Print ISSN: 2321-6379
Online ISSN: 2321-595X
DOI: 10.17354/ijss/2017/246

Original Article

Comparison of Salbutamol to Adrenaline Nebulization in Acute Severe Bronchiolitis: An Original Research Paper

Gayti Koley[1], K C Koley[2]

[1]Associate Professor, Department of Pediatrics, G S Medical College and Hospital, Pilkhuwa, Uttar Pradesh, India, [2]Professor, Department of Medicine, Major SD Singh Medical College and Hospital, Farrukhabad, Uttar Pradesh, India

Abstract

Background: The prevalent use of nebulized bronchodilators in bronchiolitis has not proved beneficial. The use of adrenergic drugs has shown some promise. The efficacy of nebulized adrenaline versus salbutamol in bronchiolitis and the safety profile of the two were studied.

Materials and Methods: Effects of nebulized adrenaline and salbutamol were compared in children with moderate to severe acute bronchiolitis. 21 infants in the age group of 1 month-1 year were enrolled in the study. Children received salbutamol (0.15 mg/kg with saline to a total of 3 ml) through nebulizer with oxygen or adrenaline 1:10000 (0.5 ml/kg subject to a maximum of 2.5 ml with saline to make it 3 ml) via nebulizer with oxygen. Changes in heart rate, respiratory rate (RR), respiratory distress assessment instrument (RDAI) score, oxygen saturation (SpO2), oxygen requirement, duration of hospital stay, and the side effects were studied.

Results: The respiratory status was better with significant improvement in RR, RDAI score and SpO2, decreased oxygen requirement and shorter hospital stay in the adrenaline group. There were no significant side effects in either group.

Conclusion: Nebulized adrenaline is a useful and safe drug for moderate/severe bronchiolitis and is superior to salbutamol.

Key words: Adrenaline, Bronchiolitis, Salbutamol

INTRODUCTION

Acute bronchiolitis is a very frequent cause of respiratory distress in the first year of life. Acute bronchiolitis is a viral inflammatory disease of the small airway characterized by edema, destruction of the mucosal lining, excessive secretions, cellular debris with muscular spasms leading to narrowing, and clogging of the smaller air passages.[1] This causes reduced flow of air, air entrapment, and respiratory distress.

It most commonly occurs in the younger infant and almost never beyond 2 years. Incidence is most common in the winter months, from December to March in northern India.

Respiratory syncytial virus (RSV) in the commonest agent. Diagnosis is mainly clinical and is defined as, "first episode of wheezing and respiratory distress, developing in an infant with signs of viral upper respiratory infection such as coryza, low-grade fever, and stuffy nose."[2] The absence of high-grade fever, toxicity, previous underlying pulmonary, or cardiac disease the diagnosis of acute bronchiolitis is made.

A chest roentgogram confirms increased bronchovascular markings with areas of air entrapment.

A complete blood count essentially shows a normal leucocyte count with increased lymphocytes.

RSV culture is rarely done.

Access this article online

www.ijss-sn.com

Month of Submission : 03-2017
Month of Peer Review : 04-2017
Month of Acceptance : 05-2017
Month of Publishing : 05-2017

Corresponding Author: Dr. Gaytri Koley, Department of Pediatrics, G S Medical College and Hospital, Pilkhuwa, Uttar Pradesh, India.
E-mail: gaytrikoley@yahoo.co.uk

The treatment of Acute Bronchiolitis is supportive.[3] Admission is required when there is respiratory distress leading to difficulty in feeding and reduced oxygen saturation.

Acute bronochiolitis has been treated variously with salbutamol, glucocorticoids, ipratropium, epinephrine, and hypertonic saline nebulization along with humidified oxygen.

There is still no consensus on the right modality of treatment. In our own hospital, we were generally using salbutamol nebulization and sometimes adding adrenaline in severe cases.

This study was designed to compare the efficiency of adrenaline nebulization versus salbutamol nebulization in the management of acute bronchiolitis.

MATERIALS AND METHODS

This was a prospective randomized study conducted in the pediatric ward of a medical college.

Infants reporting to the outpatient department/emergency in whom the diagnosis of acute severe bronchiolitis was made with severe respiratory distress and SpO2 <94% were enrolled. The inclusion criteria were:

1. Age: 1 month-1 year
2. Temperature <101°F
3. The first episode of wheezing and respiratory distress in a previously healthy infant with signs of viral coryza, cough
4. No underlying lung/cardiac pathology.

Children with the history of similar episode of respiratory distress in the past, family history of atopy/asthma, history of prolonged respiratory distress in newborn period, those with any chronic cardiac/pulmonary illness and having received corticosteroids in any form in the preceding 72 h were excluded from the study. The babies were randomly assigned to two groups.

Group A: The babies were treated with nebulized salbutamol (1.5 mg/kg along with normal saline to make it 3 ml). This was repeated every 2 hourly on day 1 and then frequency of nebulization decreased or increased as per the condition of the baby.

Group B: The babies were nebulized with 1:10,000 adrenaline at 0. 5 ml/kg to a total of 3 ml every 2 hourly on day, and then frequency of nebulization decreased or increased as per the condition of the baby.

Along with the above, IV fluid (isolyte-p), Humidified oxygen through mask and syrup paracetamol for temperature above 100°F were given in both the groups. Syrup Augmentin (amoxicillin plus clavulanic acid) in the dose of 20 mg/kg was given to both the groups for 5 days.

Breastfeeding on demand or top feeding whatever the baby was on was continued.

The heart rate (HR), respiratory rate (RR), oxygen saturation (SpO2), and the respiratory distress assessment instrument (RDAI) scores (Table 1) were monitored and compared.

The duration of hospitalization was noted.

Discharge criteria were infant maintaining saturation >97% in room air, RR <40, absence of inspiratory rhonchi, normal temperature, and acceptance of normal feeding.

All complications were noted.

Date was analyzed using SPSS Statistical Software Employing Statistical Paired and Unpaired Student *t*-test and $P < 0.001$ was considered significant (Table 1).

RESULTS

A total of 21 children in the age group of 1 month-1 year were enrolled in the study. There were 11 children the salbutamol group and 10 in the adrenaline group.

The mean age and standard deviation of infants were 3.2 ± 2.4 months in Group 1 and 2.9 ± 2.7 in Group 2.

Both the groups were comparable in their age, gender, mean initial HR, RR, RDAI scores, and SpO2 (Table 2).

Table 1: Respiratory distress assessment instrument (RDAI)

Symptoms	0	1	2	3	4	Maximum points
Wheezing						
Expiration	None	End	1/2	3/4	All	4
Inspiration	None	Part	All			2
Location	None	Segmental	Diffuse			2
Retractions						
Supraclavicular	None	Mild	Moderate	Marked		3
Intercostal	None	Mild	Moderate	Marked		3
Subcostal	None	Mild	Moderate	Marked		3
Total						17

Within each variable (wheezing, retractions) the sub scores are summed to give a total score. The maximum total points for wheezing is 8 and for retractions is 9. Respiratory distress assessment instrument (From: Lowell DI, Lister G, Von Kloss H, McCarthy P. Wheezing in infants: the response to epinephrine. Pediatrics 1987;87:939-45)

All the children were assessed for their HR, RR, SpO2, and RDAI on day 1 before admission and on subsequent days at 8 AM by the study nurse and the scores were plotted (Tables 2-4).

On analysis, the two groups were matched in age, gender, and the all the study parameters at the time of admission.

Analyzing the study parameters on subsequent days showed that there was an increased rise of HR in both the groups.

Analyzing the other parameters, it is seen that there is a significant improvement in RR, SPO_2, and RDAI scores ($P < 0.001$). The readiness to discharge was also significantly earlier in the 2nd group treated by adrenaline ($P < 0.001$).[3,4]

The heart rate in both the groups showed an increase, however there were no significant side effects such as tachyarrythmia, irritability, tremors or facial blanching with either adrenaline or salbutamol and both the drugs were tolerated well.[5]

Table 2: Initial mean and SD of respiratory status in the two groups

Mean±SD	HR/min	RR/min	RDAI score	SpO2%
Group 1	160.71±14.38	85.14±7.43	12.92±0.99	91.86±2.66
Group 2	165.29±12.86	84.14±6.19	12.79±0.98	92.93±2.59
t	0.29	0.41	0.29	0.08
P	Not significant	Not significant	Not significant	Not significant

SD: Standard deviation, HR: Heart rate, RR: Respiratory rate, RDAI: Respiratory distress assessment instrument, SpO2: Oxygen saturation

Table 3: Changes in respiratory status parameters after subsequent nebulization's in both groups

Mean±SD	HR/min	RR/min	RDAI score	SpO2%
Group 1	11.27±3.01 *t*=13.06, *P*<0.001	15.67±3.37 *t*=23.32, *P*<0.01	6.33±0.72 *t*=27.4, *P*<0.001	4.87±1.9 *t*=22.4, *P*<0.001
Group 2	9.93±2.89 *t*=14.15, *P*<0.001	9.04±1.91 *t*=16.48, *P*<0.001	3.13±0.59 *t*=24.2, *P*<0.001	5.2±1.56 *t* *t*=11.5, *P*<0.001
t	1.35	8.67	6.83	2.78 *P*
P	Not significant <0.01	*P*<0.01	*P*<0.01	*P*<0.01

HR: Heart rate, RR: Respiratory rate, RDAI: Respiratory distress assessment instrument, SpO2: Oxygen saturation

Table 4: Oxygen requirement in the two groups

Symptoms	Mean±SD	
	Oxygen requirement (h)	Time to readiness for discharge (h)
Group 1	66.71±5.78	106.86±6.65
Group 2	56.35±5.88	96.07±613
t	2.45	2.67
P	<0.05	<0.02

SD: Standard deviation

DISCUSSION

The use of bronchodilators in bronchiolitis has been controversial.[6] A variety of agents ranging from parenteral epinephrine to nebulized racemic epinephrine, albuterol, salbutamol, and routinely available laevo-epinephrine have been tried. We choose salbutamol as a control for adrenaline because it was the local standard of care at the time of our study even though that benefit was likely minimal. Other randomized trials of adrenaline in hospitalized children have used as the control normal saline. Analysis of the results showed a significant improvement in respiratory status (RR, RDAI, and SpO2) with better benefit in the adrenaline group. Unlike other studies,[7] this study did not see a significant difference in increase in HR in the two groups. There were no side effects of the bronchodilators, which was similar to other studies, including those that did not find any benefit with the bronchodilators.[8] In this study, the oxygen requirement and time at which the children were deemed fit for discharge, was significantly shorter in the adrenaline group. These findings are at variance with a recent metacentric trial which points to a lack of benefit, in either short- or long-term clinically relevant outcomes, of nebulized epinephrine in infants hospitalized with acute bronchiolitis.[4] However, Cochrane analysis describes insufficient evidence to support the use of epinephrine for the treatment of bronchiolitis among inpatients, while there was some evidence to suggest that epinephrine may be favorable to salbutamol and placebo among outpatients.[9] The use of adrenaline multiple times over several days was not associated with significant adverse events compared to salbutamol. Adrenaline is a potent adrenergic agonist with potential cardiovascular side effects including tachycardia or bradycardia and hypertension. In the doses used for bronchiolitis, such adverse events have not been reported. Given that short-term improvement may occur and its favorable safety profile, it seems reasonable to use aerosolized adrenaline selectively for infants with acute distress to decrease the work of breathing or to avoid assisted ventilation.

CONCLUSION

Adrenaline nebulization in infants with moderate to severe bronchiolitis is superior to salbutamol nebulization as per our study. However, this study had some shortcomings. It was a small study. We compared adrenaline to salbutamol which has doubtful proven benefit. We also gave oral amoxicillin and clavulanic acid even though antibiotics have no role in viral bronchiolitis.

REFERENCES

1. Citizen WP, Denny FW. Epidemiology of acute lower respiratory disease in Children. N Engl J Med 1973;288:498-505.
2. Wonl ME, Chernick V. State of the art: Bronchiolitis. Am Rev Resper Dis 1978;118:759-81.
3. Lowell DI, Lister G, Von Koss H, McCarthy P. Wheezing in infonts: The response to epirephrine. Paediatrics 1987;79:939-45.
4. Rey SM, Singh V. Comparison of nebulised adrendine versus salbutamol in wheeze anociate respiratory tract infection in infants. Indian Pediatr 2002;39:12-22.
5. The correct referance is John BM, Patnaik SK, Prasad PL. Med J Armed Forces India 2011;62:354-7.
6. Harting L, Wiebe N, Russel K, Patel H, Klassen TP. A meta- analysis of randomized contiorted trials evaluating the efficiency of epineptorine for the treated of acuate verial bronchiolitis. Arch Paediatric Adolesc Med 2003;157:957-64.
7. Schindler M. Do bronchodilators have an effect on bronchiolitis? Crit Care 2002;6:111-2.
8. Bertrand P, Aranibar H, Castro E, Sanchez I. Efficacy of nebulised epinephrine versus salbutamol in hospitalized infants with bronchiolitis. Pediatr Pulmonol 2001;31:284-8.
9. King VJ, Viswonethen M, Bordly WC, Jackman AM, Sutton SF, Lohr KN, *et al*. Pharmacologic treatment of bronchiolitis in infants and children: A systematic review. Anch Pediatr Adolesc Med 2004;158:27-37.

How to cite this article: 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):202-205.

Source of Support: Nil, **Conflict of Interest:** None declared.