

An Association of Absolute Eosinophil Count, Serum Immunoglobulin E, and Spirometry with Comorbid Bronchial Asthma in the Patients of Allergic Rhinitis

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ABSTRACT

Aim: This study aimed to analyze the association of absolute eosinophil count, serum IgE, and spirometry with comorbid bronchial asthma in patients of allergic rhinitis.

Materials and methods: This study involved 50 patients with signs and symptoms of allergic rhinitis who underwent clinical examination and various tests including spirometry and were followed up regularly. Patients found to have bronchial asthma or nasal polyposis were treated accordingly.

Results: The study found the prevalence of bronchial asthma in patients with allergic rhinitis to be 58% and that the severity of bronchial asthma reduced significantly with less acute attacks and reduced hospitalizations with the effective treatment of allergic rhinitis ($p = 0.064$).

Conclusion: This study showed that elevated AEC and serum IgE were significantly associated with coexisting allergic rhinitis and bronchial asthma and increased the chance of coexistence of the same. Spirometry is a useful tool for observing the response to treatment.

Clinical significance: The findings of this study reinforce the unified airway concept and should therefore propel ENT clinicians to diagnose and tackle early bronchial asthma in patients of allergic rhinitis, thus reducing the overall morbidity.

Keywords: Allergic rhinitis, Bronchial asthma, Comorbid, Nasal polyps, Spirometry.

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INTRODUCTION

Allergic rhinitis is a symptomatic condition that causes significant social functional impairment and decreased work performance and productivity.¹ Bronchial asthma is another chronic disease that affects a patient socially, physically, and emotionally. The probability of development of asthma is much higher in individuals with both perennial and seasonal rhinitis than for individuals with either condition alone.² Asthma and rhinitis were found to be comorbid conditions, regardless of the atopic state, and raised bronchial hyperresponsiveness was seen in patients with rhinitis.³ The above two conditions may be manifestations of an inflammatory process within a continuous airway, rather than two separate diseases, hence labeled as “one airway, one disease” or “united airways disease.”¹

MATERIALS AND METHODS

After obtaining the approval of the institutional ethical committee, 50 subjects who had presented to the outpatient department of the Department of ENT of a rural tertiary care center with symptoms and signs of allergic rhinitis were enrolled in this study. The exclusion criteria included acute or chronic sinusitis, tuberculosis, cystic fibrosis, chronic obstructive pulmonary disease, and smokers. After obtaining a written and informed consent, the subjects underwent a complete blood count, absolute eosinophil count, and serum IgE, which were then followed by radiological tests that included X-ray nose and paranasal sinuses (Water’s view) and computed tomography of the nose and paranasal sinuses (in those cases who had nasal polyposis). Examination of the stools for ova and cysts and sputum sampling for acid-fast bacilli were done for all 50 subjects. The patients were then subjected to

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diagnostic nasal endoscopy following which they were evaluated by a pulmonologist for the presence of asthma. A spirometric evaluation was done and the subjects were subsequently categorized into those with and without bronchial asthma, after which the appropriate treatment was started. All 50 subjects were treated medically and the 12 subjects who had sinonasal polyposis were treated surgically by a functional endoscopic sinus surgery followed by medical treatment. All 50 subjects were given a steroid nasal spray, fluticasone furoate nasal spray, after the 2–3 weeks’ treatment by the oral leukotriene receptor antagonist and antihistamines. This spray was given for 6 months and at the end of 6 months, repeat spirometry was done.

RESULTS

In our study out of the 50 subjects, the prevalence of allergic rhinitis with bronchial asthma was found to be 58% (29 subjects) and subjects with only allergic rhinitis without coexisting asthma was found to be 42%. Out of the 29 subjects who were found to have asthma, 18 (62.068%) were found to be females and 11 (37.3%) were males. All the 50 subjects had normal white blood cell counts, thus ruling out sinusitis and other infective conditions. A total of 42 subjects (84%) had raised absolute eosinophil count (AEC) and 8 (16%) were found to have normal counts. All the 29 patients who had asthma with rhinitis were found to have raised counts. Serum IgE was elevated in 40 subjects (80%) and all asthmatic subjects had elevated levels of IgE.

Plain X-ray nose and paranasal sinuses taken showed abnormality in 41 subjects (82%), which included turbinate hypertrophy and mucosal thickening of the sinuses. Nasal discharge for culture and sensitivity sent for all 50 subjects were reported to be sterile, thus supporting the diagnosis of allergic rhinitis.

In the initial spirometry done at the beginning of study before starting treatment, it was found that 21 patients (42%) had a normal test while 29 patients (58%) showed obstruction with reversibility, which indicates the presence of bronchial asthma. Out of the 29 subjects, 9 (18%) had mild obstruction with reversibility, 10 (20%) had moderate obstruction with reversibility, and 10 (20%) had severe obstruction with reversibility. Three follow-ups were carried out in the 1st, 3rd, and 6th months after starting treatment, and all subjects were found to be symptomatically better at the end of 6 months.

A repeat spirometry done at the third follow-up showed a significant step down in all the 29 subjects. Nine (18%), who had mild obstruction with reversibility initially, were found to have normal results in the repeat study. Out of the 10 (20%) who had moderate obstruction with reversibility initially, 2 had normal results in the repeat test and 8 had step down to mild obstruction with reversibility. Out of the 10 (20%) subjects who had severe obstruction, it was seen that all 10 had step down to moderate obstruction with reversibility. The improvement was significant with a p value of 0.064 (Fig. 1).

The statistical analysis of the patient variables showed a significant association between elevated AEC and serum IgE and

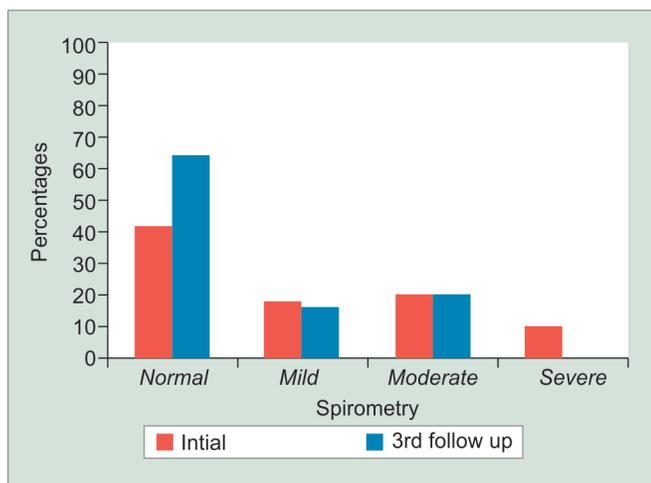


Fig. 1: Comparison of spirometry findings of patients at the initial visit and at third follow-up

abnormal findings on plain X-ray nose and paranasal sinuses and allergic rhinitis with bronchial asthma. Based on the odds ratio, patients with allergic rhinitis with elevated AEC and elevated serum IgE were 15 times and 10 times, respectively, more at risk to be associated with coexisting bronchial asthma (Table 1).

DISCUSSION

Epidemiologic studies have suggested that asthma and allergic rhinitis often coexist in the same patient. In our study, the prevalence of bronchial asthma in allergic rhinitis patients was found to be 58%. A study done by Navarro et al. showed a high prevalence of bronchial asthma in allergic rhinitis patients, which can affect as many as 89.5%.² In our study, serum IgE levels were estimated for all subjects and it was found that 40 (80%) subjects had elevated levels and 10 (20%) had normal levels. A study by Manohar et al. showed that estimation of serum IgE is a dependable laboratory data in patients suffering from allergic rhinitis and asthma.⁴ Another study by Vora et al. states that high serum levels of allergen-specific IgE that are directed toward aeroallergens or environment characterize allergic diseases like rhinitis and asthma.⁵

In our study, plain X-ray paranasal sinuses was taken for all 50 subjects and 9 (18%) were found to be normal and 41 (82%) were found to have different abnormalities like inferior turbinate hypertrophy (26%), mucosal thickening (38%), and a combination of both (18%). A study by Meltzer stated that 40–60% of patients with asthma have abnormal X-rays of the paranasal sinuses.⁶ In our study, all 50 subjects underwent spirometry and out of that, 29 (58%) subjects had an obstructive reversible pattern suggestive of bronchial asthma. In a study done by Navarro et al., 742 (79%) of 968 patients underwent spirometry and it was found to be normal in 90% subjects and hence they observed that there is no significant difference in spirometric parameters between patients with asthma or with both asthma and rhinitis.² In our study, out of the 50 subjects, 12 (24%) were found to have sinonasal polyposis along with bronchial asthma; these subjects underwent endoscopic polypectomy followed by treatment for allergy and an improvement in asthma symptoms was seen in these subjects. A study by Brent et al. states that asthma symptoms are reduced in those patients in whom functional endoscopic sinus surgery has been performed.⁷ In our study, all 50 subjects were given a steroid nasal spray, fluticasone furoate nasal spray, after the 2–3 weeks' treatment by the oral leukotriene receptor antagonist and antihistamines. This spray was given for 6 months and at the end of 6 months, all subjects were symptomatically better. A study by Pedro Giavina-Bianchi et al. states that fluticasone furoate nasal spray has a high potency and low potential for systemic effects and is proved to be a good treatment for rhinitis.⁸

SUMMARY

- The coexistence between allergic rhinitis and bronchial asthma is very strongly supported by genetic, pathophysiologic, and clinical evidence.
- The core course of treatment for allergic rhinitis benefited the patients who were diagnosed with asthma.
- An elevated AEC and serum IgE along with an abnormal radiograph of the paranasal sinuses should raise a suspicion of the possibility of coexisting bronchial asthma in the clinicians' mind.

Table 1: Comparison of patient characteristics with spirometric findings and corresponding odds ratio

Characteristic		Spirometry finding			χ^2	p value	Odds ratio
		Abnormal, n (%)	Normal, n (%)	Total, n (%)			
AEC	Elevated	29 (69)	13 (31)	42 (84)	8.9534	0.0028	15.6
	Normal	1 (12.5)	7 (87.5)	8 (16)			
Serum IgE	Elevated	29 (72.5)	11 (27.5)	40 (80)	9.3591	0.0022	10.6
	Normal	2 (20)	8 (80)	10 (20)			
Plain X-ray PNS	Abnormal	21 (51)	20 (49)	41 (82)	4.2989	0.0381	0.13
	Normal	8 (88.9)	1 (11.1)	9 (18)			

- This study supports the concept that both allergic rhinitis and bronchial asthma are a revelation of one disease entity and that the severity of asthma reduces considerably with treatment of allergic rhinitis, with less acute attacks, reduced hospitalizations, and a better quality of life.

ETHICAL STANDARDS

The authors assert that all procedures contributing to this work comply with the ethical standards of the institutional research committee and with the Helsinki Declaration of 1975, as revised in 2008. This study does not contain any studies with animals performed by any of the authors.

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