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The correlation between allergic rhinitis with hyperactive lower airway disorders and effect of management of allergic rhinitis on lower airway

Vipin Ram Ekhar, Ritesh N. Shelkar*, Krupal Pardhi, Jeevan N. Vedi

Department of ENT, IGGMC, Nagpur, Maharashtra, India

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***Correspondence:**
Dr. Ritesh N. Shelkar,
E-mail: riteshnshelkar@gmail.com

ABSTRACT

Background: Allergic rhinitis and brochial asthma are interrelated diseases because of the shared respiratory epithelium and the common allergens affecting both the areas. The treatment of both these conditions is often overlapping. Although no treatment modality is perfect in treating the disease, corticosteroids are the mainstay of the treatment for both the conditions. This study was conducted to quantify strength of association between allergic rhinitis and hyperactive lower airway disorders and to study the effect of topical intranasal steroid Fluticasone on Bronchial hyperactivity in patients with allergic rhinitis.
Methods: Patient with moderate to severe allergic rhinitis presenting to ENT OPD with symptoms of lower airway hyperactivity were subjected to pulmonary function tests. After all routine investigations, the patients were started on fixed dose of intranasal fluticasone furoate nasal spray for a period of 2 months and the pretreatment and post treatment FEV_1 and PEFR were compared and statistically analysed for the effect.
Results: Approximately 50% of patients with allergic rhinitis showed associated lower airway hyperreactivity. There was statistically significant improvement in pulmonary function test readings after 2 months therapy with intranasal fluticasone spray.
Conclusions: The study showed that the treatment of inflammation in the upper airways indirectly improves the symptoms of hyperactive lower airway disorders and decreased bronchial hyperactivity.

Keywords: Allergic rhinitis, Asthma, Intranasal corticosteroids, Fluticasone furoate

INTRODUCTION

Allergic rhinitis is an important health problem and affects up to 40% of the worldwide population.[1] Forty percent of allergic rhinitis patients have asthma, and as much as 94% of allergic asthma patients have allergic rhinitis and lower airway disorders. Asthma and allergic rhinitis are symptomatically as well as patho-physiologically overlapping conditions and their prevalence is increasing at an alarming rate. Despite significant progress in pathophysiology of asthma and allergic rhinitis and availability of several therapies in recent years, a true and complete cure for asthma and allergic rhinitis so far seems out of reach. The ARIA study concluded that allergic rhinitis is a major chronic respiratory disease owing to its prevalence, impact on quality of life, impact on school and work performance and productivity, economic burden, and links to asthma.[2] The mucous membranes of both the upper and the lower airways are covered by a pseudostratified columnar ciliated epithelium with a continuous basement membrane. For this reason, these airways share a mucosal susceptibility to inhaled allergens. The pathophysiology of allergic rhinitis is very

similar to that of allergic asthma, and the responses of the two conditions to pharmacologic and immunologic interventions are comparable. The most commonly used drugs for both conditions are corticosteroids. The following study was undertaken in order to ascertain the efficacy of intranasal corticosteroids in improvement of allergic rhinitis and hyperactive lower airway disorder.

Aims and objectives

- To quantify strength of association between allergic rhinitis and hyperactive lower airway disorders
- To study the effect of topical intranasal steroid fluticasone on bronchial hyperactivity in patients with allergic rhinitis.

METHODS

It was prospective study. The study was conducted at Indira Gandhi Govt. Medical College, Nagpur, and a tertiary care center in central India over a period of one year from September 2016 to August 2017. All patients presenting with history of allergic rhinitis and complaints like nasal discharge, sneezing and itching associated with history suggestive of lower airway hyperactivity like mild breathlessness were included in the study. Patients with sinonasal polyposis, uncontrolled diabetes mellitus, and acute infection of nose and paranasal sinuses were excluded from the study. Approval of Institutional Ethics Committee was obtained before starting the study.

Written inform consent was taken for enrolling in the study before the start of medications. Patients who fulfilled the inclusion criteria were assessed regarding the symptoms on the basis of structured questionnaire and severity of symptoms was marked on visual analog scale. Patients having moderate to severe degree of allergic rhinitis were assessed for lower airway status by doing pulmonary function tests courtesy pulmonary medicine department. After doing all routine investigations, patients with no co-morbidities were started on topical nasal steroids for 2 months and pulmonary function test (FEV_1 and PEFR) pre and post medication results were compared.

RESULTS

Total 157 patients who fulfilled the inclusion criteria were included in the study. The ages ranged from 18 years to 50 years. Maximum patients were in the age group of 26-35 years which contribute 39.4% of total patients (Table 1).

Table 1: Age distribution of patients.

Age distribution	No. of patients
15-25	54
26-35	62
36-45	31
>46	10
Total patients	157

In our study 84 subjects were male and 73 were female, and male: female ratio was 1.15.

Almost 50% of study subjects, with moderate to severe allergic rhinitis, had signs of mild to moderate lower airway obstruction on pulmonary function test. After treatment period of 2 months with intranasal fluticasone furoate spray 2 puff in each nostril two times a day, there was significant improvement in the pulmonary function test of patients. The average improvement in $FEV_1$was found to be approximately 15% in 125 patients and 5-10% in rest of 32 patients. Similarly improvement in PEFR was found to be approximately 13.5% in 120 patients. There was significant reduction in the symptoms of asthma in patients with allergic rhinitis. The maximum increase in FEV_1 is found to be in the range of 11-15 times in 67 patients (Table 2), while for PEFR was in range of 11-15 times in 51 patients (Table 3). On doing the statistical analysis of the increase FEV_1 and PEFR, The calculated p value for FEV_1 was 0.02 and found to be significant, and that for PEFR was 0.01 which was also found to be significant.

Table 2: Showing Increase in FEV_1 post-treatment.

Increased in FEV_1	No. of patients
<5 times	47
6-10 times	6
11-15 times	67
16-20 times	31
>21 times	6
Total patients	157

Table 3: Showing increase in PEFR Post-treatment.

Increased in PEFR	No. of patients
<5 times	21
6-10 times	27
11-15 times	51
16-20 times	32
>21 times	26
Total patients	157

DISCUSSION

In the present study, we assessed the efficacy of the administration of intranasal steroid in concomitant AR and asthma, and demonstrated that nasal inhalation may simultaneously control this co morbidity. A statistically significant and sustainable improvement was demonstrated in 2 months treatment, suggesting that nasal deposition is able to open a blocked nose. The improvement after nasal inhalation was due to the residual anti-inflammatory effect of deposited fluticasone in nasal cavities previous to the washout period. Comparable sustainable improvement from the second month was obtained for the clinical and functional outcomes related to asthma throughout the follow. Actually, patients progressively improved in their pre-

bronchodilator FEV_1 values, which had reached approximately 15% in 2 months, and their PEFR was improved by approximately 13.5% in the same period. Improvement obtained in the FEV_1 and PEFR suggests that the lung deposition of intranasal steroid seems to be enough to control the inflammatory process throughout the respiratory tract, probably due to the fact that the nasal inhalation of an inhaled corticosteroid allows the drug to follow the same pathway of inhaled aeroallergens and irritants. Our results suggest that nasal inhalation might be considered as a feasible alternative to the dual approach to treatment recommended by international guidelines, i.e. intranasal and orally inhaled corticosteroids. These recommendations are in agreement with recent observations.[3] Dahl et al studied 262 patients with pollen induced rhinitis and asthma, and demonstrated that topical nasal fluticasone is sufficient to avoid lower airway symptoms. The topical intranasal steroid spray was needed to control the seasonal increase in both nasal and asthmatic symptom.[3] One might speculate that adherence rate to treatment of AR and asthma would also improve, by reducing the number of devices and medicines to be administered, and also by optimizing and maximizing the clinical effects of standard dosages of the inhaled corticosteroid to treat only asthma at a lower cost. Additionally, in the present study, study subjects showed a marked improvement from baseline in symptoms of asthma, as seen in other controlled studies in asthma.[4] Although only nasal inhalation of topical corticosteroids may not be the ideal option for controlling the systemic features of AR and asthma sufferers.[5]

The studies conducted by Lohia, Schlosser et al in 477 patients comparing intranasal corticosteroid spray to placebo had showed significant improvements in FEV_1 (SMD = 0.31; 95%), bronchial challenge (SMD=0.46; 95%), asthma symptom scores (SMD =-0.42; 95%).[6] Nasal inhalation of corticosteroids significantly improved morning and evening PEFR. While the study conducted by Taramarcaz, Gibson et al showed that though the intranasal corticosteroids were well tolerated and tended to improve asthma symptoms and forced expiratory volume in one second, the results did not reach significance with only intranasal corticosteroids.[7] The combination of intranasal plus intrabronchial corticosteroids should remain the current clinical practice until more research is done.

CONCLUSION

The study showed that the treatment of inflammation in the upper airways indirectly improves the symptoms of hyperactive lower airway disorders and decreased bronchial hyperactivity. It is important to carefully assess the upper airways in asthmatic patients and the lower airways in patients with allergic rhinitis. Allergic rhinitis is an important risk factor for developing asthma and is also an important cause of non-optimal control of asthma. Links between upper- and lower-airway diseases exist through inflammatory mediators. Many therapeutic options are currently available although corticosteroids remain the most effective anti-inflammatory drugs.

Finally, we emphasize that:

- There is needed to take the entire respiratory tract into account when treating asthma.
- The practical and economical challenges of treating AR and asthma in the developing world should lead to the consideration of nasal inhalation of corticosteroids for individuals with concomitant AR and asthma. It is likely to improve adherence, reduce costs, and allow for the utilization of a lower dose of corticosteroid.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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