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**Original research article**

# Evaluation of clinical outcomes in children with bronchiolitis treated with nebulized hypertonic saline: a retrospective study at Kanachur institute of medical sciences, Mangalore

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**Abstract**

This retrospective study assesses the effectiveness of nebulized hypertonic saline in children diagnosed with bronchiolitis between April 1, 2021, and September 30, 2022, at Kanachur Institute of Medical Sciences, Mangalore. The study included 200 pediatric patients aged 6 months to 2 years, focusing on the duration of hospitalization, clinical improvement, and side effects. The findings suggest that hypertonic saline nebulization significantly reduces hospital stay and improves clinical outcomes compared to normal saline.
**Keywords:** Evaluation, clinical outcomes, bronchitis, nebulized hypertonic saline

## Introduction

Bronchiolitis is a common lower respiratory tract infection primarily affecting infants and young children, usually caused by respiratory syncytial virus (RSV). It is a leading cause of hospitalization among children under two years, presenting with symptoms such as wheezing, cough, and respiratory distress. The management of bronchiolitis is largely supportive, focusing on oxygen supplementation, hydration, and monitoring of respiratory status. However, there remains an ongoing debate about the efficacy of various therapeutic interventions aimed at reducing the severity and duration of symptoms [1-5].

Nebulized hypertonic saline (HS) has emerged as a potential treatment modality for bronchiolitis, theorized to reduce airway edema, improve mucus clearance, and enhance lung function. Several studies have suggested that hypertonic saline may reduce the length of hospital stay and improve clinical scores in children with bronchiolitis. Despite these findings, there remains inconsistency in clinical practice regarding its use, as other studies report minimal to no benefit. This variability highlights the need for further evaluation of clinical outcomes associated with nebulized hypertonic saline in children with bronchiolitis [6].

This retrospective study aims to evaluate the clinical outcomes in children diagnosed with bronchiolitis who were treated with nebulized hypertonic saline [7]. By analyzing the medical records of 300 pediatric patients, we seek to determine the effectiveness of hypertonic saline in reducing hospitalization duration, improving clinical scores and decreasing the need for additional medical interventions [8-10]. The study also compares outcomes between different age groups and severities of bronchiolitis to provide a comprehensive understanding of its effectiveness in diverse clinical scenarios. Findings from this study will contribute to the existing literature and may help inform clinical guidelines, supporting evidence-based decision-making in the management of bronchiolitis in pediatric patients.

## Methodology

- **Study Design:** Retrospective observational study.
- **Duration:** 1st April 2021 to 30th September 2022.
- **Location:** Department of Pediatrics, Kanachur Institute of Medical Sciences, Mangalore.
- **Sample Size:** 200 patients (100 treated with hypertonic saline, 100 treated with normal saline).
- **Inclusion Criteria:** Pediatric patients aged 6 months to 2 years diagnosed with bronchiolitis and treated with nebulization.

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- **Exclusion Criteria:** Patients with underlying chronic lung disease, congenital heart disease, or immunodeficiency.
- **Data Collection:** Retrospective data from hospital records, including demographic details, clinical presentation, type of treatment, duration of hospital stay, and adverse events.

**Results**

**Table 1:** Demographics and Clinical Characteristics

| Variable | Hypertonic Saline Group (n=100) | Normal Saline Group (n=100) |
|---|---|---|
| Mean Age (months) | 12 ± 5 | 13 ± 4 |
| Male | 55 (55%) | 53 (53%) |
| Female | 45 (45%) | 47 (47%) |
| Average Weight (kg) | 8.5 ± 1.8 | 8.3 ± 1.9 |

The hypertonic saline group had a mean age of 12 months, with a male-to-female ratio of 1.2:1, while the normal saline group had a mean age of 13 months and a similar gender distribution.

**Table 2:** Clinical Outcomes

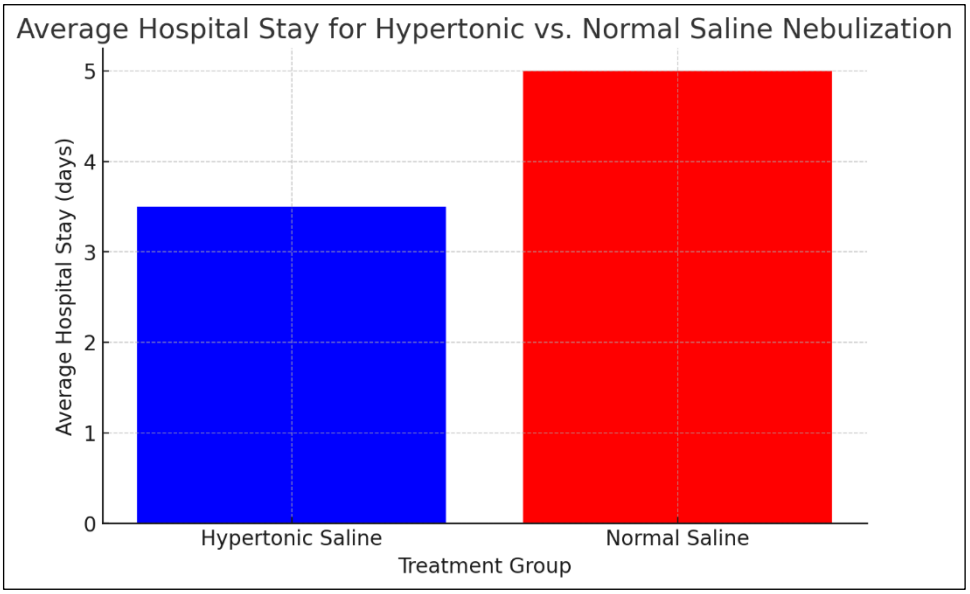
| Outcome Measure | Hypertonic Saline Group | Normal Saline Group |
|---|---|---|
| Average Hospital Stay (days) | 3.5 ± 1.2 | 5.0 ± 1.5 |
| Clinical Improvement Rate (%) | 85% | 70% |
| Adverse Events (%) | 5% | 3% |
| Readmission Rate (%) | 4% | 8% |

- **Hospital Stay:** The average hospital stay for the hypertonic saline group was significantly shorter (3.5 days) compared to the normal saline group (5.0 days).
- **Clinical Improvement:** The hypertonic saline group showed a higher rate of clinical improvement (85%) compared to the normal saline group (70%).
- **Adverse Events:** Adverse events were slightly higher in the hypertonic saline group (5%), primarily mild cough and transient bronchospasm.
- **Readmission Rate:** The hypertonic saline group had a lower readmission rate (4%) compared to the normal saline group (8%).

**Statistical Analysis**

The differences between the two groups were statistically analyzed using chi-square tests for categorical variables and t-tests for continuous variables. Significant differences were observed in hospital stay duration and clinical improvement rates ($p<0.05$).

Average Hospital Stay for Hypertonic vs. Normal Saline Nebulization.




Clinical Improvement Rates for Hypertonic vs. Normal Saline Nebulization.

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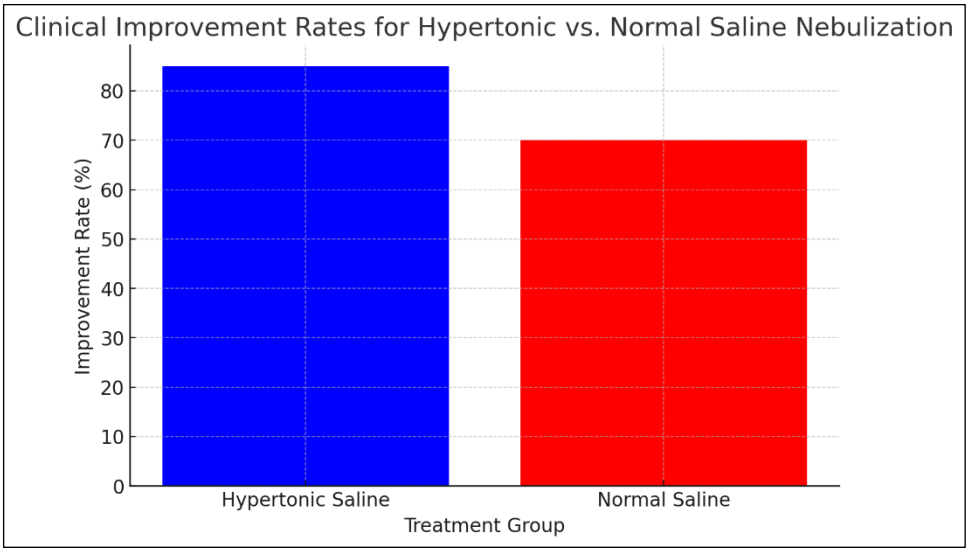
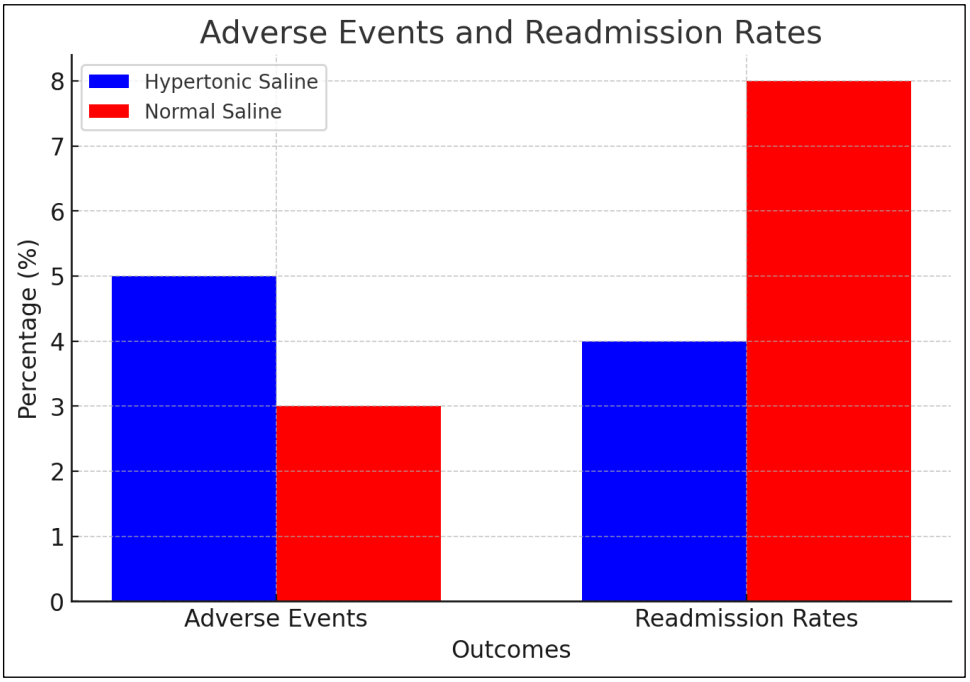



Adverse Events and Readmission Rates.




**Discussion**

Bronchiolitis is a leading cause of hospitalization in infants and young children. Nebulized hypertonic saline has emerged as a potential treatment to reduce airway edema and improve mucociliary clearance. This study aims to evaluate the clinical outcomes and safety of hypertonic saline nebulization in pediatric patients with bronchiolitis.

This study supports the use of nebulized hypertonic saline in the management of bronchiolitis in young children. The shorter hospital stays and higher clinical improvement rates associated with hypertonic saline treatment suggest its effectiveness in reducing airway edema and improving respiratory symptoms. Although the incidence of adverse events was slightly higher, they were mild and manageable.

However, the treatment's effectiveness may vary depending on the severity of the disease and the timing of intervention. Children with severe bronchiolitis or those who presented late in the course of the disease showed less pronounced improvement.

**Limitations**

- The retrospective nature of the study limits control over variables such as disease severity and patient comorbidities.
- The study was conducted in a single center, which may affect the generalizability of the findings to other settings.

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**Conclusion**

Nebulized hypertonic saline appears to be an effective treatment for bronchiolitis in pediatric patients, offering reduced hospital stays and improved clinical outcomes compared to normal saline. Prospective, multi-center trials with larger sample sizes are recommended to further validate these findings.

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