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ASSESMENT OF IMPROVEMENT IN PEAK EXPIRATORY FLOW RATE IN ASTHMATICS IN THOSE WITH INHALATIONAL VS ORAL SALBUTAMOL

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ABSTRACT

Background: Asthma is a condition that effects the air ways, characterised by bronchoconstriction and inflammation. Salbutamol, is a bronchodilator medicine that relaxes the muscles of airways leading to the lung and improves the amount of air flow to and from the lungs. The aim of this study is to compare and assess the efficacy of oral and inhalational salbutamol on the lung function. **Methodology**: A prospective, observational study was conducted at District Head Quaters Hospital, Khammam. A total of 110 patients were included in the study as per inclusion criteria. Subjects were classified into two groups, one group of patients (n=54) were given oral Salbutamol-(Asthalin - 2 mg) and the other group (n=56) with Levosalbutamol (Levolin-100mcg/ 2 puffs) metered dose inhaler. PEFR was measured before and after administration of drug. Highest value obtained after three attempts is recorded. **Resuts and Discussion:** Subjects were classified based on gender as 39% males and 60.9% females. Based on severity as mild (42), and moderate (68). Mean increase in PEFR after 15 minutes of Salbutamol inhalation was found to be 12.96% with SD - 7.63 and after 30 minutes of oral therapy to be 9.68% with SD – 8.38. **Conclusion:** Increase in post PEFR values has been achieved with both inhalational and oral therapy. However the mean increase in lung function has been greatly achieved with inhalational therapy. The study thus concludes that the inhalational therapy was most effective than oral therapy in improving PEFR.

KEYWORDS: PEFR, metered dose inhaler, lung function.

INTRODUCTION

Asthma is a chronic inflammatory disorder of the airways in which many cells and cellular elements play a major role, in particular, mast cells, eosinophils, T lymphocytes, neutrophils, and epithelial cells. In susceptible persons, this inflammation causes recurrent episodes of wheezing, breathlessness, chest tightness and cough, particularly at night and in early morning.[1]

According to WHO yearly estimates, nearly 235 million people suffer from Asthma (2017). About 3,83,000 deaths occurred due to asthma in 2016.

Many therapeutic alternatives are available to treat Asthma such as, inhalational (corticosteroids, β-agonists, cromones) and oral (theophylline, salbutamol, LTRAS) therapy. Inhalational therapy delivers drug directly into lungs and show localized action. However, many patients (especially children and elderly) find inhalers difficult to use, and poor inhalational technique can affect the amount of drug reaching the lungs and response to therapy. Oral drug administration is simple, and cost effective but is associated with more side effects and delayed onset of action. In this study we aim to compare and assess the efficacy of oral and inhalational Salbutamol on the lung function in asthma patients.[3]

Peak expiratory flow is the maximum expiratory flow rate in L/min measured over the first 10 sec of expiration, PEF is easily estimated using peak flow meter. It is the simple and sensitive indicator of the presence of severity of airways obstruction. Peak flow meters can quickly and objectively accesses the effectiveness of bronchodilators in treatment of acute asthma attacks.

The treatment for Asthma was initiated in 326 BC in patients with aggravated symptoms. They were relieved by allowing to smoke the herb- Stramonium. Later, the drugs such as Aminophylline tablets, Epinephrine injections and inhalers were greatly used during the period of 1940-1950. However use of metered dose inhalers has been initiated in 1953.

MATERIALS AND METHODS

A prospective, observational study was conducted at District Head Quarters Hospital, Khammam. The study is conducted for over seven months i.e., from January 2018 to July 2018. A total of 110 patients were included in the study as per inclusion criteria. Subjects were classified into two groups, one group of patients (n=51) were given oral Salbutamol

(ASTHALIN - 2 mg), manufactured by CIPLA. Ltd, Kumrek, Rangpo, Sikkim- 737132, India and the other group (n=59) with Levosalbutamol (LEVOLIN-100mcg/puff), 2 puffs via metered dose inhaler, manufactured by CIPLA. Ltd, Kumrek, Rangpo, Sikkim- 737132, India.

PEFR was measured before and after administration of the drug. The post PEFR values were recorded after 30 min of oral Salbutamol and 15 min of inhalational Salbutamol therapy. Highest value obtained after three attempts is the recorded value. All the subjects were taken for history of symptoms, social habits and family history. Peak expiratory flow rate was measured in this patients with the help of Wright's peak flow meter, and classified the patients accordingly based on severity. PEFR is calculated for individual patient by taking into account their age, gender, and height based on the following formula.

- **Predicted PEFR value for females: 168.551-(1.776*Age) + (1.354* Height)**
- **Predicted PEFR value for males: 69.259-(2.229*Age) + (2.888*height)**

The severity of the patient's condition is classified based on the exacerbations. Patients with PEFR between >80% of the predicted value are considered as mild, whereas the patients with PEFR between 60-80% of the predicted value as moderate and <60% as severe.[2]

Statistical version

Analysis of the data was carried out using the software SPSS Version 20.0.

RESULTS

Among 56 people who were on inhaler therapy, 23 suffered from mild and 33 suffered from moderate persistent asthma. In the other group who are on oral therapy 19 suffered with mild and 35 with moderate persistent asthma. Sex wise distribution is predominantly high in female (67) in study group. The age of subjects involved in the study include 20-82 years with a mean age of 49 years.

Out of 110 cases included in the study 42 subjects were with moderate obstruction (PEFR >80%) and 68 subjects have been suffered with moderate obstruction (PEFR 60-80%).

Table I: Classification of patients based on severity.

	N	Minimum	Maximum	Mean	Std. Deviation
Mild	42	1.00	23.00	8.4286	7.92693
Moderate	68	2.00	34.00	13.1176	7.85223

The post PEFR values among the individuals vary depending upon the variables such as age, height and gender. The percentage increase in the values is depicted in the figure-1.

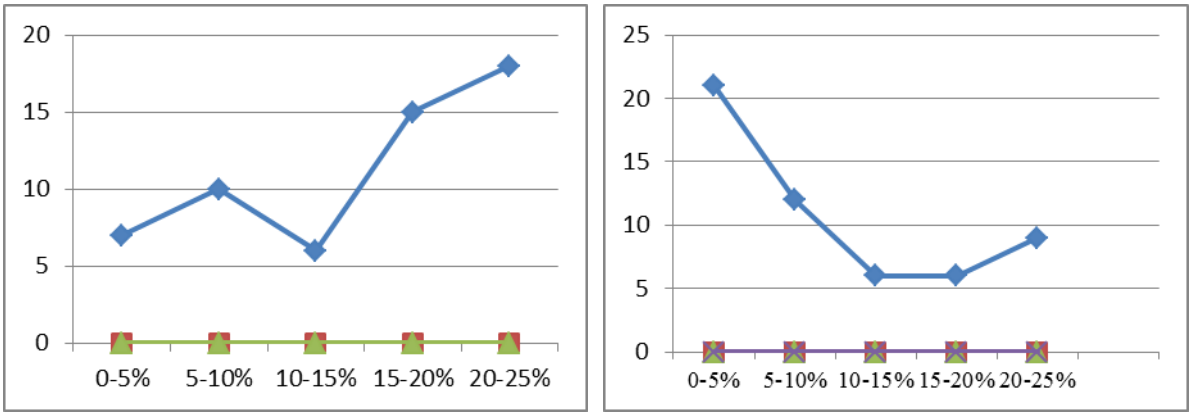

Fig I: Percentage increase in post PEFR values after inhalational and oral therapy respectively.

The Mean PEFR before giving oral salbutamol therapy was found to be 231 L/Min with SD – 68.07, and that of inhaler group was found to be 213 L/Min with SD – 72.67. The Mean PEFR after 30 minutes of Oral Salbutamol was found to be 261 L/Min with SD – 67.34, and in those who received inhalational Salbutamol was found to be 265 L/Min with SD- 93.83.

Table: II Mean and SD of PEFR before and after oral and inhalational therapy.

	Inhaler (Mean)	Inhaler (SD)	Oral (Mean)	Oral (SD)
PEFR(Before)	213.5714	72.67433	231.11	68.09
PEFR (After)	265.7500	93.83859	261.6667	67.34171
Increase in %	13.2593	7.61871	9.6852	8.38648

The Mean percentage increase in PEFR value in inhalational therapy was found to be 13.25% with SD– 7.6 and the percentage increase in PEFR after Oral therapy was found to be 9.68% with SD-8.38.

DISCUSSION

Increase in PEFR has been seen in both the inhalational and oral therapies, this shows that the β -2 agonists show significant reversibility of air way obstruction. In our study it was found that increase in PEFR has been greatly achieved with inhalers (12.96%) when compared to oral (9.06%).

Most patients in India still believe that taking the medicine orally that is through mouth is right way to treat any disease. However, the best way to take asthma medication is by inhalation. Oral therapy i.e., tablets and syrups which have to be swallowed takes time to act, as they have to pass from stomach into blood stream and finally into lungs. Whereas, Inhalational therapy is quicker because drug is delivered directly to lungs and show localized action. Besides oral therapy requires 40 times larger dose than inhalers.

Louridas et al[4] conducted a study on 10 patients with bronchial asthma. The study consisted of treating each patient for 4 consecutive days with: (1) a combined regimen consisting of a 2-mg tablet of salbutamol and 10 puffs of salbutamol inhalation (100 micrograms in each puff) given in pairs of two puffs every 20 min (regimen 1); (2) salbutamol inhalation (regimen 2); (3) salbutamol tablet (regimen 3), and (4) placebo, tablet and inhalation (regimen 4). The bronchodilator effect was assessed measuring the forced expiratory volume in 1 s, the forced vital capacity and the peak expiratory flow rate. The bronchodilator response was significantly greater on the inhalation alone and the combined regimen than on the oral and placebo regimens. Although our methodology was different we are in agreement with their findings that salbutamol inhalation produce a greater improvement in PEFR.

CONCLUSION

Asthma is one of the leading diseases mostly effecting female (55.4%) population compared to males (44.5%). The bronchodilatory effect of oral verses inhalational Salbutamol therapy was compared by taking peak expiratory flow rate into consideration. Increase in post PEFR values has been achieved with both inhalational and oral therapy. However the mean increase in lung function has been greatly achieved with inhalational therapy. The study thus concludes that the inhalational therapy was most effective than oral therapy in improving PEFR.

Recommendation

Use of inhalers with proper inhalational technique leads to best results. Counseling the patients regarding the use inhalers is mandatory.

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