%) children admitted with LRTI. **Conclusions:** Infants under 1 year, male gender, lower socioeconomic status, and malnutrition were more commonly affected by LRTI. Shortness of breath, fever, and cough were the predominant presenting symptoms. Malnutrition, sepsis, and very severe pneumonia were strongly associated with the need for ventilator support and higher mortality. Exclusive breastfeeding was found to be protective, significantly reducing mortality.

INTRODUCTION

According to World Health Organization (WHO), LRTIs are the leading cause of Morbidity and mortality in children under five years of age globally.[1] In 2021, South Asian countries accounted for over 40% of global LRTI cases in this age group. India contributed more than 20% of worldwide burden.[2] Specific data for karnataka are limited; however, a study conducted in Andhra Pradesh, identified several risk factors for acute LRTIs (ALRTIs) in children aged 1 month to 5 years. These factors include parental illiteracy, overcrowding, incomplete immunization, lack of exclusive breastfeeding, low birth weight, use of biomass fuels, and inadequate flooring materials.[3]

The pathophysiology of LRTIs involves the invasion of the lower airways by pathogens such as Streptococcus pneumoniae, Haemophilus influenzae type B, Staphylococcus aureus, influenza virus, and respiratory syncytial virus. These pathogens trigger inflammatory responses, leading to symptoms like cough, difficulty breathing, and hypoxia. The consequences of pneumonia lead to empyema, a condition of pus formation in the pleural cavity under the influence of microorganisms.[4,5] Risk factors for LRTIs in young children include malnutrition, incomplete immunization, exposure to indoor air pollution, and socioeconomic determinants such as parental illiteracy and overcrowded living conditions.[6] Lower respiratory tract infections remain a persistent issue in society, influenced by various social, demographic, and individual risk factors such as parental illiteracy, low socioeconomic status, malnutrition, inadequate breastfeeding and weaning, and overcrowding.[7] Management of LRTIs involves supportive care, including oxygen therapy and hydration, along with appropriate antimicrobial treatment based on the identified pathogen.[8] The outcomes of LRTIs can range from full recovery to severe complications or death, particularly in regions with limited access to healthcare services. Addressing the burden of these infections requires a comprehensive approach that

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goes beyond diagnosis and treatment to include preventive measures at both the primary healthcare and community levels to reduce the substantial burden of LRTIs in children aged 1 to 5 years.[2,7] Bacterial pathogens, particularly Streptococcus pneumoniae and Haemophilus influenzae type b (Hib), have been identified as major contributors to LRTI-related mortality in children in our country. However, recent studies highlight the significant global burden of respiratory viruses, such as respiratory syncytial virus (RSV) and influenza virus, which also contribute to child mortality. Nearly all children experience at least one RSV infection by the age of two, with infants under three months being at the highest risk for severe infections. To address the global challenge of lower respiratory infections (LRIs), organizations like the World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) have led numerous international initiatives. Prominent examples include the Global Action Plan for the Prevention and Control of Pneumonia and Diarrhoea (GAPPD) and the Integrated Management of Childhood Illness (IMCI) program. Nevertheless, Lower respiratory tract infections (LRTIs) continue to be a leading cause of illness and death among children, Hence this study was undertaken to update existing literature of LRTI in under 5 which varies widely globally and nationally, which will further aid in improving patient care.

MATERIALS AND METHODS

Methods: Purposive sampling method was used.
Age, Sex and Socio economic status was assessed using modified Kuppuswamy scale.
Various investigations were done that aid in proper diagnosis like complete blood count(CBC), CRP and culture. Mantoux and HIV screening were done for selected cases. Chest X-ray was taken in all 20 cases. CT chest and USG thorax were taken in selected cases for assessing complications.
Diagnosis: The study subjects were classified as pneumonia, Severe pneumonia, very severe pneumonia, bronchiolitis, Wheeze associated lower respiratory tract infection (WALRI) and croup were diagnosed according to history, clinical features and laboratory investigations. Statistical analysis was done using software SPSS version 27.

RESULTS

Study was done in 439 children with mean age in months being 24.22 and SD 17.1. Incidence of LRTI was more in the age group of 1-12 months with 38.3%, followed by 13-24 months (21%), 37-48 months (15.5%), 49-60 months (13.4%) and 25-36 months (11.8%) respectively.
Out of 439 children 78.8% belong to lower SES as per modified kuppuswamy classification Most common symptom of presenting illness was shortness of breath seen in 93.4% children.
Fever was the symptom reported in 91.3% of children, cold/cough in 87%, irritability in 41.5%, vomiting in 19.6% other symptoms included seizures and loss of weight in 3.6% children.

Table 1: Distribution by symptoms of presenting illness

Symptoms	Frequency	Percentage
Fever	403	91.8
Cold/cough	382	87
Shortness of breath	410	93.4
Irritability	182	41.5
Vomiting	86	19.6
others	16	3.6

Exclusive breast feeding was practiced in 247 (56.3%) children.
Clinical signs identified were nasal flaring/ grunting, tachypnoea, cyanosis, chest retractions and adventitious sounds on auscultation in 56.3%, 95.2%, 28.2%, 85.9% and 84.7% of children respectively.

Sepsis (culture positive) was seen in 15.3% (67) Children.
Anaemia was seen in 221 (50.3%) children.
Malnutrition was seen in 27.6% (121) children. Undernourished children were 24.4% and over nourished were 3.2% as per WHO weight for age

Table 2: Distribution by diagnosis

Diagnosis	N	%
Bronchiolitis	54	12.3
Croup	22	5.0
Pneumonia	183	41.7
Severe pneumonia	65	14.8
Very severe pneumonia	51	13.9
WALRI	54	12.3

Morbidity was assessed in the form of need for O2 therapy, ventilator support, prolonged PICU stay and hospital stay. Prolonged stay was defined as stay for more than 7 days. Need for oxygen therapy was seen in 67.4% and ventilator support was seen in 14.1%. Prolonged PICU stay was seen in 20% of children admitted. Prolonged hospital stay was seen in 42.6% of children admitted.

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Mortality was seen in 32 (7.3%) children admitted with LRTI.

DISCUSSION

The present study aimed to identify and categorize the different types of lower respiratory tract infections (LRTIs) in children under five years of age. It focused on examining various clinical presentations, assessing associated risk factors, and analysing elements that contribute to morbidity and mortality in this age group.

Age distribution

Study was done in 439 children with mean age in months being 24.22 and SD 17.1. Incidence of LRTI was more in the age group of 1-12 months with 38.3%, followed by 13-24 months (21%), 37-48 months (15.5%), 49-60 months (13.4%) and 25-36 months (11.8%) respectively. Study by Srinivas S et al, 31 cases (18%) between 1 month and 6 months, 83 cases (48%) were between 6 months and 2 years, 58 cases (34%) were between 2 years and 5 years.[8] Thus the incidence was decreasing with age.

Socioeconomic status

In this study, out of 439 children 78.8% belong to lower SES as per modified kuppuswamy classification. In study by Swathi R et al, Prajapati B et, al Ramesh TV et al, Yellanthoor R B et al, Munagala VK et al, and Kumar AMK et al 48.3%, 79.4%, 65%, 84.5%, 73.6%, and 76.5% of LRTI patients hailed from lower socio-economic strata of society.[10,11,12,13,14,9] The incidence is more in lower SES due to poor living standards which leads to LRTI.

Symptoms

Symptoms in the current study, most common symptom was shortness of breath seen in 93.4% children. Fever was the symptom reported in 91.3% of children, cold/cough in 87%, irritability in 41.5%, vomiting in 19.6% other symptoms included seizures and loss of weight in 3.6% children.

Thus the symptomatology is varied in the study conducted by Kumar AMK et al., the Most common symptoms observed were cough (96.5%) and fever (92%). Other reported symptoms included hurried breathing in 42% of cases, noisy breathing in 25.5%, refusal of feeds in 16%, altered sensorium in 14.5%, and vomiting or diarrhea in 18% of patients.[9]

Exclusive breast feeding

Exclusive breast feeding was practiced in 247(56.3%) children in our study.

The study by Srinivas S et al. reported that 70% of infants (121 cases) were exclusively breastfed. The remaining infants were either on a combination of formula and expressed breast milk (EBM) or On formula alone. Additionally, delayed weaning was observed in 18% of the cases.[8]

Immunization history

Out of 439 children, 332 (75.6%) children received immunization appropriate to age in our study. Similarly, research by Swathi R et al. reported that only 115 children (37.6%) Were completely immunized, while a substantial portion—191 children (72%)—were incompletely immunized.[10]

In our study, clinical signs identified were nasal flaring/ grunting, tachypnoea, hypotension, cyanosis, Chest retractions and adventitious sounds on auscultation in 56.3%, 81.5%, 50.3%, 28.2%, 85.9% and 84.7% of children respectively. In the study by Kumar AMK et al., tachypnea and chest retractions were observed in 98% and 93% of cases, respectively. Other prominent signs included wheezing (64.5%) and crepitations (63.5%).[9] In the study by Srinivas S et al., respiratory distress was present in the majority of children (94%), commonly manifesting as tachypnea, nasal flaring, and retractions. Other signs are pallor (78%), hepatomegaly (44%), altered consciousness due to hypoxia (6%), and cyanosis in 3% of Cases,[8]

Anaemia

In our study Anaemia was seen in 288 (65.6%) children. These findings were similar to the Report as per NFHS 5, where anaemia was seen in 72% of Indian children.[6]

Malnutrition

Malnutrition was seen in 27.6%, {121} children. Undernourished children were 24.4% and over nourished were 3.2% as per WHO weight for age in our study. In study by Ramesh TV et al, Yellanthoor et al, and Kumar AMK et al, 72%, 54.3%, and 60.5% children were associated with PEM.[12,13,9] This variation in prevalence rate could be due to differences in patients enrolment in the above studies.

Diagnosis

Pneumonia (41.7%) was the most common condition diagnosed. Other conditions include bronchiolitis, croup, severe pneumonia, very severe pneumonia and WALRI in 12.3%, 5.0%, 4.8%, 13.9% and 12.3% respectively, in the current study. Srinivas S et al. reported 73 cases of bronchopneumonia, 28 cases of bronchiolitis, and 22 cases each of croup and lobar pneumonia. The study also noted 9 cases of pneumonia with parapneumonic effusion,[9] cases of wheeze-associated LRTI, 4 cases of empyema thoracis, and 3 cases of tuberculosis.

Morbidity Assessment

In this study need for oxygen therapy was seen in 67.4% and ventilator Support was seen in 14.1% children admitted. Prolonged PICU stay was seen in 20% of children admitted. Prolonged hospital stay was seen in 42.6% of children admitted. In the study by Swathi R et al., out of 306 children admitted with Acute Respiratory Infections (ARI), 28 children (9.2%) required mechanical ventilation, while 59 (19.3%) needed admission to the Pediatric Intensive Care Unit (PICU).[10]

Mortality

Mortality was seen in 32 (7.3%) children admitted with LRTI, in the current study. The overall mortality rate reported in the study by Mathew J.L. was 5.9%. 92 Mortality in study by Kumar AMK et al was 3% i.e, 6 cases out of which 4 died due to sepsis and 2 due to congestive cardiac failure.[9]

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CONCLUSION

Infants under 1 year, lower socioeconomic status, and malnutrition were more commonly affected by LRTI. Shortness of breath, fever, and cough were the predominant presenting symptoms.

Malnutrition, sepsis, and very severe pneumonia were strongly associated with the need for ventilator support and higher mortality.

Exclusive breastfeeding was found to be protective, significantly reducing mortality.

Despite no statistical difference in outcomes with respect to gender, and immunization status, children from vulnerable populations (lower SES, undernourished, septic) showed worse outcomes.

Early identification and intervention is essential to reduce morbidity and mortality associated with LRTI.

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