



Comparison of Salbutamol and Salbutamol with ipratropium bromide in children with exacerbation of Asthma in terms of peak expiratory flow rate (PEFR).

1. MBBS, FCPS (Paediatric)
Senior Registrar Pediatrics
Medicsi Hospital, Islamabad.
2. MBBS, FCPS (Paediatric)
Senior Registrar Paeds
Emergency Mayo Hospital Lahore.
3. MBBS, DCH, MRCPCH, FCPS
Assistant Professor Pediatric
Medicine
Services Institute of Medical
Sciences (SIMS), Lahore.
4. MBBS, FCPS (Paediatric)
Senior Registrar Pediatrics
Mayo Hospital Lahore.
5. MBBS, FCPS
Assistant Professor Pediatric
Medicine
Services Institute of Medical
Sciences (SIMS), Lahore.
6. MBBS, FCPS (Paediatric)
Assistant Professor Paeds
Emergency Medicine,
Mayo Hospital Lahore.
7. MBBS, PGP (Boston, USA)
Medical Officer Pediatrics
Government General Hospital,
Faisalabad.

Correspondence Address:

Dr. Muhammad Ahsan
Department of Pediatrics
Government General Hospital,
Faisalabad.
sadafm56@gmail.com

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Sadaf Minhas¹, Saqib Aslam², Muhammad Azhar Farooq³, Ayesha Anwar⁴, Farhan Zahoor⁵, Tehmina Maqbool⁶, Muhammad Ahsan⁷

ABSTRACT... Objective: To compare the Salbutamol alone and Ipratropium Bromide supplemented Salbutamol in children with exacerbation of asthma in terms of PEFR. **Study Design:** Randomized Controlled Trial. **Setting:** Pediatrics Emergency, KRL Hospital Islamabad. **Period:** 1st August 2016 to 31 January 2017. **Material & Methods:** Group A patients were given only Salbutamol (0.15mg/kg per dose with minimum 2.5 mg, maximum 5 mg/dose). Group B was given Ipratropium Bromide supplemented Salbutamol (250 mcg/dose for <20 kg while 500 mcg/dose for >20kg of Ipratropium Bromide with same dose of Salbutamol as prescribed for Group A). Baseline spirometry was performed on each patient and after measurement of baseline peak expiratory flow. The outcome was measured by Peak flow meter and reassessed at 60 minutes. **Results:** Comparison of salbutamol alone and ipratropium bromide supplemented salbutamol in children with exacerbation of asthma in terms of PEFR shows that 40.5 + 4.28 in Group-A and 59.5 + 4.75 in Group-B, P-value was calculated as 0.0001, showing a significant difference between the two groups while the difference in increase was recorded as 19%. **Conclusion:** We concluded that salbutamol alone is significantly less effective when compared with Ipratropium Bromide supplemented Salbutamol in children with exacerbation of asthma in terms of PEFR.

Key words: Children, Exacerbation of Asthma, Ipratropium Bromide Supplemented Salbutamol, PEFR, Salbutamol Alone.

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INTRODUCTION

Acute exacerbation of asthma can lead to admission in the pediatric intensive care unit. This disease involves airway inflammation with excess mucus production leading to mucus plugs, and bronchospasm, leading to airflow obstruction. The severity of asthma can be assessed using various scoring systems. Asthma can be mild, moderate or severe; but the acute exacerbations can occur in any of the case.¹

Asthma, as a disease, has been more prevalent in 21st century as compared to its prevalence in last two or three decades. In a report published by National Center of Health Statistics, asthma occurrence for 2009 in United States was recorded 8.2%, affecting 24.6 million people of all ages and 7.1 million of them were children with age 0 to 17 years. Studies have shown that in

USA, paediatric emergency visits due to asthma increased by 13.3% from 2001 to 2010. In the United Kingdom, an asthmatic child presents in the hospitals after every 20 min.²

Age, gender, family history and in some populations socioeconomic status are important risk factors associated with asthma. In young age, asthma is more common and even more common in male children.^{3,4}

Asthma is highly prevalent in our country and many children suffer from morbidity and mortality due to improper treatment approach. There is still insufficient local data comparing both salbutamol alone versus combined salbutamol and ipratropium bromide nebulisations in terms of change in peak expiratory flow rate (PEFR). Early improvement in PEFR will shorten the span

of emergency situation, and decrease associated morbidity accordingly.

MATERIAL & METHODS

This research was conducted in Department of Paediatrics, KRL General Hospital Islamabad, six months after approval from the hospital ethical review committee (ERC-16/03/01). Children of 5-10 years age of any gender and who were diagnosed with asthma PIS >12 were included in the study. Acute exacerbation of Asthma: All children having pulmonary index score >12. Change in PEFR: It was measured in percentage mean %change= PEFR before treatment/PEFR, 60 mins after treatment All children having comorbid that did not allow use of drugs being studied in the research i.e. coexisting renal or cardiac disease, known intolerance to Ipratropium Bromide or salbutamol, glaucoma, urinary retention, children who used oral bronchodilators in the last 12 hours were excluded from the study.

All the patients attending pediatrics emergency and admitted in ward fulfilling the inclusion criteria. We used pre-designed Performa for data collection. Eligible patients were assigned to two groups by lottery method. Group A was given only Salbutamol (0.15mg/kg per dose with minimum 2.5 mg, maximum 5 mg/dose). Group B was given Ipratropium Bromide supplemented Salbutamol (250 mcg/dose for <20 kg while 500 mcg/dose for >20kg of Ipratropium Bromide with same dose of Salbutamol as prescribed for Group A). Baseline spirometry was performed on each patient and after measurement of baseline peak expiratory flow, patients of Group A (n=60) received 3 doses of Salbutamol while patients of Group B (n=60) received 3 doses of salbutamol and Ipratropium Bromide at the rate of 20 minutes/dose through a nebulizer. The outcome was measured by Peak flow meter and reassessed at 60 minutes.

Data entry and analysis was performed with statistical package for social sciences (SPSS) version 10. Quantitative variables like age, heart rate, wheeze score (0-3), respiratory rate, oxygen saturation, accessory muscle score (0-3), duration of hospital stay and mean change in

PEFR was measured as mean SD and Qualitative variables like gender was measured as frequency and percentage. Independent t-test sample size was used to compare the mean of increase in PEFR between two groups. P-value less than 0.05 was considered statistically significant. Effect modifiers like age and gender were controlled by stratification. Post stratification independent sample t test was applied. P value <0.05 was significant.

RESULTS

Total of 120 cases (60 in two groups) fulfilling the inclusion/exclusion criteria were enrolled to compare Salbutamol alone and Ipratropium Bromide supplemented Salbutamol in children with exacerbation of asthma in terms of PEFR. Age distribution showed that 68.3% (n=41) in Group-A and 78.3% (n=47) in Group-B were between 5-8 years of age while 31.7% (n=19) in Group-A and 21.7%(n=13) in Group-B were between 9-10 years of age, mean + SD was calculated as 7.7+1.53 years in Group-A and 7.9+1.36 years of age in Group-B. Table-I

Gender distribution shows that 43.33% (n=26) in Group-A and 48.33% (n=29) in Group-B were males while 56.67% (n=34) in Group-A and 51.67% (n=31) in Group-B were females. Table-II

Comparison of salbutamol alone and ipratropium bromide supplemented salbutamol in children with exacerbation of asthma in terms of PEFR shows that 40.48+4.28 in Group-A and 59.47+4.75 in Group-B, p value was calculated as 0.0001 showing a significant difference between the two groups while the difference in increase was recorded as 18.99%. Table-III.

Effect modifiers like age and gender were controlled by stratification. Post stratification independent sample t test was applied. P value <0.05 was significant. Table-IV-V

Age (in years)	Group-A (n=60)	Group-B (n=60)
	No. of Patients (%)	No. of Patients (%)
5-8	41 (68.33%)	47 (78.33%)
9-10	19 (31.67%)	13 (21.67%)
Total	60 (100%)	60 (100%)
Mean+SD	7.7+1.53 Years	7.9+1.36 Years

Table-I. Showing the distribution of Age of the patients on the study (n=120).

Gender	Group-A (n=60)	Group-B (n=60)
	No. of Patients (%)	No. of Patients (%)
Male	26 (43.33 %)	29 (48.33 %)
Female	34 (56.67 %)	31 (51.67 %)

Table-II. Showing the gender distribution of the patient in both groups in the study (n=120).

PEFR	Group-A (n=60)	Group-B (n=60)
	Mean SD	Mean SD
	40.48 ± 4.28	59.47 ± 4.75

**Table-III. Comparison of salbutamol alone and ipratropium bromide supplemented salbutamol in children with exacerbation of asthma in terms of PEFR (n=120).
P value= 0.0001**

PEFR	Group-A (n=60)	Group-B (n=60)
	Mean SD	Mean SD
	40.80 ± 4.38	59.36 ± 4.80

**Table-IV. Stratification for age (n=120).
Age: 5-8 years
P value= 0.0001**

PEFR	Group-A (n=60)	Group-B (n=60)
	Mean SD	Mean SD
	39.79 ± 4.08	59.85 ± 4.76

**Age: 9-10 years.
P value= 0.0001**

PEFR	Group-A (n=60)	Group-B (n=60)
	Mean	Mean SD
	40.38 ± 4.34	59.10 ± 4.85

**Table-V (a). Stratification for gender (n=120). Male
(P value= 0.0001)**

PEFR	Group-A (n=60)	Group-B (n=60)
	Mean SD	Mean SD
	40.79 ± 4.27	59.81 ± 4.71

**Table-V (b). Stratification for Gender (n=120).
Female: P value= 0.0001**

DISCUSSION

Early improvement in PEFR may shorten the span of emergency situation, and decrease associated morbidity accordingly. In our study, mean age was 7.7+1.53 years in Group-A and 7.9+1.36 years of age in Group-B, 43.33%(n=26) in Group-A and 48.3% (n=29) in Group-B were males while 56.7% (n=34) in Group-A and 51.7% (n=31) in Group-B were females, comparison of salbutamol alone and ipratropium bromide supplemented salbutamol in children with exacerbation of asthma in terms of PEFR shows that 40.48+4.28 in Group-A and 59.47+4.75 in Group-B, p value was calculated as 0.0001 showing a significant difference between the two groups while the difference in increase was recorded as 18.99%.

In the management of acute exacerbations, anticholinergics like ipratropium when used with Salbutamol can lead to prolonged bronchodilation and decrease in the mucous production. Same was concluded in a control trial by Vezina K, et al⁵ that it can even it can decrease hospital admissions. Another trial concluded the same results done by Hossain AS, et al.⁶ After one hour of nebulization, mean + SD of % increase in the peak flow rate was better in the group with combined used of bronchodilators (60.01+35.01%) as compared to the group in which Salbutamol was used alone (44.47+25.03%) with difference of 16%. It was also concluded that with the combined use >60% cases reached target peak flow rate percentage. These findings are in agreement with our study.

Memon BN, et al⁷ reported after a trial on two groups with 100 patients, most of the patients between 7 to 11 years, with equal ratio of males and females, that combined used of both the bronchodilator showed an improvement in 93% patients. Improvement was noted in terms of change in the asthma clinical score. This improvement was seen on 84% patients of the other group with use of salbutamol alone, but this difference was not statistically significant (p>0.05). They were of the conclusion that the combined use of nebulized bronchodilators in acute asthma is not superior to salbutamol alone.

In 2009 the results of a controlled trial showed

that with the combined use of salbutamol and tiotropium while managing severe asthma patient's significant improvement was seen in the lung function. In this study, 138 severe asthma patients were included with significantly reduced lung function. Tiotropium 18 µg (via HandiHaler) was added to the regular treatment at a dose of once daily regime. The assessment of lung function was done after every four weeks. Any patient who showed an improvement of more than or equal to 15% (or 200 mL) in the forced expiratory volume (FEV1) and it remained improved for consecutive 8 weeks, was labeled as a responder. Of these 138 people, 46 (33.3%) responded to salbutamol and tiotropium.⁸

In a similar study, Peters SP, et al.⁹ conducted a double-blind study including 210 patients of asthma to determine the effect of addition of salbutamol and tiotropium to ICS, when compared with doubling the dose of ICS or adding salmeterol, it was found that the tiotropium addition to the regular treatment was superior as compared to the results seen with doubling the dose of ICS. This addition also showed significant improvement in the asthma control days, pre-bronchodilator FEV1, and the symptoms of asthma. It was found that this addition was almost equal in its effects to the addition of salmeterol.

Bateman ED, et al¹⁰ also carried out a controlled trial to compare the efficacy of salbutamol and tiotropium with the efficacy of salbutamol and placebo added to an ICS (controlled group). Results showed that the tiotropium was not inferior to salbutamol.

However, the results of our study justify the hypothesis that "Ipratropium bromide supplemented salbutamol is better in terms of improving PEFR in children with asthmatic exacerbation as compared to salbutamol alone".

CONCLUSION

We concluded that salbutamol alone is significantly less effective when compared with Ipratropium Bromide supplemented Salbutamol in children with exacerbation of asthma in terms







of PEFR.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Sadaf Minhas	Data collection, Paper writing.	
2	Saqib Aslam	Data analysis, Result writing.	
3	Muhammad Azhar Farooq	Data analysis, Discussion writing.	
4	Ayesha Anwar	Review of paper, Data analysis.	
5	Farhan Zahoor	Data entry, Data analysis.	
6	Tehmina Maqbool	Discussion writing	
7	Muhammad Ahsan	Paper writing, Plagirism removal, Data analysis.	