

COMPARISON OF HOSPITALIZATION STAY IN CHILDREN WITH BRONCHIOLITIS TREATED WITH AND WITHOUT ANTIBIOTICS

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Abstract

Background: Bronchiolitis is a common viral illness in children, yet antibiotics are often overused, causing antimicrobial resistance and side effects. This study was conducted locally to compare hospitalization duration in children treated with and without antibiotics to promote rational use antimicrobials.**Objectives:** To compare hospital, stay during treatment of bronchiolitis in children with and without antibiotics.**Duration:** Six months w.e.f. 01-11-2024 to 30-04-2025**Methodology:** After approval from the Hospital's Ethical Review Board, 110 children with clinical diagnosis of bronchiolitis (55 in each group) admitted to Ghurki Trust Teaching Hospital were enrolled after obtaining parental consent. All patients received standard treatment, including hypertonic saline IV fluids nebulization and oxygen therapy. Group A was treated with Azithromycin, while Group B received a placebo. Clinical observations and laboratory tests were recorded. Collected data was entered and analyzed using SPSS version 27.**Results:** The study included 110 children with bronchiolitis (mean age 15.30±5.69 months; 52.6% boys). Baseline characteristics, including age, gender, BMI, respiratory rate, fever, and oxygen saturation, were comparable between Group A (antibiotic) and Group B (placebo). Group B had a significantly shorter mean hospital stay.**Conclusion:** In conclusion, children with bronchiolitis treated without antibiotics (placebo group) had a significantly shorter hospital stay compared to those receiving antibiotics, despite similar baseline characteristics and clinical parameters. The findings suggest that routine antibiotic use may not reduce hospitalization duration in bronchiolitis and should be avoided unless clearly indicated.

INTRODUCTION

Bronchiolitis is a viral infection that primarily affects the lower respiratory tract in infants, most commonly those under one year of age. Clinically, it often begins with symptoms of an upper respiratory tract infection and may progress to involve the lower airways, presenting with

respiratory distress, crackles, wheezing, and crepitation.¹ Each year, pediatric hospitals see a substantial number of children, particularly infants, admitted with bronchiolitis.²

In Europe, the cost of hospital care for acute bronchiolitis is considerable. On average, hospitalization in a pediatric ward costs around

2,000 euros per patient, while treatment in pediatric intensive care units can reach approximately 8,000 euros per patient. These expenses are notably higher for cases caused by respiratory syncytial virus (RSV) compared to bronchiolitis from other causes. Moreover, hospitalization costs are particularly elevated in infants aged three months or younger compared to older children.^{3,4} In Pakistan, respiratory infections account for nearly 20-30% of all childhood deaths, highlighting the substantial disease burden in this population.⁵ Local data further demonstrate that RSV detection is particularly high among young infants less than three months of age (48/168, 29%), representing 22% of all RSV-positive cases.⁷ Among RSV-positive infants under 12 months, bronchiolitis is the most common diagnosis, followed by pneumonia.⁶ Additionally, bronchiolitis has been reported in 10,830 children aged 5-9 years in Pakistan, accounting for 12.2% of cases in this age group.⁷

The management of bronchiolitis is clearly defined and involves supportive care, which includes fluid regulation, respiratory support and supplemental hydration, requiring both medical and nursing intervention.⁶ Obolski et al. in Israel reported significantly higher mean duration of hospitalization in children admitted for bronchiolitis treated with versus without antibiotics (4.60 ± 2.90 vs. 3.15 ± 2.47 days; $p < 0.001$).⁴ In light of this study, there seems no need for antibiotics administration in the treatment of children with bronchiolitis. Redundant antibiotic therapy can be detrimental in two main ways. First, it can harm individual patients by increasing their future likelihood of antibiotic-resistant infections and antibiotic-associated diarrhea.⁷ Secondly, redundant antibiotic prescription promotes population-wide rates of antibiotic resistance, leading to the dangerously increasing trends of antibiotic resistance observed worldwide. Therefore, decreasing unnecessary antibiotic prescription and increasing supportive care is a high public-health priority.^{7,8}

However, Luisi et al. in Brazil reported a less mean duration of hospitalization in children admitted

for bronchiolitis treated with and without antibiotics (5.32 ± 2.63 vs. 5.85 ± 33.30 days; $p = 0.464$), but the difference was insignificant.⁹

Ortmann et al. reported that both the groups had a similar length of hospital stay ($p > 0.05$).¹⁰

Above studies^{4,8,9} contained controversy regarding the administration of antibiotics in children with bronchiolitis and duration of hospitalization. Therefore, purpose of this study was to repeat this trial to unearth potential benefits of antibiotic therapy in such patients, if any, or to avoid its unnecessary administration in future practice, because Pakistan is a limited-resource country and judicious use of resources is necessary.

METHODOLOGY

This study is a randomized controlled trial conducted in the Department of Pediatrics, Ghurki Trust Teaching Hospital, Lahore, over a period of six months following approval of the synopsis. A total of 110 cases were calculated as the required sample size using the WHO calculator, with 55 cases in each group, 80% power of the test, and 6% level of significance. The expected mean hospitalization stay was taken as 4.60 ± 2.90 versus 3.15 ± 2.47 days in children treated with versus without antibiotics for bronchiolitis.⁴ Non-probability, consecutive sampling was used for participant selection. Children of both genders aged between 6–24 months were included in the study. Bronchiolitis was defined as the first episode of low-grade fever ($<100.5^{\circ}\text{F}$), cough, raised respiratory rate (>50 per min for age 5–12 months and >40 per min for age 13–24 months), clear nasal discharge for ≥ 24 hours, and hyperinflation of lungs on chest X-ray (PA view). Hospital stay was calculated as the number of days between admission and discharge, with discharge criteria including temperature $<99^{\circ}\text{F}$ for 24 hours, normal respiratory rate (≤ 49 per min for 5–12 months and ≤ 39 per min for 13–24 months), ability to feed, and absence of infection.

Children with previous antibiotic treatment in the last three months, recurrent bronchiolitis, critical illness, hyperactive airway/asthma, chronic cardiopulmonary disorders, congenital or

acquired immunodeficiency, neuromuscular disease, prematurity, or other neonatal complications were excluded from the study. After approval from the hospital's Ethical Review Board, informed written consent was obtained from parents or guardians. Detailed history was taken from each patient. Patients were randomly divided into two groups using the lottery method: Group A (Antibiotic Group, n=54) and Group B (Placebo Group, n=54). Standard treatment for both groups included hypertonic saline nebulization and oxygen therapy at 1 L/min for children older than six months to maintain oxygen saturation above 90%. Children with respiratory distress and respiratory rate exceeding 60/min had feeding compromised, so enteral feeding through an orogastric tube was done and patients were kept NPO according to clinical conditions. In addition, patients in Group A received oral Azithromycin (10 mg/kg/day) for five days, while patients in Group B were given an equivalent size of placebo. All tests were arranged from the hospital lab free of cost. Patients who developed a superadded infection, became clinically unstable, experienced recurrent bronchiolitis, required antiviral therapy, or showed clinical deterioration were withdrawn from the study and managed individually according to hospital protocol. Patients with superadded infection were excluded.

Collected data was entered and analyzed using SPSS version 27. Numerical variables, including age, BMI, duration of hospital stay, respiratory rate (RR), fever, and SPO₂, were recorded, while categorical variables, such as gender, were presented as frequencies and percentages. The duration of hospital stay was compared between the groups using an independent sample t-test, with a p-value ≤ 0.05 considered statistically significant. Additionally, the mean duration of hospital stay between the groups was stratified by age, gender, and BMI to assess potential effect modifiers, and post-stratification, an independent sample t-test was applied, again considering a p-value ≤ 0.05 as significant.

RESULTS

The study included a total of 110 children diagnosed with bronchiolitis. The mean age of participants was 15.30 ± 5.69 months, with 47.4% aged between 6–12 months and 52.6% between 13–24 months. There were 71 (52.6%) boys and 64 (47.4%) girls. The mean body mass index (BMI) was 24.53 ± 3.27 , with 48.1% of children having a normal BMI and 51.9% being overweight or obese. The mean respiratory rate was 57.72 ± 6.68 breaths per minute, while the mean recorded temperature was 99.97 ± 0.26 °F. The mean oxygen saturation (SpO₂) among participants was 89.12 ± 2.35 %. Data is given in Table 1.

Table 1: Baseline Characteristics of Children include in the Study

Characteristics	Total (110)
Age (years)	15.30±5.69
• 6-12 months	64 (47.4%)
• 13-24 months	71 (52.6%)
Gender	
• Boy	71 (52.6%)
• Girl	64 (47.4%)
BMI	24.53±3.27
• Normal	65 (48.1%)
• Overweight / Obese	70 (51.9%)
Respiratory Rate (RR per minute)	57.72±6.68
Fever (°F)	99.97±0.26
SPO ₂ (%)	89.12±2.35

Both groups were comparable at baseline. The mean age was 15.16 ± 5.43 months in Group A and 15.44 ± 5.99 months in Group B ($p = 0.803$). Gender distribution, BMI, respiratory rate, fever,

and oxygen saturation showed no significant differences between groups (all $p > 0.05$) as given in Table 2.

Table 2: Comparison of Baseline Variables between the Groups

Characteristics	Group A (n=55)	Group B (n=55)	p-value
Age (years)	15.16 ± 5.43	15.44 ± 5.99	0.803
• 6-12 months	19 (34.5%)	20 (36.4%)	0.842
• 13-24 months	36 (65.5%)	35 (63.6%)	
Gender			
• Boy	31 (56.4%)	35 (63.6%)	0.436
• Girl	24 (43.6%)	20 (36.4%)	
BMI	24.36 ± 3.24	24.69 ± 3.32	0.606
• Normal	36 (65.5%)	34 (61.8%)	0.692
• Overweight / Obese	19 (34.5%)	21 (38.2%)	
Respiratory Rate (RR per minute)	52.85 ± 6.62	52.58 ± 6.79	0.832
Fever ($^{\circ}\text{F}$)	99.96 ± 0.27	99.98 ± 0.25	0.801
SPO2 (%)	88.82 ± 2.43	89.42 ± 2.26	0.183

Chi Square test, taking $p\text{-value} \leq 0.05$ as significant.

There was no significant difference between the two groups in respiratory rate and oxygen saturation at any time interval. Fever remained

comparable across both groups except on day five, where a significant difference was observed.

Table 3: Comparison of Mean Duration of Hospital Stay between the Groups

Outcome	Groups	N	Mean	Std. Deviation	p-value
Hospital Stay	Group A	55	5.75	1.41	0.009
	Group B	55	5.13	1.00	

Independent Sample t test, taking $p\text{-value} \leq 0.05$ as significant.

Table 3 presents the comparison of the mean duration of hospital stay between the two groups. The mean hospital stay was significantly shorter in Group B (placebo group) at 5.13 ± 1.00 days compared to 5.75 ± 1.41 days in Group A (antibiotic group), with a $p\text{-value}$ of 0.009,

indicating a statistically significant difference. The prolonged hospital stay may be explained by persistent oxygen requirement, feeding intolerance, and the need for careful clinical monitoring prior to discharge.

Table 4: Stratification of Mean Duration of Hospital Stay between the Groups on the basis of Subgroups

Group	Sub Group	Mean Duration of Hospital Stay		p-value
		Group A	Group B	
Age	6-12 months	5.05 ± 1.43	5.35 ± 0.99	0.453
	13-24 months	6.11 ± 1.28	5.00 ± 1.00	0.000
Gender	Boy	5.77 ± 1.18	5.17 ± 0.89	0.021

	Girl	5.71±1.71	5.05±1.19	0.153
BMI	Normal Weight	5.94±1.51	5.06±1.01	0.006
	Overweight / Obese	5.37±1.16	5.24±0.99	0.071

Independent Sample t test, taking p-value≤0.05 as significant.

Table 4 shows the stratified comparison of mean hospital stay between the two groups based on age, gender, and BMI. Among children aged 13–24 months, the mean hospital stay was significantly shorter in Group B (5.00 ± 1.00 days) compared to Group A (6.11 ± 1.28 days, $p = 0.000$). Similarly, boys in Group B had a significantly shorter hospital stay (5.17 ± 0.89 days) than those in Group A (5.77 ± 1.18 days, $p = 0.021$). A significant difference was also observed among children with normal BMI, with Group B showing a shorter stay (5.06 ± 1.01 days) compared to Group A (5.94 ± 1.51 days, $p = 0.006$). No statistically significant differences were found among children aged 6–12 months, girls, or those who were overweight/obese ($p > 0.05$), which may be due to the small sample size in these subgroups.

DISCUSSION

Bronchiolitis is a common lower respiratory tract infection in young children, often leading to hospitalization.^{11,12} Despite its viral origin, antibiotics are frequently prescribed, raising concerns about their unnecessary use.^{13,14} The overuse of antibiotics contributes to resistance, increased healthcare costs, and avoidable side effects such as diarrhea, allergic reactions, and alteration of gut flora.¹⁴ However, some clinicians continue prescribing them, assuming possible bacterial co-infection.¹⁵ This controversy highlights the need for evidence-based guidelines.^{4,9,10} Therefore, this study was planned in a local tertiary care hospital to compare hospitalization duration in children with bronchiolitis treated with and without antibiotics, aiming to rationalize antibiotic use.

The results of this study are consistent with established trends observed in both regional and international research. For instance, Obolski et al., in a study conducted in Israel, found that children hospitalized with bronchiolitis who

received antibiotics had a significantly longer average hospital stay compared to those who did not (4.60 ± 2.90 vs. 3.15 ± 2.47 days; $p < 0.001$).⁴ Our findings reflect a similar pattern, with antibiotic use associated with prolonged hospitalization, further supporting the view that antibiotics do not confer clinical benefit in the treatment of viral bronchiolitis.

In comparison, Luisi et al., reporting data from Brazil, observed a slightly shorter mean hospital stay in children who were not treated with antibiotics (5.32 ± 2.63 vs. 5.85 ± 3.30 days). However, this difference did not reach statistical significance ($p = 0.464$), reinforcing the notion that antibiotics have little to no impact on the course of illness in uncomplicated viral bronchiolitis.⁹ Collectively, these findings contribute to the growing body of evidence discouraging routine antibiotic use in such cases.

Ortmann et al. further reinforced this conclusion by reporting no significant difference in hospital stay between antibiotic and non-antibiotic groups ($p > 0.05$). They also observed that early antibiotic use was common and varied among centers, yet it did not lead to any improvement in clinical outcomes in children admitted to intensive care units for noninvasive respiratory support due to bronchiolitis.¹⁰

In a local context, Rasul et al. from Pakistan found that symptoms such as restlessness and difficulty in sleeping improved slightly earlier in children who did not receive antibiotics. Although chest indrawing and hepatomegaly resolved faster in those given parenteral antibiotics, the differences were statistically insignificant. The mean hospital stay was shorter in the non-antibiotic group (6.2 ± 1.4 days) compared to the oral antibiotic group (6.7 ± 1.1 days). They concluded that general supportive care remains the most effective treatment for bronchiolitis, while antibiotics do not alter the disease course.¹⁷

Similarly, García-García in Spain concluded that strict adherence to clinical guidelines and the use of rapid viral diagnostic methods can significantly minimize the unnecessary use of antibiotics in infants with bronchiolitis, thereby improving antibiotic stewardship and reducing resistance.¹⁸

CONCLUSION

In conclusion, children with bronchiolitis treated without antibiotics (placebo group) had a significantly shorter hospital stay compared to those receiving antibiotics, despite similar baseline characteristics and clinical parameters. The findings suggest that routine antibiotic use may not reduce hospitalization duration in bronchiolitis and should be avoided unless clearly indicated.

LIMITATIONS & RECOMMENDATIONS

Strengths of the study are controlled hospital setting and strict inclusion and exclusion criteria thereby reducing the factor of bias. The prospective design ensured reliable comparison of children treated with or without antibiotics. But relatively small sample size and single-center nature limit generalizability. Absence of viral identification also restricted etiological insights. Future multicenter studies with larger samples and viral testing are recommended to validate findings and promote rational antibiotic use through improved stewardship in managing bronchiolitis in children.

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Authors Contribution

Author 1

Substantial contributions to study design, acquisition of data
Analysis & Interpretation of Data, Manuscript writing
Has given final approval of the version to be published
Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy

or integrity of any part of the work are appropriately investigated and resolved

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Data Analysis, Manuscript writing, Critical Review

Has given final approval of the version to be published

Agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved

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