



## COMPARISON OF SALBUTAMOL ALONE AND SALBUTAMOL IN COMBINATION WITH IPRATROPIUM BROMIDE IN TREATMENT OF ACUTE ASTHMA IN CHILDREN.

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**ABSTRACT... Objectives:** Asthma affects about 15% of children while it is one of the commonest reason for admissions in pediatric emergencies and wards. We aimed this study to determine outcome of Salbutamol alone and salbutamol in combination with Ipratropium Bromide in acute asthma in children. **Study Design:** Randomized Controlled trial (RCT). **Setting:** Unit-II Department of Pediatric Medicine, Nishtar Medical College and Hospital, Multan. **Period:** 20<sup>th</sup> Nov 2017 to 30<sup>th</sup> June 2018. **Material & Methods:** The study consisted of 104 children, with 52 children each in Group 'A' and 'B' who were subjected to salbutamol alone and salbutamol in combination with Ipratropium bromide respectively. In both groups oxygen was administered via nasal prongs at a flow rate of 3L/minute. These children was monitored at 30 minutes interval for 2 hours (least value out of these 4 values was taken). Both groups were compared for outcome in terms of mean heart rate, respiratory rate, accessory muscle score, peak expiratory flow rate (PERF) percentage and SPO<sub>2</sub>. **Results:** Of these 104 study cases, 61 (58.7%) were boys while 43 (41.3%) were girls. Mean age of our study cases was noted to be 9.92 ± 3.01 years. Mild level of asthma severity was noted in 35 (33.7%) and moderate severity in 69 (66.3%). Mean heart rate in group A was noted to be 119.40 ± 12.22 and in group was 119.29 ± 8.51 beats per minute. (p=0.956). Mean respiratory rate in group A was 29.98 ± 4.00 while in group B was 27.88 ± 3.85 (p=0.000). Mean accessory muscle score in group A was 0.537 ± 0.336 while in group B was 0.130 ± 0.030 (p = 0.000). Mean PEFR percentage in group A was 68.69 ± 18.64 while in group B was 87.12 ± 17.10 (p = 0.000). Mean SPO<sub>2</sub> in group A was 96.15 ± 1.05 while it was 95.94 ± 1.29 (p = 0.362). **Conclusion:** Our study results have shown that nebulization of salbutamol in combination with Ipratropium Bromide is more effective in the management of children with acute asthma. It was safe, effective and reliable as there was no adverse side effect noted in our study. We recommend the use of this combination nebulization therapy in children with acute asthma.

**Key words:** Acute Asthma, Ipratropium Bromide, PERF, Salbutamol, SPO<sub>2</sub>.

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### INTRODUCTION

Asthma affects more than 300 million people around the world while a 50% increase is reported every decade.<sup>1-3</sup> Asthma affects about 15% of children while it is one of the commonest reason for admissions in pediatric emergencies and wards. Poor asthma control is observed in 26-45%.<sup>4</sup>

In South Asia<sup>2</sup>, the prevalence of asthma is noted to be around 30%. The International Study of Asthma and Allergies in Childhood (ISAAC) study reported 8% prevalence of asthma in the

paediatric population of Pakistan but these figures are considered to be lower while masking the original numbers.<sup>5</sup> Young children pose major challenge in terms of asthma diagnosis as conventional pulmonary function testing is not available for them. Asthma management in terms of drugs are same for both adults and children but difference lies regarding symptoms, presentation and most effective management strategy in these two different age groups.<sup>4,5</sup> Anticholinergics such as Ipratropium Bromide given with β<sub>2</sub>-agonists like Salbutamol have been found valuable in minimizing hospitalization amongst children

presenting with moderate to severe asthma exacerbation.<sup>6-8</sup>

A study conducted by Chakraborti et al reported PEFr percentage  $82.32 \pm 25.93$  in children nebulized with salbutamol with Ipratropium bromide while it was  $69.53 \pm 19.87$  with salbutamol alone.<sup>9</sup> In this study heart rate/min was  $119.43 \pm 17.09$  versus  $115.3 \pm 18.7$ , respiratory rate/min  $27.9 \pm 4.67$  versus  $28.97 \pm 5.84$ , accessory muscle score was  $0.17 \pm 0.46$  versus  $0.43 \pm 0.82$  and  $SpO_2$  was  $96.97 \pm 2.08$  versus  $96.4 \pm 1.69$  in Salbutamol with ipratropium group and Salbutamol alone respectively.<sup>9</sup>

The findings of this study will be useful for the clinicians who are treating asthma for better treatment option to be adopted as there is no such study done in children at national level. The results will also be helpful for other researchers to design more advanced studies in this area which will lead to the proper management of asthmatic exacerbations. The study results will generate useful database of our population which was compared with those of from other countries.

## MATERIAL & METHODS

This study was conducted from 20 Nov 2015 to 30 Jun 2016 at the Unit-II Department of Pediatric Medicine, Nishtar Medical College and Hospital, Multan, after approval of Hospital Ethical Committee. Here 104 children with diagnosis of acute asthma were included using non-probability consecutive sampling technique. Sample size was calculated using WHO sample size calculator taking level of significance 5% and power of test 80% (using statistics for mean PEFr in group A as  $82.32 \pm 25.93$  and group B as  $69.53 \pm 19.87$ ).<sup>9</sup> Inclusion criteria were all children aged 5-15 years of both gender having acute asthma from less than 1 month. Children with severe exacerbation; coexisting cardiac or renal disease, known intolerance to salbutamol or ipratropium bromide, already diagnosed with congenital or acquired immunodeficiency and diagnosed Tb were excluded.

Informed consent was taken from the parents or guardians of each child. Baseline information like

mean heart rate, mean respiratory rate, mean oxygen saturation, mean accessory muscle score and mean PEFr were taken. These study cases were randomly divided into 2 groups by draws methods (Group A and Group B). Group A, each child was nebulized with salbutamol sulfate 0.03 ml/kg/dose of 0.5 % respiratory solution while group B was nebulized with additional 1 ml of 0.025% solution of ipratropium bromide (in addition to salbutamol as in group A). In both groups oxygen was administered via nasal prongs at a flow rate of 3L/minute. These children was monitored at 30 minutes interval for 2 hours (least value out of these 4 values was taken). All these procedures were performed by a senior consultant having 5 years post fellowship experience. All the findings were recorded in the study proforma.

All the data was entered and analyzed by SPSS-18. Descriptive statistics was applied to calculate mean and standard deviation for quantitative variables. Frequencies and percentage were calculated for the categorical variables. Student's t test was applied to compare the outcomes in both groups. P value equal or less than 0.05 was considered as significant.

## RESULTS

Our study included a total of 104 patients with acute asthma who met inclusion criteria of our study. Of these 104 study cases, 61 (58.7%) were boys while 43 (41.3%) were girls. Mean age of our study cases was noted to be  $9.92 \pm 3.01$  years (range; 6 – 15 years). Majority of our study cases i.e. 59 (56.7%) were aged 5 – 10 years of age. Mild level of asthma severity was noted in 35 (33.7%) and moderate severity was noted in 69 (66.3%). (Table-I).

Mean heart rate was noted to be  $119.35 \pm 10.48$  beats per minute. Mean respiratory rate was  $28.93 \pm 4.05$  per minute. Mean accessory muscle score was noted to be  $0.333 \pm 0.19$  while mean PEFr percentage was noted to be  $77.90 \pm 20.06$  and mean oxygen saturation was  $96.05 \pm 1.17$ . Mean heart rate in group A was noted to be  $119.40 \pm 12.22$  and in group was  $119.29 \pm 8.51$  beats per minute. ( $p=0.956$ ). Mean respiratory

rate in group A was  $29.98 \pm 4.00$  while in group B was  $27.88 \pm 3.85$  ( $p=0.000$ ). Mean accessory muscle score in group A was  $0.537 \pm 0.336$  while in group B was  $0.130 \pm 0.030$  ( $p = 0.000$ ). Mean PEFR percentage in group A was  $68.69 \pm 18.64$  while in group B was  $87.12 \pm 17.10$  ( $p = 0.000$ ). Mean  $SPO_2$  in group A was  $96.15 \pm 1.05$  while it was  $95.94 \pm 1.29$  ( $p = 0.362$ ). (Table-II)

## DISCUSSION

Asthma is known be a common problem among children while it is estimated to have a lifetime prevalence of 11-16%.<sup>10</sup> Potentially, severe episodes of asthma are life threatening. Timely assessment and treatment bring favorable

outcomes.<sup>10</sup>

Our study included a total of 104 patients with acute asthma who met inclusion criteria of our study. Of these 104 study cases, 61 (58.7%) were boys while 43 (41.3%) were girls. Al – Abdullah et al<sup>11</sup> from Iraq also reported male gender predominance in children with acute asthma to be 58.2% which is similar to our study results. A study conducted by Memon et al<sup>12</sup> from Karachi has reported 56% male gender predominance which is similar to our study results. Chakaraborti et al<sup>9</sup> reported 60% male gender preponderance which is similar to that of our study results.

Variable	Group A	Group B	Total
<b>Age Groups</b>			
5-10 years	29(55.8%)	30(57.7%)	Mean±SD=9.92 ± 3.01 years
10-15 years	23(44.2%)	22(42.3%)	
<b>Gender</b>			
Male	28(53.8%)	33(63.5%)	61(58.70%)
Female	24(46.2%)	19(36.5%)	43(41.3%)
<b>Disease severity</b>			
Mild	18(34.6%)	17(32.7%)	35(33.7%)
Moderate	34(65.4%)	14 (40%)	69(66.3%)
<b>Steroid Therapy</b>			
Budesonid	34(65.4%)	35(67.3%)	69(66.3%)
Fluticasone	18(34.6%)	17(32.7%)	35(33.7%)
<b>Disease duration</b>			
Less than 15 days	21(40.4%)	20(38.5%)	41(39.4%)
More than 15 days	31(59.6%)	32(61.5%)	63(60.6%)
<b>URTI</b>			
Yes	26(50%)	31(59.6%)	57(54.8%)
No	26(50%)	21(40.4%)	47(45.2%)

**Table-I. Characteristic of study population (n=104)**

Outcome	Groups		P-Value
	Group A	Group B	
	Mean (SD)	Mean (SD)	
Heart rate/min	$119.40 \pm 12.22$	$119.29 \pm 8.51$	0.956
Respiratory rate/min	$29.98 \pm 4.00$	$27.88 \pm 3.85$	0.008
Accessory muscle score	$0.537 \pm 0.336$	$0.130 \pm 0.030$	0.001
PEFR %	$68.69 \pm 18.64$	$87.12 \pm 17.10$	0.001
$SPO_2$	$96.15 \pm 1.05$	$95.94 \pm 1.29$	0.362

**Table-II. Comparison of outcome of therapy in both groups:**

Mean age of our study cases was noted to be  $9.92 \pm 3.01$  years (range; 6 – 15 years). Majority of our study cases i.e. 59 (56.7%) were aged 5 – 10 years of age. Al – Abdullah et al<sup>13</sup> from Iraq also reported similar results. A study conducted by Memon et al<sup>12</sup> from Karachi has reported  $9.2 \pm 2.9$  years mean age of the patients with acute asthma. Chakaraborti et al<sup>9</sup> reported from India mean age of these patients with acute asthma to be  $106 \pm 25$  months which is similar to our study.

Mild level of asthma severity was noted in 35 (33.7%) and moderate severity was noted in 69 (66.3%) of our study cases. A study conducted by Fayaz et al<sup>13</sup> from UK also reported moderate level of severity of asthma predominated which is in compliance with our study results. Chakaraborti et al<sup>9</sup> also reported similar results from India showing mild severity being more common than mild level of severity.

Upper respiratory tract infection (URTI) was present in 54.8% of our study cases. Chakaraborti et al<sup>9</sup> from India reported 50 % URTI in patients with acute asthma. These findings of Chakaraborti et al<sup>9</sup> are similar to that of our study results.

In our study mean heart rate was noted to be  $119.35 \pm 10.48$  beats per minute. Mean respiratory rate was  $28.93 \pm 4.05$  per minute. Mean accessory muscle score was noted to be  $0.333 \pm 0.19$  while mean PEFR percentage was noted to be  $77.90 \pm 20.06$  and mean oxygen saturation was  $96.05 \pm 1.17$ . Mean heart rate in group A was noted to be  $119.40 \pm 12.22$  and in group B was  $119.29 \pm 8.51$  beats per minute. ( $p=0.956$ ). Mean respiratory rate in group A was  $29.98 \pm 4.00$  while in group B was  $27.88 \pm 3.85$  ( $p=0.000$ ). Mean accessory muscle score in group A was  $0.537 \pm 0.336$  while in group B was  $0.130 \pm 0.030$  ( $p = 0.000$ ). Mean PEFR percentage in group A was  $68.69 \pm 18.64$  while in group B was  $87.12 \pm 17.10$  ( $p = 0.000$ ). Mean SPO<sub>2</sub> in group A was  $96.15 \pm 1.05$  while it was  $95.94 \pm 1.29$  ( $p = 0.362$ ). A study conducted by Chakaraborti et al reported PEFR percentage  $82.32 \pm 25.93$  in children nebulized with salbutamol with Ipratropium bromide while it was  $69.53 \pm 19.87$  with salbutamol alone.<sup>9</sup> In this study heart rate/ min was  $119.43 \pm 17.09$  versus

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## CONCLUSION

Our study results have shown that nebulization of salbutamol in combination with Ipratropium Bromide is more effective in the management of children with acute asthma. It was safe, effective and reliable as there was no adverse side effect noted in our study. We recommend the use of this combination nebulization therapy in children with acute asthma for better outcomes.




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### AUTHORSHIP AND CONTRIBUTION DECLARATION

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2	Farhan ul Haq	Data collection.	
3	Muhammad Azam Khan	Supervision, Methodology, Discussion.	
4	Zahid Ahmad	Data analysis, Drafting.	