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Nebulized epinephrine versus salbutamol for the management of children presenting with bronchiolitis: Single Center Study.

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ABSTRACT… Objectives: To compare the outcome of nebulized epinephrine versus salbutamol for the management of children presenting with bronchiolitis. **Study Design:** Randomized Controlled Trial. **Setting:** Department of Pediatrics, Federal Government Polyclinic Hospital, Islamabad. **Period:** 6 month (1st October, 2016 to 1st April, 2017). **Material & Methods:** Children fulfilled selection criteria were enrolled. Then patients were randomly divided in two groups by using lottery method. In Group A, children received salbutamol. In group B, children received nebulized adrenaline. After 48 hours, children were evaluated for heart rate, respiratory rates, oxygen saturation and Respiratory Distress Assessment Index (RDAI) score. All the information was collected using proforma. Data was analyzed using SPSS version 21. **Results:** The mean age of children was 10.45±6.70 months in epinephrine group and13.07±6.28 months in salbutamol group. There were 29 (52.7%) males & 26 (47.3%) females in both groups. After 48 hours, mean heart rate was 122.58±4.75bpm with epinephrine while 127.87±4.4.44bpm with salbutamol. Mean respiratory rate was 35.16±3.29bpm with epinephrine while 39.84±3.32bpm with salbutamol. Mean RDAI score was 8.35±1.36 with epinephrine while 10.07±1.37 with salbutamol. Mean oxygen saturation was 85.24±2.74% with epinephrine while 80.38±3.26% with salbutamol. The difference was significant (P<0.05). **Conclusion:** Thus the nebulized epinephrine was found to be more effective in maintaining heart rate, respiratory rate, oxygen saturation and RDAI score of children as compared to salbutamol.

Key words: Bronchiolitis, Children, Heart Rate, Nebulized Epinephrine, Oxygen Saturation, Respiratory Rate, RDAI Score, Salbutamol.

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INTRODUCTION

Acute viral bronchiolitis is one of the commonest lower respiratory tract infections in infants and younger children <2 years age. Most of the cases come in the winter and spring season. Within the first year of life, 10% of children are diagnosed with bronchiolitis.[1] By age 2, more than a third of children have had a bronchiolitis diagnosis.[2] It is generally a self-limiting condition and is commonly associated with respiratory syncytial virus (RSV) infection. Human meta-pneumo virus can cause bronchiolitis almost similar to the disease caused by RSV.[3]

Pathophysiologically, bronchiolitis involves bronchiolar epithelium with profound sub mucosal edema, increased mucus secretion, peri bronchiolar mononuclear infiltration and epithelial cell necrosis. Cough, rhinitis, tachypnea, wheezing and respiratory distress are features of this disease.[4] Various treatment strategies are in practice for years but no specific treatment for bronchiolitis is present.[5]

Nebulized epinephrine is safe for moderate to severe bronchiolitis and is better than salbutamol.[6] Recently a study concluded that using epinephrine instead of salbutamol could be more effective in the management of the disease. This study showed that mean respiratory rate (52.5±4.9 vs. 50±2.9, P<0.05), oxygen saturation (97.1±1.5 vs. 97.9±0.8, P<0.05), mean heart rate (151.8±10 vs 160.2±10.2, P<0.05) and RDAI score (6.4±1.7 vs. 7.7±1.0, p>0.05) were

significantly different in salbutamol and nebulized adrenaline therapy, respectively for management of bronchiolitis in children.[7] But another trial concluded that nebulized epinephrine was not found to be more efficacious than albuterol in treating moderately ill infants with bronchiolitis.[8]

The rationale of our study was to compare outcome of nebulized epinephrine versus salbutamol for the management of children presenting with bronchiolitis. Literature has showed that nebulized ephedrine is more effective than salbutamol. But due to lack of local evidence, salbutamol is still in practice. It's not surprising that we lack the data for bronchiolitis and we have to rely heavily on the western data and base our treatments on that. To date, not a single study has been done from Pakistan evaluating the role of bronchodilators in bronchiolitis. This study will help change this scenario and provide clinical evidence regarding bronchodilator use in bronchiolitis treatment in Pakistani population. This technique being a cheap intervention has a cost saving benefit and this will help reduce the hospital stay.

MATERIAL & METHODS

This randomized controlled trial was conducted in Department of Pediatrics, Federal Government Polyclinic Hospital (PGMI), Islamabad, after approval from the hospital ethical review committee. Children between 2-24 months of age, either gender diagnosed with bronchiolitis (as per operational definition) were included in the study. Bronchiolitis was defined as wheezing, respiratory rate >50bpm from 2-12 months of age and >40 bpm in 2 years children, with chest wall retractions, following an upper respiratory tract infection. Outcome was assessed after 48 hours of initial management of child as follows:

1. Heart Rate: in terms of number of heart beats per minute.
2. Respiratory Rate: in terms of number of breaths per minute.
3. Oxygen Saturation: in terms of measured via Pulse Oximetry (85 to 96%).
4. RDAI Score: In terms of clinical score based on 2 variables of wheezing, respiratory rate and retractions

Null Hypothesis: There is no difference in the outcome of nebulized epinephrine versus salbutamol for the management of children presenting with bronchiolitis. Alternate Hypothesis: There is a difference in outcome of nebulized epinephrine versus salbutamol for the management of children presenting with bronchiolitis.

Exclusion criteria we used for this study was:

- Children with history of asthma or preexisting heart disease (known by medical record)
- Tachycardia >180/min, and respiratory rate >100/min.
- Already taken bronchodilator, glucocorticoids or monoamine oxidase inhibitors (medical record).

Sample size of 110 cases; 55 in each group (calculated with 95% confidence level, 90% power of study) with mean respiratory rate 52.5±4.9rpm with nebulized epinephrine and 50±2.9rpm with salbutamol for the management of children presenting with bronchiolitis. Patients were selected by non-probability, consecutive sampling. 110 children fulfilled selection criteria were enrolled in the study through emergency of Department of Pediatrics, Federal Government Polyclinic Hospital, Islamabad. Informed consent was obtained from parents. Demographic details (name, age, sex, weight of child, duration of bronchiolitis) were also obtained. Then patients were randomly divided in two groups by using lottery method.

In Group A, children received salbutamol (0.15 mg/kg body weight) diluted in normal saline to make a total volume of 3 ml. In group B, children received nebulization with 0.1 ml/kg body weight of 1 in 10,000 solution of adrenaline (1 ampoule 1:1000 injection diluted with 9 ml of normal saline). It was further mixed in normal saline making total of 3 ml, along with oxygen for five minutes at 0, 30, 60 minutes and then 4 hourly for 48 hours. After 48 hours, children were evaluated for heart rate, respiratory rates, oxygen saturation and RDAI score (as per operational definition). All the information was collected by the researcher herself by using proforma.

Data was analyzed using SPSS version 21. Mean and Standard Deviation was calculated for quantitative variables like age, weight of child, duration of bronchiolitis, HR, RR, SpO2 and RDAI Score. Frequency and percentage was calculated for qualitative variables like gender. Both groups were compared for mean HR, RR, SpO2 and RDAI Score by using independent sample t-test. P-value≤0.05 was taken as significant. Confounders like age, gender, weight of child and duration of bronchiolitis was controlled through stratification. Post stratification, independent sample t-test was applied. P-value≤0.05 was taken as significant.

RESULTS

In epinephrine group, the mean age of children was 10.45±6.70months. In salbutamol group, the mean age of children was 13.07±6.28months. In epinephrine group, there were 29 (52.7%) males & 26 (47.3%) females. In salbutamol group, there were 29 (52.7%) males & 26 (47.3%) females.

In epinephrine group, the mean weight of children was 7.79±3.71kg. In salbutamol group, the mean weight of children was 9.18±3.45kg. In epinephrine group, mean duration of bronchiolitis was 3.98±2.12days. In salbutamol group, mean duration of bronchiolitis was 4.13±2.13days.

Table-I, shows the heart rates, respiratory rate, RDAI score and oxygen saturation in both the group. At baseline, the mean heart rate was 119.02±4.48bpm with epinephrine while 118.29±4.63bpm with salbutamol. The difference was insignificant (P>0.05). After 48 hours, the mean heart rate was 122.58±4.75bpm with epinephrine while 127.87±4.4.44bpm with salbutamol. (P<0.05).

At baseline, the mean respiratory rate was 52.36±4.53bpm with epinephrine while 52.67±5.20bpm with salbutamol. The difference was insignificant (P>0.05). After 48hours, the mean respiratory rate was 35.16±3.29bpm with epinephrine while 39.84±3.32bpm with salbutamol. (P<0.05). At baseline, the mean RDAI score was 12.02±2.26 with epinephrine while 11.76±2.28 with salbutamol. The difference was insignificant (P>0.05). After 48hours, the mean RDAI score was 8.35±1.36with epinephrine while 10.07±1.37 with salbutamol. (P<0.05).

At baseline, the mean oxygen saturation was 73.64±4.49% with epinephrine while 74.02±4.22%vwith salbutamol. The difference was insignificant (P>0.05). After 48 hours, the mean oxygen saturation was 85.24±2.74% with epinephrine while 80.38±3.26% with salbutamol. (P<0.05).

Data was stratified for age of patients. In age 2-12 months, after 48 hours, the mean heart rate was 123.26±4.32bpm with epinephrine while 127.52±4.33bpm with salbutamol. In age 13-24 months, after 48 hours, the mean heart rate was 120.95±5.15bpm with epinephrine while 128.21±4.60bpm with salbutamol. (P<0.05). Table-II

Data was stratified for age of children. In age 2-12months, after 48 hours, the mean respiratory rate was 35.32±3.60bpm with epinephrine while 40.26±3.34bpm with salbutamol. In age 13-24 months, after 48 hours, the mean respiratory rate was 34.90±2.77bpm with epinephrine while 39.43±3.32bpm with salbutamol. (P<0.05).

Data was stratified for age of children. In age 2-12 months, after 48 hours, the mean RDAI score was 7.97±1.40with epinephrine while 9.89±1.34with salbutamol. In age 13-24 months, after 48 hours, the mean RDAI score was 8.95±1.07with epinephrine while 10.25±1.40with salbutamol. (P<0.05).

Data was stratified for age of patients. In age 2-12months, after 48 hours, the mean oxygen saturation was 85.41±2.97% with epinephrine while 79.74±3.46% with salbutamol. In age 13-24 months, after 48 hours, the mean oxygen saturation was 84.95±2.38% with epinephrine while 81.00±2.99% with salbutamol. (P<0.05).

Data was stratified for gender of patients. In males, after 48 hours, the mean heart rate was 123.38±5.11bpm with epinephrine while 128.66±4.49bpm with salbutamol. In

females, after 48 hours, the mean heart rate was 121.27±4.12bpm with epinephrine while 127.00±4.30bpm with salbutamol. (P<0.05). Table-III

Data was stratified for gender of children. In males, after 48 hours, the mean respiratory rate was 35.59±3.42bpm with epinephrine while 39.93±3.41bpm with salbutamol. In females, after 48 hours, the mean respiratory rate was 34.69±3.13bpm with epinephrine while 39.73±3.28bpm with salbutamol. (P<0.05).

Data was stratified for gender of children. In males, after 48 hours, the mean RDAI score was 7.86±1.38 with epinephrine while 9.62±1.35 with salbutamol. In females, after 48 hours, the mean RDAI score was 8.88±1.14 with epinephrine while 10.58±1.24 with salbutamol. (P<0.05).

Data was stratified for gender of patients. In males, after 48 hours, the mean oxygen saturation was 84.97±3.03% with epinephrine while 80.83±3.47% with salbutamol. In females, after 48 hours, the mean oxygen saturation was 85.54±2.40% with epinephrine while 79.88±3.01% with salbutamol. (P<0.05).

Data was stratified for weight of patients. In weight 2.5-8.0kg, after 48 hours, the mean heart rate was 123.16±4.10bpm with epinephrine while 127.4±4.47bpm with salbutamol. In weight 8.1-16.0kg, after 48 hours, the mean heart rate was 121.38±5.40bpm with epinephrine while 128.27±4.45bpm with salbutamol. (P<0.05). Table-IV

Data was stratified for weight of children. In weight 2.5-8.0kg, after 48 hours, the mean respiratory rate was 35.13±3.63bpm with epinephrine while 40.12±3.38bpm with salbutamol. In weight 8.1-16.0kg, after 48 hours, the mean respiratory rate was 35.21±2.86bpm with epinephrine while 39.6±3.31bpm with salbutamol. (P<0.05).

Data was stratified for weight of children. In weight 2.5-8.0kg, after 48hours, the mean RDAI score was 7.97±1.45 with epinephrine while 9.80±1.32 with salbutamol. In weight 8.1-16.0kg, after 48 hours, the mean RDAI score was 8.83±1.09 with epinephrine while 10.30±1.39 with salbutamol. (P<0.05).

Data was stratified for weight of patients. In weight 2.5-8.0kg, after 48 hours, the mean oxygen saturation was 85.35±2.97% with epinephrine while 79.80±3.40% with salbutamol. In weight 8.1-16.0kg, after 48 hours, the mean oxygen saturation was 85.08±2.47% with epinephrine while 80.87±3.12% with salbutamol. (P<0.05).

Data was stratified for duration of patients. In duration 1-3 days, after 48 hours, the mean heart rate was 122.48±4.21bpm with epinephrine while 128.35±4.80bpm with salbutamol. In duration 4-7 days, after 48 hours, the mean heart rate was 122.31±5.17bpm with epinephrine while 127.53±4.20bpm with salbutamol. (P<0.05). Table-V

Data was stratified for duration of children. In duration 1-3 days, after 48 hours, the mean respiratory rate was 35.43±3.60bpm with epinephrine while 40.30±3.52bpm with salbutamol. In duration 4-7 days, after 48 hours, the mean respiratory rate was 34.97±3.09bpm with epinephrine while 39.50±3.18bpm with salbutamol. (P<0.05).

Data was stratified for duration of children. In duration 1-3 days, after 48 hours, the mean RDAI score was 8.30±1.33 with epinephrine while 9.91±1.44 with salbutamol. In duration 4-7 days, after 48 hours, the mean RDAI score was 8.38±1.41 with epinephrine while 10.19±1.33 with salbutamol. (P<0.05).

Data was stratified for duration of patients. In duration 1-3 days, after 48 hours, the mean oxygen saturation was 84.70±2.34% with epinephrine while 80.30±2.84% with salbutamol. In duration4-7days, after 48 hours, the mean oxygen saturation was 85.63±2.97% with epinephrine while 80.44±3.58% with salbutamol. (P<0.05).

Heart Rate	Group		P-Value
	Nebulized Epinephrine	Salbutamol	
N	55	55	
Baseline	119.02±4.48	118.29±4.63	0.405
After 48 hours	122.58±4.75	127.87±4.4.44	0.000
Resp Rate	**Group**		**P-Value**
	Nebulized Epinephrine	**Salbutamol**	
N	55	55	
Baseline	52.36±4.53	52.67±5.20	0.740
After 48 hours	35.16±3.29	39.84±3.32	0.000
RDAI Score	**Group**		**P-Value**
	Nebulized Epinephrine	**Salbutamol**	
N	55	55	
Baseline	12.02±2.26	11.76±2.28	0.557
After 48 hours	8.35±1.36	10.07±1.37	0.000
Oxygen Saturation	**Group**		**P-Value**
	Nebulized Epinephrine	**Salbutamol**	
N	55	55	
Baseline	73.64±4.49	74.02±4.22	0.647
After 48 hours	85.24±2.74	80.38±3.26	0.000

Table-I. Comparison of heart rate, resp rate, RDAI and Oxygen Saturation in both groups on follow-up (n=110)

Age (Months)	HR	Group		p-value
		Nebulized Epinephrine	Salbutamol	
2-12	N	34	27	
	Baseline	118.68±4.52	117.59±4.68	0.364
	After 48 hours	123.26±4.32	127.52±4.33	0.000
13-24	N	21	28	
	Baseline	119.57±4.47	118.96±4.57	0.645
	After 48 hours	120.95±5.15	128.21±4.60	0.000
Age (Months)	**RDAI**	**Group**		**P value**
		Nebulized Epinephrine	**Salbutamol**	
2-12	N	34	27	
	Baseline	12.18±2.21	12.30±2.13	0.931
	After 48 hours	7.97±1.40	9.89±1.34	0.000
13-24	N	21	28	
	Baseline	11.76±2.36	11.25±2.34	0.454
	After 48 hours	8.95±1.07	10.25±1.40	0.000
Age (Months)	**Oxygen Saturation**	**Group**		**P value**
		Nebulized Epinephrine	**Salbutamol**	
2-12	N	34	27	
	Baseline	74.21±4.37	74.41±4.29	0.857
	After 48 hours	85.41±2.97	79.74±3.46	0.000
13-24	N	21	28	
	Baseline	72.71±4.65	73.64±4.19	0.468
	After 48 hours	84.95±2.38	81.00±2.99	0.000
Age (Months)	**Resp Rate**	**Group**		**P-Value**
		Nebulized Epinephrine	**Salbutamol**	
2-12	N	34	27	
	Baseline	52.09±4.83	52.19±5.35	0.941
	After 48 hours	35.32±3.60	40.26±3.34	0.000
13-24	n	21	28	
	Baseline	52.81±4.06	53.14±5.10	0.806
	After 48 hours	34.90±2.77	39.43±3.32	0.000

Table-II. Comparison of heart rate, respiratory rate, RDAI and oxygen saturation in both groups on follow-up stratified for age (n=110)

Sex	HR	Group		P-Value
		Nebulized Epinephrine	Salbutamol	
Male	N	29	29	
	Baseline	118.9±4.61	118.93±4.94	0.978
	After 48 hours	123.38±5.11	128.66±4.49	0.000
Female	N	26	26	
	Baseline	119.15±4.42	117.58±4.24	0.196
	After 48 hours	121.27±4.12	127.00±4.30	0.000

Sex	RR	Group		P-Value	
		Neb Epinephrine	Salbutamol		
Male	N	29	29		
	Baseline	51.66±4.32	51.9±5.80	0.858	
	After 48 hours	35.59±3.42	39.93±3.41	0.000	
Female	N	26	26		
	Baseline	53.15±4.71	53.54±4.38	0.761	
	After 48 hours	34.69±3.13	39.73±3.28	0.000	

Sex	RDAI	Group		P-Value
		Neb Epinephrine	Salbutamol	
Male	**N**	29	29	
	Baseline	12.34±2.08	11.97±2.37	0.519
	After 48 hours	7.86±1.38	9.62±1.35	0.000
Female	N	26	26	
	Baseline	11.65±2.43	11.54±2.20	0.858
	After 48 hours	8.88±1.14	10.58±1.24	0.000

Sex	Oxygen Saturation	Group		P-Value
		Nebulized Epinephrine	Salbutamol	
Male	N	29	29	
	Baseline	73.14±4.58	74.14±4.64	0.412
	After 48 hours	84.97±3.03	80.83±3.47	0.000
Female	N	26	26	
	Baseline	74.19±4.42	73.88±3.78	0.788
	After 48 hours	85.54±2.40	79.88±3.01	0.000

Table-III. Comparison of heart rate, respiratory rate, RDAI and oxygen saturation in both groups on follow-up stratified for Gender (n=110)

Weight (kg)	HR	Group		P-Value
		Neb Epinephrine	Salbutamol	
2.5-8.0	n	31	25	
	Baseline	118.26±4.43	117.72±4.84	0.666
	After 48 hours	123.16±4.10	127.4±4.47	0.001
8.1-16.0	n	24	30	
	Baseline	120.00±4.44	118.7±4.49	0.318
	After 48 hours	121.38±5.40	128.27±4.45	0.000
Weight	**RR**	**Group**		**P-Value**
		Nebulized Epinephrine	**Salbutamol**	
2.5-8.0	n	31	25	
	Baseline	52.48±4.84	52.12±5.18	0.787
	After 48 hours	35.13±3.63	40.12±3.38	0.000
8.1-16.0	n	24	30	
	Baseline	52.21±4.19	53.13±5.25	0.486
	After 48 hours	35.21±2.86	39.6±3.31	0.000
Weight	**RDAI**	**Group**		**P-Value**
		Nebulized Epinephrine	**Salbutamol**	
2.5-8.0	n	31	25	
	Baseline	12.29±2.15	12.32±2.04	0.958
	After 48 hours	7.97±1.45	9.80±1.32	0.000
8.1-16.0	n	24	30	
	Baseline	11.67±2.39	11.30±2.40	0.578
	After 48 hours	8.83±1.09	10.30±1.39	0.000
Weight	**Oxygen Saturation**	**Group**		**P-Value**
		Nebulized Epinephrine	**Salbutamol**	
2.5-8.0	n	31	25	
	Baseline	74.42±4.08	74.64±4.32	0.845
	After 48 hours	85.35±2.97	79.80±3.40	0.000
8.1-16.0	n	24	30	
	Baseline	72.63±4.88	73.5±4.13	0.479
	After 48 hours	85.08±2.47	80.87±3.12	0.000

Table-IV. Comparison of heart rate, respiratory rate, RDAI and oxygen saturation in both groups on follow-up stratified for weight (n=110)

Duration	HR	Group		P-Value
		Neb Epinephrine	Salbutamol	
1-3	n	23	23	
	Baseline	118.30±4.77	118.13±4.28	0.897
	After 48 hours	122.48±4.21	128.35±4.80	0.000
4-7	n	32	32	
	Baseline	119.53±4.27	118.41±4.94	0.333
	After 48 hours	122.31±5.17	127.53±4.20	0.000
Duration	**RR**	**Group**		**P-Value**
		Nebulized Epinephrine	**Salbutamol**	
1-3	n	23	23	
	Baseline	52.17±4.61	51.87±5.33	0.837
	After 48 hours	35.43±3.60	40.30±3.52	0.000
4-7	n	32	32	
	Baseline	52.50±4.54	53.25±5.11	0.537
	After 48 hours	34.97±3.09	39.50±3.18	0.000
Duration	**RDAI**	**Group**		**P-Value**
		Nebulized Epinephrine	**Salbutamol**	
1-3	N	23	23	
	Baseline	11.70±2.23	11.39±2.13	0.638
	After 48 hours	8.30±1.33	9.91±1.44	0.000
4-7	N	32	32	
	Baseline	12.25±2.29	12.03±2.38	0.709
	After 48 hours	8.38±1.41	10.19±1.33	0.000
Duration	**Oxygen Saturation**	**Group**		**p-value**
		Nebulized Epinephrine	**Salbutamol**	
1-3	N	23	23	
	Baseline	74.39±4.04	74.35±4.43	0.972
	After 48 hours	84.70±2.34	80.30±2.84	0.000
4-7	N	32	32	
	Baseline	73.09±4.78	73.78±4.12	0.540
	After 48 hours	85.63±2.97	80.44±3.58	0.000

Table-V. Comparison of heart rate in both groups on follow-up stratified for duration (n=110)

DISCUSSION

Despite widespread use of inhaled β2-agonists for bronchodilation in infants with bronchiolitis since the late 1950s, the efficacy of these drugs remains unproven. In 1978, Wohl and Chernick suggested that epinephrine, a combined α-and β-receptor agonist, would be an ideal bronchodilator.[8]

In our study, at baseline, the mean heart rate was 119.02±4.48bpm which was reduced to 122.58±4.75bpm with epinephrine while 118.29±4.63bpm with salbutamol which was reduced to 127.87±4.4.44bpm. The difference was significant (P<0.05) between both groups. In our study, at baseline, the mean respiratory rate was 52.36±4.53bpm with epinephrine which was reduced to 35.16±3.29bpm while 52.67±5.20bpm with salbutamol which was reduced to 39.84±3.32bpm. The difference was significant (P<0.05).

In our study, at baseline, the mean RDAI score was 12.02±2.26 with epinephrine which was reduced to 8.35±1.36while 11.76±2.28 with salbutamol which was reduced to 10.07±1.37 with salbutamol. The difference was significant (P<0.05). In our study, at baseline, the mean oxygen saturation was 73.64±4.49% with epinephrine which was reduced to 85.24±2.74% while 74.02±4.22% with salbutamol which was reduced to 80.38±3.26% with salbutamol. The difference was significant (P<0.05).

Nebulized epinephrine is a useful and safe drug for moderate/severe bronchiolitis and is superior to salbutamol.[6] In a study it was concluded that using epinephrine instead of salbutamol could be more effective in the management of the disease. This study showed that mean respiratory rate (52.5±4.9 vs. 50±2.9, P<0.05), oxygen saturation (97.1±1.5 vs. 97.9±0.8, P<0.05), mean heart rate (151.8±10 vs 160.2±10.2, P<0.05) and RDAI score (6.4±1.7 vs. 7.7±1.0, p>0.05) were significantly different in salbutamol and nebulized adrenaline therapy, respectively for management of bronchiolitis in children.[7] But another trial concluded that nebulized epinephrine was not found to be more efficacious than albuterol in treating moderately ill infants with bronchiolitis.[8]

Adhikari et al., reported that mean respiratory rate (37.0±6.0 vs. 36.0±5.0) and RDAI score (4.15±1.82 vs. 4.1±1.36) were significantly different in salbutamol and nebulized adrenaline therapy, respectively for management of bronchiolitis in children.[9]

Modaressi et al., also reported that mean RDAI after 48 hours was 4.3 ± 2.6 with salbutamol while 3.1 ± 2.2 with epinephrine. The difference was significant (p=0.02).[10] But a study by John et al., showed that mean heart rate (161.71±14.38vs. 160.29±12.86, p=0.29), oxygen saturation (88.86±2.66 vs. 88.93±2.59, P=0.08), mean respiratory rate (85.14±7.43vs 84.14± 6.19, P=0.41) and RDAI score (12.92±0.99vs. 12.79±0.98, p=0.29) were significantly different in nebulized epinephrine and salbutamol, respectively for management of bronchiolitis in children and nebulized epinephrine showed better results than salbutamol.

In a systematic review, it was concluded that salbutamol had no effect on bronchiolitis in children less than 2 years old. And its use before this age can lead to adverse effects, such as high heart rate.[11]

Similarly, studies have shown that the nebulized epinephrine is also not safe for routine use in infants with bronchiolitis. It should be considered in severe symptoms only. If it is given and there are no signs of improvement, further doses are discouraged. Further trials should be done along with other agents (eg, hypertonic saline, oral dexamethasone) to confirm their benefits.[12]

Nebulized epinephrine was found to be more effective in maintaining heart rate, respiratory rate, oxygen saturation and RDAI score of children as compared to salbutamol. Further trials are required comparing the two drugs.

CONCLUSION

The nebulized epinephrine was found to be more effective in maintaining heart rate, respiratory rate, oxygen saturation and RDAI score of children as compared to salbutamol. This shows that nebulization using epinephrine with proper technique can be used in the treatment of children with bronchiolitis. Further trials are required comparing the two drugs.

LIMITATION OF THE STUDY

The limitations of this study included a small sample size done at a single center without taking in some factors like nutritional status, socioeconomic status. Long term side effects or adverse effects were not documented as well during or after the trial. These factors should be considered in other trials.

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