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PREVALENCE OF LOWER RESPIRATORY TRACT INFECTION IN DIFFERENT AGE GROUPS -A PROSPECTIVE OBSERVATIONAL COHORT STUDY

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Abstract:

Background: *Lower respiratory tract infections (LRTIs) are a major cause of morbidity and hospitalization among pediatric patients, particularly in younger age groups. Understanding their prevalence and associated risk factors is essential for improving management and prevention. This study was conducted to assess the prevalence of LRTIs in different pediatric age groups and evaluate associated risk factors and antibiotic utilization.*

Methods: *A prospective observational study was conducted over six months (October 2024 to March 2025) at a tertiary care hospital. A total of 100 pediatric patients aged 1–12 years diagnosed with LRTIs and receiving antibiotics were included. Data on demographics, clinical features, breastfeeding duration, maternal education, and residence were collected and analyzed using descriptive statistics, t-test, and chi-square test.*

Results: *The highest prevalence was observed in children aged 1–3 years (71%). Bronchiolitis was the most common condition (40%), followed by pneumonia (32%) and bronchitis (28%). Cold (60%) and fever (43%) were the most frequent symptoms. A significant association was found between shorter breastfeeding duration and LRTI prevalence ($\chi^2 = 31.2$, $p = 0.0005$). Age was also significantly associated ($p = 0.00001$), while residence and maternal education showed no significant association.*

Conclusion: *LRTIs are highly prevalent in younger children, with breastfeeding playing a protective role. Early preventive strategies and rational antibiotic use are essential to reduce disease burden.*

Keywords : *Lower Respiratory Tract Infections (LRTIs), Pediatrics, Bronchiolitis, Pneumonia, Antibiotic Utilization, Prevalence, Breastfeeding, Risk Factors*

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INTRODUCTION:

Lower respiratory tract infections (LRTIs) rank among the leading causes that result in illness and death among children throughout developing nations. The infections affect all airways that exist below the larynx because they involve both bronchi and bronchioles and lungs and they usually develop into either bronchitis or bronchiolitis or pneumonia. Children under five years of age face higher risks because their immune systems remain undeveloped and they have narrower airways. LRTIs not only increase hospital admissions but also place a significant burden on families and healthcare systems.[1] The healthcare system requires early detection of medical problems together with efficient treatment methods because they help in decreasing patient fatality rates. Healthcare professionals benefit from learning about LRTI patterns and their underlying causes because this knowledge enables them to develop effective treatment and preventive approaches for pediatric patients.[2]

The causes of LRTIs are varied and include viral, bacterial, and sometimes fungal pathogens. Young children especially use respiratory syncytial virus (RSV) and influenza and adenovirus as their main sources of infection. Bacterial infections which result from Streptococcus pneumoniae and Haemophilus influenzae infections, represent an important risk factor for severe medical conditions.[3] Malnutrition, lack of breastfeeding, tobacco smoke exposure, overcrowding, and incomplete immunization all increase the risk of people developing LRTIs. The occurrence of diseases hinges on the socioeconomic conditions which exist within a particular area. The effective prevention process needs these factors to be understood because they help target children who require early intervention.[4]

Doctors need to use antibiotics for bacterial LRTIs because these drugs serve as essential tools. Doctors need to prescribe antibiotics according to established medical guidelines which require justified usage and scientific proof. In pediatric practice, doctors prescribe antibiotics without proper testing because they believe their patients need these drugs, which leads to unnecessary treatments for viral diseases. The misuse of antibiotics leads to antibiotic resistance which has become a worldwide health emergency.[5] Medical professionals need to research how doctors use antibiotics in pediatric medicine because this knowledge protects patient health. Medical professionals choose antibiotics based on three factors which include a patient's age and their current health condition and the pathogen that they suspect to be responsible for their illness. Health facilities can decrease antibiotic resistance through better prescribing methods and their existing antibiotic management systems which will also enhance treatment results for young patients with lung infections.[6]

LRTIs remain a significant public health challenge although healthcare systems have improved due to their high impact in areas with limited resources. Researchers need to study how LRTIs affect different pediatric age groups while identifying their corresponding risk factors. This study investigates how common LRTIs affect children between the ages of 1 and 12 at a tertiary care hospital while assessing their antibiotic prescription practices.[7] Researchers study how breastfeeding patterns and maternal educational background and residential location affect disease occurrence. The findings of this study enable health experts to develop better preventive measures while establishing guidelines for proper antibiotic usage which will decrease the total incidence of pediatric respiratory infections.[8]

METHODOLOGY:

Study Design : This study was designed as a prospective observational study to assess the prevalence of lower respiratory tract infections (LRTIs) and evaluate antibiotic utilization patterns among pediatric patients.

Study Setting : The study was conducted at the Government General Hospital, Guntur, a tertiary care teaching hospital providing pediatric healthcare services.

Study Duration : The study was carried out over a period of **six months**, from **October 2024 to** March 2025.

Study Population

The study included 100 pediatric patients aged between 1–12 years who were diagnosed with lower respiratory tract infections and were prescribed antibiotics during their hospital visit.

Inclusion Criteria

- Pediatric patients aged 1–12 years
- Both male and female patients
- Diagnosed with lower respiratory tract infections
- Patients who were prescribed antibiotics
- Patients whose parents/guardians provided informed consent

Exclusion Criteria

- Pediatric patients with **chronic illnesses**
- Patients with incomplete medical records
- Patients not receiving standard respiratory care
- Patients whose guardians did not provide consent

Data Collection Method

Data were collected using a structured data collection form. Information was obtained from

patient case records and through direct or indirect interviews with caregivers using a pre-designed questionnaire.

Data Collection Variables

The following data were collected:

- Demographic details: age, gender
- Clinical details: symptoms, diagnosis
- Maternal factors: education status, breastfeeding duration
- Socio-demographic data: residence (urban/rural)
- Medical history: past illness, vaccination status
- Treatment details: antibiotic prescribed, dose, duration

Study Procedure

Eligible patients were identified during hospital visits. After obtaining informed consent from parents or guardians, relevant data were collected. Patients were followed up during their hospital stay until discharge. Additional information was collected using questionnaires to minimize missing data and improve accuracy.

Statistical Analysis

All collected data were entered into Microsoft Excel and analyzed using SPSS software.

- Descriptive statistics: frequency, percentage
- Inferential statistics:
  - t-test for comparison of age groups
  - Chi-square test for categorical variables
- A p-value < 0.05 was considered statistically significant

Ethical Considerations

Informed consent was obtained from parents or guardians before participation. Confidentiality of patient information was strictly maintained. Participation was voluntary, and patients had the right to withdraw at any time without any consequences.

RESULTS:

Table 1: Age-wise Distribution of Study Population (N = 100)

Age Group (Years)	Number of Subjects	Percentage (%)
1–3	71	71%
4–6	9	9%
7–9	10	10%
10–12	10	10%
Total	**100**	**100%**

The age-wise distribution shows that 71% (n=71) of pediatric patients were in the 1–3 years age group, indicating the highest vulnerability. The remaining patients were distributed as 9% (4–6 years), 10% (7–9 years), and 10% (10–12 years). This demonstrates a clear decline in LRTI prevalence with increasing age among the study population overall.

Table 2: Age-wise Gender Distribution

Age Group (Years)	Male	Female	Total	Percentage (%)
1–3	30	41	71	71%
4–6	8	1	9	9%
7–9	3	7	10	10%
10–12	5	5	10	10%
Total	**46**	**54**	**100**	**100%**

The gender distribution revealed 54% females (n=54) and 46% males (n=46). In the 1–3 years group, females (41) outnumbered males (30). Other age groups showed relatively balanced distribution. This suggests a slight female predominance, particularly in younger children, while overall gender variation decreases as age increases in pediatric LRTI cases observed.

Table 3: Distribution of LRTI Types

Disease Condition	Male	Female	Total	Percentage (%)
Bronchiolitis	18	22	40	40%
Bronchitis	12	16	28	28%
Pneumonia	16	16	32	32%
Total	**46**	**54**	**100**	**100%**

Among the study population, bronchiolitis was most prevalent, accounting for 40% (n=40), followed by pneumonia at 32% (n=32) and bronchitis at 28% (n=28). Gender distribution was nearly equal in pneumonia cases (16 males, 16 females). These findings indicate bronchiolitis as the leading LRTI condition, especially among younger pediatric patients in the study.

Table 4: Clinical Presentation of Patients

Symptoms	Number of Subjects	Percentage (%)
Cold / Running Nose	60	60%
Fever	43	43%
Cough (Dry/Wet/Productive)	35	35%
Shortness of Breath (SOB)	2	2%

Clinical symptoms analysis showed cold or running nose as the most common symptom, affecting 60% (n=60) of patients. Fever was present in 43% (n=43), while cough occurred in 35% (n=35). Shortness of breath was rare, observed in only 2% (n=2). This pattern highlights predominance of mild respiratory symptoms in early pediatric LRTIs..

Table 5: Age Group vs Prevalence (t-test Analysis)

Variable	Category	No. of Subjects	Percentage (%)	t-value	df	p-value
Age	1–3 yrs	71	71%	-12.87	34	0.00001
	4–12 yrs	29	29%			

Statistical analysis comparing age groups revealed a significantly higher prevalence in 1–3 years (71%) compared to 4–12 years (29%). The t-test showed a value of -12.87 with df=34 and a highly significant p-value of 0.00001. This confirms that younger age is a strong and statistically significant risk factor for LRTIs.

Table 6: Place of Residence vs LRTI Prevalence (Chi-square Test)

Residence	Number of Subjects	Percentage (%)	Chi-square	df	p-value
Rural	48	48%	3.841	1	0.1881
Urban	52	52%			
Total	**100**	**100%**			

Among participants, 52% (n=52) were from urban areas and 48% (n=48) from rural areas. The chi-square value was 3.841 with df=1 and p-value 0.1881, indicating no statistically significant association. This suggests that LRTI prevalence is comparable across both rural and urban populations without significant variation in this study sample.

Table 7: Maternal Education and LRTI Prevalence

Maternal Education	Number of Subjects	Percentage (%)	Chi-square	df	p-value
Educated	75	75%	3.84	1	>0.05 (NS)
Uneducated	25	25%			
Total	**100**	**100%**			

The analysis showed that 75% (n=75) of children belonged to educated mothers, while 25% (n=25) had uneducated mothers. Despite this difference, statistical analysis showed no significant association (χ^2=3.84, p>0.05). This indicates that maternal education level did not significantly influence the occurrence of LRTIs in the studied population..

Table 8: Duration of Breastfeeding and LRTI Prevalence

Duration of Breastfeeding	Number of Subjects	Percentage (%)	Chi-square	df	p-value
< 6 months	45	45%	31.2	3	0.0005
6–12 months	30	30%			
12–18 months	18	18%			
> 18 months	7	7%			
Total	**100**	**100%**			

Breastfeeding duration analysis revealed that 45% (n=45) were breastfed for less than 6 months, followed by 30% (6–12 months), 18% (12–18 months), and 7% (>18 months). The association was statistically significant (χ^2=31.2, df=3, p=0.0005). This indicates shorter breastfeeding duration is strongly associated with increased LRTI prevalence.

DISCUSSION:

The present study demonstrated that the highest prevalence of LRTIs was observed in the 1–3 years age group (71%), followed by a sharp decline in older children. This finding highlights the increased susceptibility of younger children due to immature immune function and higher exposure to environmental pathogens. Similar trends were reported in a large cohort study where LRTI incidence peaked during infancy and early childhood, particularly within the first year of life . Another study also confirmed that children under three years are at significantly higher risk of developing LRTIs due to increased viral exposure and developing immunity . These findings strongly support the age-related vulnerability observed in the present study.[9,10]

In terms of disease pattern, bronchiolitis was the most common condition (40%), followed by pneumonia (32%) and bronchitis (28%). This aligns with global epidemiological evidence indicating that bronchiolitis is a leading cause of LRTIs in infants and young children,

predominantly due to viral infections. A large epidemiological study reported bronchiolitis as a major contributor to pediatric hospitalizations with seasonal peaks . Similarly, another study identified bronchiolitis and viral infections as primary causes of LRTI-related admissions in children under three years .The comparable distribution in our study reinforces the predominance of viral LRTIs in early childhood.[11,12]

Clinical presentation in this study showed that cold/running nose (60%) was the most common symptom, followed by fever (43%) and cough (35%), while shortness of breath was rare (2%). This pattern indicates that most cases were identified at an early stage before progression to severe disease. These findings are consistent with previous studies showing that mild upper respiratory symptoms often precede LRTIs in children . Additionally, research has demonstrated that early respiratory symptoms like rhinorrhea and cough are common initial indicators of viral respiratory infections in pediatric populations . Thus, early recognition of these symptoms is crucial for preventing complications.[13,14]

The present study showed a statistically significant association between age and LRTI prevalence, with 71% cases in children aged 1–3 years compared to 29% in 4–12 years ($t = -12.87$, $p = 0.00001$), indicating higher vulnerability in younger children. Residence (urban 52%, rural 48%; $p = 0.1881$) and maternal education (educated 75%, $p > 0.05$) showed no significant association. However, breastfeeding duration demonstrated a strong significant relationship ($\chi^2 = 31.2$, $p = 0.0005$), with 45% cases in children breastfed <6 months. These findings are consistent with studies by Rudan I and Victora CG, which highlight early age susceptibility and the protective role of prolonged breastfeeding against pediatric respiratory infections.[15]

CONCLUSION:

The present study highlights that lower respiratory tract infections (LRTIs) are highly prevalent among pediatric patients, particularly in children aged 1–3 years, who accounted for 71% of cases. Bronchiolitis emerged as the most common condition, followed by pneumonia and bronchitis. Among the evaluated risk factors, shorter duration of breastfeeding showed a statistically significant association with increased LRTI prevalence ($\chi^2 = 31.2$, $p = 0.0005$), emphasizing its protective role. In contrast, factors such as place of residence and maternal education did not demonstrate significant influence. These findings underscore the importance of early-life preventive strategies, especially promoting adequate breastfeeding practices and early detection of symptoms, to reduce the burden of LRTIs and improve pediatric health outcomes in clinical settings.

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