

# Comparison of Epinephrine and Salbutamol Nebulization in Acute Bronchiolitis in terms of mean change in RDAI Score

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## Author's Contribution

<sup>1,6</sup> Conception of study

<sup>1</sup> Experimentation/Study conduction

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## Abstract

**Objective:** This study was conducted to compare epinephrine and salbutamol nebulization in emergency management of moderately ill children less than one and a half years old with bronchiolitis in terms of mean change in respiratory distress assessment instrument (RDAI) score.

**Materials and Methods:** Randomized controlled design was selected in this trial at the Department of Pediatrics, KRL Hospital Islamabad, Pakistan from 24th April 2016 to 24th October 2016. Sixty children with acute bronchiolitis, having a moderate degree of illness (RDAI 8-15) were included in this study. Patient were randomly allocated into Group A (epinephrine = 0.1 mL/kg in concentration of 1:10000) and Group B (salbutamol = 0.15 mg/kg combined with 3 mL 0.9% normal saline). It was delivered by a nebulizer and a face mask with a continuous flow of 6 L/min at 100% oxygen. Data was collected on a predesigned performa and assessed with reference to mean change in RDAI score.

**Results:** The patients' mean age in Group A and Group B were 10.57±4.22 and 11.63±3.14 months, respectively. The majority of the patients were males (56%). The mean RDAI score was insignificant between the two groups, both at baseline (11.57±2.21 in epinephrine group vs 11.3±2.14 in salbutamol group,  $p = 0.63$ ) and 125 minutes (4.77±2.19 in Epinephrine group vs 5.43±1.69 in Salbutamol group,  $p = 0.19$ ). However, when stratified according to age and gender, the mean RDAI score was found statistically significant among the 2-12 months age group ( $p = 0.0045$ ) and female gender ( $p = 0.0052$ ).

**Conclusion:** Epinephrine and salbutamol have similar effects in acute bronchiolitis when compared with regards to mean change in RDAI score.

**Keywords:** Bronchiolitis, infants, comparison, epinephrine, salbutamol, RDAI score.

## Introduction

Acute bronchiolitis is a viral disease with Respiratory syncytial virus (RSV) as the main cause in more than half of the cases. Approximately 75,000-125,000 children aged less than 1 year old are hospitalized annually in the United States due to RSV infection.<sup>1</sup> RSV is the main viral disease-causing mortality in infants.<sup>2</sup> In Pakistan, a winter spike of this virus was noted. There is an increase of 30-50% in the positivity of RSV cases from December to February in Pakistan.<sup>3</sup> A meta-analysis showed that Beta 2-agonist therapy does not improve saturation of oxygen, does not lessen hospital stay, does not help in reducing hospitalization rate but can result in increased respiratory rate.<sup>4</sup> A trial conducted by Farooq A et al.<sup>5</sup> in Islamabad showed that epinephrine could be a more effective treatment than salbutamol in the emergency management of acute bronchiolitis (mean RDAI score after 48 hours in the epinephrine group was  $8.35 \pm 1.36$  as compared to  $10.07 \pm 1.37$  in the salbutamol group). Another meta-analysis also showed the effectiveness and superiority of adrenaline over salbutamol. It was also helpful in reducing respiratory rate.<sup>6</sup> However, other studies did not reveal any significant difference between salbutamol and epinephrine in terms of symptomatic improvement.<sup>7</sup> So, the optimal treatment of bronchiolitis remains unclear. Additionally, there is a limited local study available.

The rationale of this study was to compare the two drugs in the emergency treatment of acute bronchiolitis. The results of this study will help to choose the appropriate drug in reducing symptoms of the disease and will also provide the local data regarding its management.

## Materials and Methods

A randomized controlled trial was conducted in the Paediatrics department of KRL Hospital, Islamabad from 24<sup>th</sup> April 2016 to 24<sup>th</sup> October 2016, after taking approval from the Institutional Research Forum of the hospital.

60 patients, who fulfilled the inclusion criteria, were enrolled in the study. All patients with a diagnosis of acute bronchiolitis, between ages 2-18 months of both genders, and a moderate degree of illness (RDAI score = 8-15) were included in the study. RDAI scoring was done clinically based on wheezing (total score 8) and retractions (total score 9) and patients have scored 0 to 17 accordingly.<sup>8</sup> Patients with a family history of

asthma, previous use of bronchodilators, requiring influenza vaccine prophylaxis and RDAI score > 15 were excluded.

A "written informed consent" was taken from the parents of the patients. The double-blinded randomized selection was done to eliminate any sort of bias during the study. Patients were assigned into two groups (30 patients each) by giving them random numbers generated by a pharmacist. Group A received a dose of epinephrine nebulization (0.1mL/kg in the concentration of 1:10000) and Group B received salbutamol nebulization (0.15 mg/kg) with 3 mL of 0.9% isotonic saline solution and delivered to the patient by the nebulizer and a face mask with a continuous flow of oxygen.

Infants were monitored by weight, respiratory rate, SpO<sub>2</sub> (determined by pulse oximeter), and heart rate. The study drug was administered at 0, 25, and 50 minutes. The infant's condition was assessed by an independent investigator before giving each drug at 75, 100, and 125 minutes. The duration of patient retention in the emergency department was at least 125 minutes. At the end of this duration, RDAI score, respiratory rate, SpO<sub>2</sub>, heart rate, and the need for hospital admission based on the patient's clinical assessment was recorded on a preformed performa.

SPSS v17.0 was used for data analysis. Frequencies and percentages were calculated for qualitative variables. The quantitative variables were assessed at baseline and 125 minutes and mean change in RDAI score were presented as mean and standard deviation. The modifiers like age and gender were controlled by stratification. Post-stratification independent sample T-test was applied to compare mean change in RDAI scores. The *p*-value of < 0.05 was considered statistically significant.

## Results

Out of the 60 patients included in the study, 60% of patients in Group A and 53.3% in Group B were males whereas 40% in Group A and 46.7% in Group B were females. The mean age of the patients in both groups was presented in Table 1.

The mean weight of the patients was  $13.54 \pm 3.61$  kg in the epinephrine group while  $14.77 \pm 4.14$  kg in the salbutamol group. The mean RDAI score at baseline was  $11.57 \pm 2.21$  in Group A and  $11.3 \pm 2.14$  in Group B (*p* = 0.63). After 125 minutes, the mean RDAI score was  $4.77 \pm 2.19$  in the epinephrine group compared to  $5.43 \pm 1.69$  in the salbutamol Group (*p* = 0.19, Table 2).

Stratification according to mean RDAI score with respect to age and gender was presented in Table 3.

**Table 1: Age distribution of the patients**

Treatment group	Epinephrine Group (n = 30)		Salbutamol Group (n = 30)	
	Count	Percentage	Count	Percentage
2-12 months	19	63.33%	21	70%
13-18 months	11	36.67%	09	30%
Total	30	100%	30	100%
Mean $\pm$ SD	10.57 $\pm$ 4.22		11.63 $\pm$ 3.14	

**Table 2: Mean RDAI score at baseline and at 125 minutes in both groups**

Variable	Treatment groups				P-value
	Epinephrine Group (n = 30)		Salbutamol Group (n = 30)		
	Mean	SD	Mean	SD	
RDAI score (Baseline)	11.57	2.21	11.3	2.14	<b>0.6325</b>
RDAI score (125 minutes)	4.77	2.19	5.43	1.69	<b>0.1964</b>

**Table 3: Treatment efficacy in terms of mean RDAI score stratified for Age & Gender in both groups**

Variable		Treatment groups				P-value
		Epinephrine Group (n = 30)		Salbutamol Group (n = 30)		
		Mean	SD	Mean	SD	
Age	2-12 months	4.42	2.09	5.81	1.50	<b>0.0045</b>
	13-18 months	5.36	2.34	4.56	1.88	0.1497
Gender	Male	4.92	2.15	4.71	1.86	0.6873
	Female	4.67	2.28	6.06	1.29	<b>0.0052</b>

## Discussion

Acute bronchiolitis is a viral disease predominantly with RSV-responsible organisms in the majority of cases. In our study, most of the infants belonged to the 2-12 months age group as compared to the 13-18 months group (66.6% vs 33.4%). The mean RDAI score at baseline and 125 minutes were statistically insignificant between the two groups. ( $p = 0.63$  vs  $p = 0.19$  respectively)

A recent study by Usman S et al.<sup>9</sup> in Lahore showed that epinephrine use over salbutamol could be more effective in the emergency treatment of the illness (Mean RDAI score at 48 hours was  $1.6 \pm 1.6$  in the epinephrine group vs  $2.4 \pm 2$  in the salbutamol group). This is in concert with the findings of our study. However, the results were statistically insignificant. This study also found a reduction in the duration of hospital stay of those treated with epinephrine. Another meta-analysis showed the effectiveness and superiority of epinephrine among outpatients in terms of improvement in respiratory rate and RDAI score with age variance.<sup>6</sup>

Nada et al.<sup>10</sup> conducted a study in Iraq to investigate the effect of epinephrine and salbutamol in the treatment of acute bronchiolitis in infants. In their findings, the mean SpO<sub>2</sub> was significantly on a higher side in the epinephrine group ( $p=0.008$ ) and there was also improvement in respiratory rate ( $p=0.003$ ). It was concluded that epinephrine has more efficacy in comparison to salbutamol in patients admitted with bronchiolitis.

There is substantial variation seen regarding the management of infants with bronchiolitis between countries. Various meta-analyses did not find bronchodilators including epinephrine and salbutamol effective in treating patients with bronchiolitis, even antibiotics and steroids were equally found ineffective in its management.<sup>11</sup> A randomized double-blind trial from Turkey showed no statistical difference between nebulized epinephrine and salbutamol in terms of discharge rate at 24 hours, however adrenaline with 3% hypertonic helped reduce the length of stay ( $p=0.039$ ).<sup>12</sup> Racemic epinephrine was compared with hypertonic saline in terms of length of stay by Yasin F et al.<sup>13</sup> and found epinephrine effective in reducing the length of stay in patients with moderate bronchiolitis. However, some contrasting results were also in literature, where researchers demonstrated equal effectiveness of salbutamol and epinephrine.<sup>14</sup>

The main limitation of our study was the small sample size in both groups of children. It is recommended that further studies should be done on a larger number of patients and at a more comprehensive level to observe the efficacy of epinephrine over salbutamol and to assess improved clinical response in patients with acute bronchiolitis.

## Conclusion

Epinephrine and salbutamol nebulization have similar effects in acute bronchiolitis when compared with regards to mean change in RDAI score.

## References

1. Ivanciuc T, Sbrana E, Casola A, Garofalo RP. Protective Role of Nuclear Factor Erythroid 2-Related Factor 2 Against Respiratory Syncytial Virus and Human Metapneumovirus Infections. *Front Immunol.* 2018 Apr 23;9:854. DOI: 10.3389/fimmu.2018.00854
2. Cevigney R, Leary C, Gonik B. Adjustable algorithmic tool for assessing the effectiveness of maternal respiratory syncytial virus (RSV) vaccination on infant mortality in developing countries. *Infect Dis Obstet Gynecol.* 2021;2021:1-7. <https://doi.org/10.1155/2021/5536633>.
3. Tariq WZ, Waqar T, Ali S, Ghani E. Winter peak of respiratory syncytial virus in Islamabad. *Trop Doct.* 2005 Jan;35(1):28-9. DOI: 10.1258/0049475053001958.
4. Cai Z, Lin Y, Liang J. Efficacy of salbutamol in the treatment of infants with bronchiolitis: A meta-analysis of 13 studies. *Medicine (Baltimore).* 2020;99(4):e18657. doi:10.1097/MD.00000000000018657
5. Farooq A, Maqbool T, Aslam S, Tariq M, Khan MA, Ali MA, et al., Nebulized epinephrine versus salbutamol for the management of children presenting with bronchiolitis: Single Center Study. *Professional Med J.* 2020; 27(12):2719-2728. <https://doi.org/10.29309/TPMJ/2020.27.12.4726>
6. Sah VK, Giri A, Sah S, Niraula N. Comparison of Efficacy of Nebulisation with Salbutamol versus Adrenaline in Acute Bronchiolitis in Children aged Two Months to Two Years. *JoNMC.* 2019 Jun 16;8(1):27-32. DOI: <https://doi.org/10.3126/jonmc.v8i1.24473>
7. Oakley E, Brys T, Borland M, Neutze J, Phillips N, Krieser D, et al., Medication use in infants admitted with bronchiolitis. *Emerg Med Australas.* 2018;30(3):389-97. doi:10.1111/1742-6723.12968
8. Koley G, Koley KC. Comparison of Salbutamol to Adrenaline Nebulization in Acute Severe Bronchiolitis: An Original Research Paper. *Int J Sci Stud* 2017;5(2):202-5. DOI: 10.17354/ijss/2017/246
9. Usman S, Zareen A, Gillani A, Kaleem A, Ali M, Sarwar HA. Comparison of Adrenaline and Salbutamol nebulization in treatment of Children with Bronchiolitis. *Professional Med J.* 2019; 26(9):1434-9. DOI: 10.29309/TPMJ/2019.26.09.1537
10. Nada Ali A. Al-Ali, Saud H. Mohammed. Comparison of Nebulized Salbutamol and Epinephrine in Acute Bronchiolitis. *Med-J-Tikrit-Univ.* 2020;26(1):68-74 DOI: <http://dx.doi.org/10.25130/mjotu.26.01.07>
11. Korppi M, Mecklin M, Heikkilä P. Review shows substantial variations in the use of medication for infant bronchiolitis between and within countries. *Acta Paediatr.* 2019 Jun;108(6):1016-22. DOI: 10.1111/apa.14713. Epub 2019 Jan 25.
12. Uysalol M, Haşlak F, Özünal ZG, Vehid H, Uzel N. Rational drug use for acute bronchiolitis in emergency care. *Turk J PEDIATR.* 2017;59(2):155-61. DOI: 10.24953/turkjped.2017.02.007
13. Yasin F, Afridi ZS, Mahmood Q, Khan AA, Condon S, Khan R. Role of Nebulized Epinephrine in Moderate Bronchiolitis: A

Quasi-randomized Trial. *Ann Pediatr Child Health. Ir J Med Sci.* 2021 Feb;190(1):239-42. DOI: 10.1007/s11845-020-02293-5. 14. Herilanto RRL, Ravelomanana L, Emilson JPRA, Lalao T, Noeline R. Comparison of the efficiency of the nebulization of salbutamol, epinephrine and normal saline on treatment of bronchiolitis. *Int J Res Med Sci.* 2016 Dec;4(12):5108-11. DOI: <http://dx.doi.org/10.18203/2320-6012.ijrms20164057>