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## RESEARCH ARTICLE

### COMPARATIVE STUDY OF INHALED SALBUTAMOL AND IPRATROPIUM BROMIDE IN BRONCHIAL ASTHMA

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#### ARTICLE INFO

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#### ABSTRACT

**Objective:** (i) To study pulmonary function test abnormalities in patients suffering from bronchial asthma. (ii) To assess the reversibility of broncho-constriction after inhalation of salbutamol & ipratropium bromide in these patients. (iii) To study comparative response of reversibility broncho constriction with salbutamol and ipratropium bromide in these patients.

**Materials and methods:** The present study was undertaken in dept. of chest medicine GMC Nanded during period between 1/10/2001 to 15/1/2004 total 100 patients of bronchial asthma those who attended chest OPD were evaluated for efficiency of salbutamol & ipratropium. In selected 100 patients of bronchial spirometry done with computerized med graphics Spiro meter.

**Results:** This study showed both salbutamol and ipratropium are effective bronchodilators in asthma patients. Although statistically over all response to salbutamol, appears to be superior.

**Conclusions:** Overall improvement in lung functions with salbutamol was better as comparative ipratropium bromide.

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#### INTRODUCTION

Asthma is a disease that has become increasingly common over last century. Although it is variable in severity, it is now a common cause of disability. The incidence of asthma has increased dramatically over last 25 years in industrialized nations as a result exposure to air pollution (so<sub>2</sub>, no<sub>2</sub> ↓level ozone), tobacco smoke, and diesel exhaust. Also other factors include obesity, decreased exercise, change in diet and increased viral respiratory infection. Sympathomimetic inhaled beta – 2 agonists are the mainstay of therapy for acute asthma. Ipratropium bromide (IB) is an anticholinergic bronchodilator that is not as fast acting as short acting beta- 2 agonists or as potent, but it has a longer duration of action and perhaps more reassuring safety profile. While more commonly used in the treatment of chronic obstructive pulmonary disease, Ipratropium Bromide has also been suggested to have a role in the treatment of bronchial asthma. Ipratropium is more useful in borderline case of asthma and chronic bronchitis. Both Salbutamol (Sal) ipratropium (ipra) are effective bronchodilators in asthma patients. However, the issue of their relative status remains unresolved and the clinical factors affecting the responses have also not been adequately defined. Presently ipratropium bromide is established in chronic obstructive pulmonary disease patients, however studies offer definitive conclusion regarding use of ipratropium bromide in

asthma. This study was designed to compare bronchodilator effect of salbutamol and ipratropium bromide in bronchial asthma.

#### Aim and objectives

To study comparative response of reversibility of broncho constriction with salbutamol and ipratropium bromide in these patient. The present study carried out in the department of chest medicine G.M.C. Nanded with following criteria:

- To study pulmonary function test abnormalities in patients suffering from bronchial asthma.
- To assess the reversibility of broncho-constriction after inhalation of salbutamol and ipratropium bromide in these patients.
- To study comparative response of reversibility broncho constriction with salbutamol and ipratropium bromide in these patients.

#### MATERIALS AND METHODS

The present study was undertaken in dept. of chest medicine GMC Nanded during period between 1/10/2001 to 15/1/2004 total 100 patients of bronchial asthma those who attended chest OPD were evaluated for efficiency of salbutamol and ipratropium. In selected 100 patients of bronchial spirometry done with computerized med graphics Spiro meter. This Spiro meter met American thoracic society criteria and volume

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calibrated daily measured accuracy of Spiro meter was  $\pm 2\%$  results forced expiratory volume in the 1<sup>st</sup> of second (FEV<sub>1</sub>) forced vital capacity FVC and FEF max forced expiratory flow (maximum), FEF<sub>25-75</sub> were significantly treated after inhalation therapy. Asthma as compared to ipratropium bromide conclusion, both salbutamol and ipratropium are effective bronchodilators in asthma patient causing statistically improvements in pulmonary function when given as a nebulizing dose with variability in response although the overall response to salbutamol appears to be superior. Total asthma patients those who attended chest OPD, were evaluated for efficiency of salbutamol and ipratropium. The diagnosis of each patient was made after obtaining a proper history and according to the clinical, radiological and pulmonary function tests criteria. After physical examination and laboratory investigation. Patients were informed regarding 48 hours of abstinence from sympatomimetics and cholinergic drugs. In selected asthma patients, after getting an informed consent baseline spirometry done with spirometer. Following which nebulization of salbutamol treatment was given in 50 patients in a dosage of 2.5 mg; (.5mg) diluted with 2ml. 9% normal saline available as 5 mg per ml. In another 50 patients ipratropium 125 mcg (.5ml) with 2ml. normal saline given available 250mcg /ml. 15 minutes after nebulization with salbutamol and 60 min. After ipratropium bromide PFT performed. The best of 3 consecutive measurements taken and the following pulmonary function were recorded. FEV<sub>1</sub>, FVC, FEV<sub>1</sub>, FVC%, FEF<sub>MAX</sub>, FEF<sub>25-75</sub>%, FIVC, FEF<sub>50</sub> l/sec, FIF<sub>MAX</sub> l/sec before and after bronchodilation.

## RESULTS

This study showed both salbutamol and ipratropium are effective bronchodilators in asthma patients. Although statistically overall response to salbutamol appears to be superior.

## DISCUSSION

The data of salbutamol and ipratropium bromide were compared pulmonary function parameters of both drugs compared. Since we excluded the pediatric age groups from our study the youngest patient was 13 years old and oldest was 70 years old. The maximum number of patients in our study in between 40 and 50 years of age group. K.N.V. Palmer, M. L. Diament conducted a study on 72 asthmatic patients and concluded (Comparison of pulmonary function, 1970). The functional defect to all asthma is obstruction of airflow dynamic and static, which may either continuous with variable severity or apparently episodic, influenced by age, disease duration, and FEV variability (Crofton and Daoglas,?)

From this primary abnormality other pathophysiologic mechanism:

- Disturbances in work of breathing
- Lung mechanics
- Lung volumes
- Distribution of ventilation and perfusion and gas exchange (Robbins pathologic basis of disease, 2000)

These alterations may in turn load to arterial hypoxemia and in severe episodes CO<sub>2</sub> retention and transient pulmonary hypertension. A study by Meisner and P. Hugh Jones on asthma shows FEV<sub>1</sub> variable changes with severity (Pulmonary function, 1968). Patients with bronchial asthma often have reduced vital capacity (VC), increased functional residual capacity (FRC), residual volume (RV) and occasionally total lung capacity (TLC) [ $\downarrow$ VC,  $\uparrow$ FRC,  $\uparrow$ RV,  $\uparrow$ TLC]. This pattern of reduced vital capacity with hyperinflation in common to all diseases that cause airways obstruction however is asthma it improves when the airways obstruction is relieved. The interpretation of the effect of a bronchodilator drug focused on change in certain pulmonary function parameters. The American college of chest physicians recommended and increase in 15-25% in (FVC, FEV<sub>1</sub>, and FEF<sub>25-75</sub>) in at least two or three spirometric values clinically significant. It was concluded that both salbutamol and ipratropium are effective bronchodilators in asthma patients, although the overall response to salbutamol appears to be superior. Purohit SD, Khangaro, Gupta PR, Bhatnagar m conducted study on patients of bronchial asthma put on salbutamol and ipratropium bromide inhalers in a cross over manner to assess the relative efficacy of drugs (Role of pratriopium Bromide and salbutamol, 1990). Both inhalers were found to produce significant rise in airway functions FEV<sub>1</sub>, PEFR and FEF<sub>25-75</sub>. The mean rise was higher in patients while they were on salbutamol as salbutamol (p<.005) compared to ipratropium bromide (p<.01). Singh JP, Singh R and Gupta RC conducted study (A Comparative Study, ?). The bronchodilator actions of salbutamol and ipratropium bromide were compared 30 cases of bronchial asthma before and after exercise induced asthma. It was noticed that percentage change as follows:

| FVC    | PEFR   | FEV <sub>1</sub> |
|--------|--------|------------------|
| 20.86% | 15.96% | 17.98%           |
| 18.31% | 13.01% | 20.90%           |
|        |        | salbutamol       |
|        |        | ipratropium      |

It was noticed that salbutamol is a better drug in bronchial asthma than ipratropium bromide. Taskar V, Michandani, Mahashur A, conducted study (Effect of ipratropium, ?). The effect of ipratropium bromide was evaluated in 20 patients with bronchial asthma. It was observed that there was no significant in forced vital capacity & the forced expired volume in one second, while there was significant improvement in peak expiratory flow rate measured after inhalation of ipratropium bromide. A study conducted at city hospital Nottingham concluded, that salbutamol and ipratropium bromide have no significant differences in clinical score, PEFR, after addition of ipratropium bromide (Salbutamol and ipratropium, ?). Chabra SK and Pandey KK conducted a study in 44 asthmatics in a double blind, randomized crossover study. It showed the change in FEV<sub>1</sub> produced by salbutamol when given as bronchodilator was .50± .3 L and in ipratropium .3g±.27L (Comparison of acute bronchodilator effects, ?) J Stor and W. Lenny studied and concluded in bronchial asthma response was greater with salbutamol alone (Chest India edition, 2003; Comparison of nebulized, ?). Both salbutamol and ipratropium bromide act through unrelated biochemical pathway expecting additive or synergistic interaction between them. In our series we have studied pulmonary function before and after inhalation of

salbutamol and ipratropium bromide and as seen from the tables we got the mean rise in:

|                       |            |             |
|-----------------------|------------|-------------|
| FVC                   | 33%        | 15%         |
| FEV <sub>1</sub>      | 25%        | 15%         |
| FEF <sub>MAX</sub>    | 34%        | 20%         |
| FEV <sub>1</sub> /FVC | 6%         | 11%         |
| FEF <sub>25-75</sub>  | 42%        | 26%         |
|                       | Salbutamol | ipratropium |

Conclusively this study shows both salbutamol and ipratropium are effective bronchodilators in asthma patients. Both salbutamol and ipratropium resulted in statistically improvement in pulmonary functions when given as a nebulizing does with variability in response.

## Conclusion

Overall improvement in lung functions with salbutamol was better as comparative ipratropium bromide. Analysis CHI square test is applied. P value statistically significant in FVC < FEV<sub>max</sub> and FEF<sub>25-75</sub>. The interpretation of effect of bronchodilator drug focused on change in spirometric parameters. The American college of Chest physician recommends an increase in 15-25% in (FVC, FEV<sub>1</sub> and FEF<sub>25-75</sub>) in at least two or three spirometric values clinically significant (Pulmonary function, 2003; The increase in asthma prevalence chest, 1995). This is comparable to our study.

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