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SOCIODEMOGRAPHIC, CLINICAL PROFILE OF ACUTE BRONCHIOLITIS IN CHILDREN OF 1MONTH TO 24 MONTHS ADMITTED IN A TERTIARY CARE CENTRE

Meghana S Bhagavath[1], Leelakumari P[2]
[1]Senior Resident, Government Medical College, Kasargod,
[2]Professor and Head of department of Pediatrics, Government Medical College, Idukki

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ABSTRACT

Background: Acute bronchiolitis is a leading cause of lower respiratory tract infection and hospitalization in infants, particularly during early infancy. It remains a significant contributor to pediatric morbidity, especially in developing countries.

Objectives: To evaluate the sociodemographic profile, clinical characteristics, severity, and short-term outcomes of children admitted with acute bronchiolitis, and to identify factors associated with disease severity.

Methods: This hospital-based prospective observational study was conducted over 15 months (March 2023 to May 2024) in a tertiary care center. A total of 97 children aged 1–24 months diagnosed with bronchiolitis based on standard clinical criteria were included. Data on demographics, clinical features, laboratory findings, risk factors, and outcomes were collected and analyzed using SPSS. Categorical variables were expressed as proportions, and continuous variables as mean ± standard deviation. Statistical significance was set at $p < 0.05$.

Results: The mean age was 5.4 ± 3.4 months, with peak incidence at 4 months (19.58%). Males constituted 56.7% of cases. The majority of children belonged to lower middle (45.36%) and upper lower (36.08%) socioeconomic classes. Cough was present in all cases, followed by fever (61.8%) and respiratory distress (51.5%). Hypoxia (SpO_2 <95%) was observed in 29.7% of children. Laboratory findings revealed lymphocyte predominance (72.7%) and leukocytosis (56.7%). Most cases were mild (69%), while 18.6% were classified as severe. Significant predictors of severity included low socioeconomic status ($p = 0.002$), low birth weight ($p = 0.023$), and anemia ($p = 0.029$). No mortality was observed.

Conclusion: Acute bronchiolitis predominantly affects young infants and is strongly influenced by socioeconomic and nutritional factors. Early identification of high-risk children and targeted interventions can help reduce disease severity and improve clinical outcomes.

Keywords: *Acute bronchiolitis, infants, respiratory infection, hypoxia, socioeconomic status, anemia, low birth weight, severity, outcomes.*

***Corresponding Author**
Dr. Meghana S Bhagavath

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INTRODUCTION

Acute bronchiolitis is a clinical syndrome commonly used to describe the constellation of signs and symptoms resulting from viral lower respiratory tract infections in infants and very young children. It is characterized by respiratory findings such as tachypnea, wheezing, crackles, and rhonchi. The clinical spectrum of bronchiolitis ranges from mild disease, presenting with tachypnea and expiratory wheeze, to severe, life-threatening respiratory failure due to extensive airway inflammation and obstruction. Among high-risk groups, particularly premature and low birth weight infants, apnea is a well-recognized and potentially fatal complication.

Bronchiolitis represents a significant health burden in early childhood, especially during seasonal peaks when respiratory viruses are prevalent. Respiratory Syncytial Virus is the most common etiological agent, although other viruses such as parainfluenza virus, human metapneumovirus, influenza virus, rhinovirus, coronavirus, and human bocavirus also contribute substantially to disease burden. Given the high rates of hospitalization and the potential strain on pediatric wards and intensive care units, effective management requires well-established clinical protocols, including adequate respiratory

support, maintenance of fluid balance, and close monitoring for complications. Despite the clinical importance of bronchiolitis, data on short-term outcomes from Indian tertiary care settings remain limited. This study was undertaken to address this gap by evaluating the clinical profile, severity, and short-term outcomes of children admitted with acute bronchiolitis, along with associated risk factors.

METHODOLOGY

This hospital-based prospective observational study was conducted in the Department of Pediatrics at Government Medical College Thiruvananthapuram, specifically at SAT Hospital, over a period from March 2023 to May 2024. The study included 97 children aged between 1 month and 24 months who were admitted with a diagnosis of acute bronchiolitis, defined according to established clinical guidelines (NICE criteria). Children with a prior diagnosis of asthma or a previous history of hospitalization for bronchiolitis were excluded to ensure a homogeneous study population. Data were collected using a semi-structured questionnaire that recorded demographic details, clinical presentation, laboratory parameters, severity of illness, treatment modalities, complications, and short-term outcomes. All enrolled children underwent a detailed clinical examination, and the severity of bronchiolitis was classified as mild, moderate, or severe based on a standardized clinical scoring system. Data analysis was performed using Microsoft Office 2010. Categorical variables were expressed as proportions and percentages, while continuous variables were summarized as mean and standard deviation. The association between categorical variables and disease severity was assessed using the chi-square test, with a p-value of <0.05 considered statistically significant. Ethical clearance for the study was obtained from the Institutional Ethics Committee, and written informed consent was secured from the parents or caregivers of all participants prior to enrollment.

RESULTS

A total of 97 children diagnosed with bronchiolitis were included in the study. The mean age of presentation was **5.4 ± 3.4 months**, with the highest proportion of cases observed at **4 months of age (19.58%)**, indicating peak vulnerability in early infancy. A **male predominance** was noted (56.7%), with a male-to-female ratio of 1.3:1.

Most children belonged to **lower middle (45.36%) and upper lower (36.08%) socioeconomic classes**, highlighting a higher burden among economically disadvantaged populations.

Clinically, **cough was universal (100%)**, followed by **fever (61.8%) and respiratory distress (51.5%)**, consistent with classical bronchiolitis presentation. At admission, **29.7% of children had oxygen desaturation (SpO_2 <95%)**, indicating a significant proportion requiring oxygen support. However, **danger signs were present in only 3.09%**, suggesting that most cases were not critically ill at presentation.

Comorbid conditions were relatively uncommon, with **congenital heart disease (4.12%)** being the most frequent. Among perinatal factors, **prematurity (24.74%)**, **LSCS delivery (63.9%)**, and **NICU admission (16.49%)** were notable. Low birth weight (SGA) was observed in 14.4% of cases.

Postnatally, **neonatal jaundice (16.49%)** and prior respiratory issues (9.27%) were the most common conditions. Regarding feeding practices, **34.02% of infants were bottle-fed**, and **23.7% were partially immunized**, indicating gaps in optimal infant care.

Environmental risk factors such as **family history of acute respiratory infections (27.83%)** and **reactive airway disease (11.34%)** were relatively common, whereas **passive smoking and overcrowding (4.12% each)** were less frequently reported.

Nutritionally, the majority of children had **normal weight-for-length (81.5%)**, although **14.4% had severe acute malnutrition (SAM)**.

Laboratory findings revealed a predominance of **lymphocytosis (72.7%)**, followed by **leukocytosis (56.7%)**, **thrombocytosis (46.4%)**, and **CRP positivity (40.2%)**, supporting an inflammatory and likely viral etiology.

Regarding disease severity, most cases were **mild (69%)**, while **18.6% were severe**, indicating a substantial subset requiring intensive care.

Statistical analysis showed that **socioeconomic status (p=0.002)**, **low birth weight (p=0.023)**, and **anemia (p=0.029)** were significantly associated with increased disease severity. In contrast, **gender, prematurity, family history of ARI, and passive smoking** did not show a statistically significant association.

Table 01: Comprehensive Profile of Children with Bronchiolitis (n = 97)

Domain	Variable	Category	Number (%) / Value
Gender Analysi	Age (months)	Mean ± SD	5.4 ± 3.4
		Peak age	4 months (19.58%)
Gender		Male	55 (56.7%)
		Female	42 (43.3%)
Socioeconomic Status	SES Class	Upper	3 (3.09%)
		Upper Middle	4 (4.12%)
		Lower Middle	44 (45.36%)
		Upper Lower	35 (36.08%)
		Lower	11 (11.34%)
Clinical Profile	Symptoms	Cough	97 (100%)

		Fever	60 (61.8%)
		Respiratory distress	50 (51.5%)
Oxygen Saturation	SpO_2	>95%	69 (70.3%)
		91–95%	20 (21.2%)
		<90%	8 (8.5%)
Danger Signs	Presence	Present	3 (3.09%)
		Absent	94 (96.91%)
Comorbidities	CHD	Present	4.12%
	Neurodevelopmental delay	Present	2.06%
	Genetic disorders	Present	2.06%
Birth & Antenatal Factors	Prematurity	Yes	24.74%
	Mode of delivery	LSCS	63.9%
	Birth weight	SGA	14.4%
	Birth asphyxia	Yes	3.09%
	NICU admission	Yes	16.49%
Postnatal History	Neonatal jaundice	Yes	16.49%
	Respiratory distress	Yes	9.27%
	Sepsis	Yes	6.18%
Feeding & Development	Bottle feeding	Yes	34.02%
	Developmental delay	Yes	6.18%
	Partial immunization	Yes	23.7%
Family & Environmental Factors	Family history of ARI	Yes	27.83%
	Reactive airway disease	Yes	11.34%
	Passive smoking	Yes	4.12%
	Overcrowding	Yes	4.12%
Nutritional Status	Weight-for-length	Normal	79 (81.5%)
		SAM	14 (14.4%)
		MAM	4 (4.1%)
Laboratory Findings	Anemia	Present	27.83%
	Leukocytosis	Present	56.7%
	Lymphocyte predominance	Present	72.7%
	Thrombocytosis	Present	46.4%
	CRP positivity	Present	40.2%
Severity	Classification	Mild	67 (69%)
		Moderate	12 (12.3%)
		Severe	18 (18.6%)
Factors Associated with Severity	SES	p = 0.002	Significant
	Birth weight	p = 0.023	Significant
	Anemia	p = 0.029	Significant
	Gender	p = 0.612	Not significant
	Prematurity	p = 0.633	Not significant
	ARI history	p = 0.899	Not significant
	Passive smoking	p = 0.393	Not significant

DISCUSSION

This study provides a comprehensive overview of the demographic, clinical, and laboratory characteristics of infants presenting with acute respiratory illness (ARI), along with factors influencing disease severity.

The mean age of the study population was **5.4 ± 3.4 months**, with a peak incidence at **4 months**, highlighting the increased vulnerability of early infancy. This age predisposition is consistent with the known immaturity of the immune system and smaller airway caliber, which predispose infants to more frequent and severe respiratory infections. The slight male predominance (56.7%) aligns with existing literature, although gender was not significantly associated with disease severity in this cohort.

A large proportion of patients belonged to **lower middle (45.36%) and upper lower (36.08%) socioeconomic classes**, reflecting the disproportionate burden of ARI in socioeconomically disadvantaged populations. Importantly, socioeconomic status (SES) showed a statistically significant association with disease severity (p = 0.002), underscoring the role of environmental factors, healthcare access, and nutritional disparities in disease progression.

Clinically, **cough was universal (100%)**, followed by fever (61.8%) and respiratory distress (51.5%), indicating that while cough remains the hallmark symptom, nearly half of the patients presented with signs suggestive of more severe lower respiratory tract involvement. Despite this, the majority of children had **SpO_2 >95% (70.3%)**, and danger signs were rare (3.09%), suggesting that most cases were identified before critical deterioration.

The prevalence of comorbidities such as congenital heart disease (4.12%), neurodevelopmental delay (2.06%), and genetic disorders (2.06%) was relatively low but clinically relevant, as these conditions are known to increase susceptibility to severe respiratory infections.

Birth and antenatal factors revealed notable findings. **Prematurity (24.74%) and NICU admission (16.49%)** were relatively common, reflecting early-life vulnerabilities. Although prematurity did not show a statistically significant association with severity (p = 0.633), **low birth weight (SGA 14.4%) was significantly associated (p = 0.023)**, indicating

that intrauterine growth restriction may have a more direct impact on respiratory outcomes than gestational age alone.

Postnatal risk factors such as neonatal jaundice (16.49%), respiratory distress (9.27%), and sepsis (6.18%) further emphasize the cumulative burden of early-life insults. Feeding practices also play a critical role, with **34.02% of infants being bottle-fed**, a known risk factor for infections due to increased exposure to pathogens and reduced protective effects of breastfeeding.

Partial immunization (23.7%) and a positive family history of ARI (27.83%) highlight gaps in preventive healthcare and ongoing transmission within households. Environmental contributors such as passive smoking and overcrowding were relatively low in this cohort but remain important modifiable risk factors.

Nutritional assessment showed that while the majority had normal weight-for-length (81.5%), **severe acute malnutrition (SAM) was present in 14.4%**, which is clinically significant given its known association with impaired immunity and worse infection outcomes.

Laboratory findings revealed a predominance of inflammatory and viral markers, including **leukocytosis (56.7%), lymphocyte predominance (72.7%), and CRP positivity (40.2%)**. The high rate of lymphocyte predominance suggests a substantial proportion of viral etiologies. Notably, **anemia was present in 27.83% and was significantly associated with severity (p = 0.029)**, likely reflecting its role in reducing oxygen-carrying capacity and impairing host immunity.

In terms of severity, the majority of cases were classified as **mild (69%)**, with smaller proportions of moderate (12.3%) and severe (18.6%) disease. This distribution suggests effective early healthcare-seeking behavior or triage but also indicates a substantial burden of severe illness.

Among the factors analyzed, **low SES, low birth weight, and anemia emerged as significant predictors of severity**, while gender, prematurity, prior ARI history, and passive smoking did not show statistically significant associations. These findings reinforce the multifactorial nature of ARI severity, with nutritional, socioeconomic, and hematological factors playing central roles.

CONCLUSION

This study demonstrates that acute respiratory illness in infants predominantly affects younger age groups, particularly around 4 months of age, and is more common in socioeconomically disadvantaged populations. While most cases are mild, a considerable proportion progresses to severe disease.

Low socioeconomic status, low birth weight, and anemia were identified as significant predictors of disease severity, highlighting the critical role of social determinants, early-life growth, and nutritional status in influencing outcomes. In contrast, factors such as gender, prematurity, and environmental exposures like passive smoking did not show a significant association in this cohort.

These findings underscore the importance of **targeted public health interventions**, including improving maternal and child nutrition, strengthening anemia control programs, promoting exclusive breastfeeding, and ensuring complete immunization. Early identification and management of at-risk infants-particularly those with low birth weight and from lower socioeconomic backgrounds-can help reduce morbidity and prevent progression to severe disease.

Overall, a multidimensional approach addressing clinical, nutritional, and socioeconomic factors is essential for reducing the burden and severity of ARI in infants.

LIMITATIONS

Single center design and lack of viral etiological confirmation may limit generalizability.

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Nil

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CONFLICT OF INTEREST

Not Declared

INFORMED CONSENT AND ETHICAL STATEMENT

Informed consent was taken, and the present study is approved by the IRC and IEC from Sustainable Action for Transforming Human Capital (SATH), Trivandrum, with the reference number 02/25/2023/MCT.

AUTHOR CONTRIBUTION

Both authors contributed equally.

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