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Original Article

Spirometric Changes in Patients of Allergic Rhinitis: A Prospective Study

Chandra Shekhar Purohit

Assistant Professor, Pulmonary Medicine, SRMSIMS, Bhojpura, Bareilly.

ABSTRACT

Background: *Allergy is a chronic inflammatory disease, which may affect the upper and lower airway in reversible airflow obstruction or asthma. Spirometry is a noninvasive way to assess lower airway function routinely and to detect reversible airflow obstruction. Objective: To find out prevalence of abnormal small airway function in allergic rhinitis patients without diagnosis of asthma*
Methods: *This prospective study was conducted in the department of Pulmonary Medicine, SRMSIMS, Bareilly. Spirometric measurement of patients of allergic rhinitis.*
Results: *One hundred and thirty nine patients of Allergic Rhinitis (AR)were included in this study.73 were males and 66 were females. Farmers and labors outnumbered the students.13/49 (26.53%) farmers and 8/20(40%) labours had decreased FEF25-75%. It was also observed that longer the duration of AR, more patients were having abnormal FEF25-75%.*
Conclusions: *When patients with AR seek treatment, the lower airway status should always be evaluated. This study provided evidence that an early bronchial impairment might be detectable by considering the FEF25-75.*

Keywords: *Spirometry, Bronchial Asthma, Rhinitis.*

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***Corresponding Author**

Dr. Chandra Shekhar Purohit,
A-24, Doctors Residence, SRMSIMS,
Bhojpura, Bareilly.
Email: Papurv1988@yahoo.co.uk

INTRODUCTION

Allergic rhinitis (AR) and allergic asthma are two common allergic diseases. The prevalence of AR worldwide is 20%-40%.[1,2] Epidemiologic studies have shown that the prevalence of asthma in patients with AR is 19%-35%, which is higher than the prevalence of asthma in the normal population.[3,4]

There are various hypotheses about the linkage of upper and lower airways, such as sharing similar airway epithelial lining and pathophysiology, and both conditions respond to same treatment modalities.[5-7] AR may lead to the development of asthma or aggravate an asthmatic attack. The first hypothesis is nasobronchial reflex. This reflex is considered to arise because of evidence that nasal irritation can lead to bronchoconstriction.[8] The second hypothesis is that mouth breathing as a result of AR can lead to unconditioned (cold, dry) air that passes to the lower airway, resulting in bronchial hyperactivity.[4] The third hypothesis is related to the systemic inflammation after the local nasal allergy. Allergic inflammation in the nose leads to release of cytokines and mediators especially interleukin (IL)-5 from bone marrow.[9] The fourth hypothesis is chronic irritation of lower airway from postnasal drip.[9] AR and asthma have high comorbidity.[10] Over 80 % of asthmatics have AR[3] while 10–40 % of individuals with AR have asthma.[10,11] AR is a risk factor for asthma,[4,5,12,13] and the diagnosis of AR can precede asthma.[1]

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Burgess et al. found that childhood AR was associated with a 7-fold increased risk of asthma in preadolescence (HR 7.12, 95 % CI 3.97-12.75) and an over 4-fold increased risk of asthma in adolescence (HR 4.34, 95 % CI 2.23-8.46). Furthermore, childhood AR increased the likelihood of having asthma that persisted into middle age by 3-fold (95 % CI 1.98-4.56).[14] Similarly, a prospective 8-year study of children with a history of recurrent wheezing demonstrated that a history of AR was associated with significantly increased odds of persistent asthma symptoms (OR 15.8, 95 % CI 6.1-40.8).[15]

There are various studies from the west that have studied the prevalence of spirometric abnormalities in AR without asthmatic symptoms.[16,17] Force expiratory volume in 1s (FEV1) and the forced expiratory flow between 25% and 75% of forced vital capacity (FEF25–75) have been proposed as early predictors of small airway hyperresponsiveness.[17]

Although there are several articles showing the relationship between AR and the lower airway, the majority describe AR with concurrent asthma or with aggravation/worsening of asthma symptoms.[18-21] Even though there is no direct parameter capable of assessing small airways, it has been assumed that the forced expiratory flow at the 25 and 75 % of the pulmonary volume (FEF25–75) might be considered as a measure of the caliber concerning distal airways.[22] So we took initiative to see spirometric changes in adult patients of AR without any previous history of bronchial asthma at our institute and this part of India.

METHODS

The present study was a cross-sectional examination of pulmonary function in patients with AR. The study was approved by the institutional review board. Written informed consent was obtained from all study participants. Patients with chronic rhinitis, 20-40 years old, and normal X-ray of the paranasal sinuses and the chest were included. The diagnosis of AR was made by ENT consultants. Exclusion criteria were known pulmonary disease, asthma, current or previous smoking, severe cardiovascular disease, pregnancy, aneurysm aorta, or brain, previous history of ophthalmologic, abdominal or thoracic surgeries, immunodeficiency, hepatitis, and gastroesophageal reflux (by history).

Spirometry was performed using a computer assisted spirometer (Koko Spirometer, Ferraris Respiratory, Louisville, CO, USA). Patients stopped medication that may affect the spirometric result before performing the test. The test was conducted by a single technician who is familiar with the technique recommended by the standard guidelines [22]. Two main values of spirometry including FEV1 and reversible airflow obstruction were considered. Airflow obstruction was defined as FEV1 values <80% of predicted [22) The other variable of spirometry i.e. the force expiratory flow during 25-75 second (FEF25–75), was also recorded and analyzed.

RESULTS

One hundred and thirty-nine patients of allergic rhinitis diagnosed in ENT department were included in the present study. 73 were males and 66 were females.

It was observed that farmers and labours outnumbered the student group. 3 out of 49 farmers and 2 out of 20 labours had decreased FEV1.Similarly 13/49(26.53%) farmers and 8/20(40%) labours had decreased FEF25-75% which was significantly higher than student group probably because of higher chances of exposure to allergens. Moreover, the occupational change with weather change was also there.

Longer the duration of disease i.e. allergic rhinitis, more were the chances of deranged PFT. Thus 5/56 (8.92%) patients with duration of 5 yrs and 17/35 (48.57%) patients with duration > 10 yrs had deranged FEF25-75%

Table 1. Age Distribution

Age- Group	Number
20-25	34
25-30	24
30-35	42
35-40	39

Table 2. Occupation Distribution

Students	26
Housewife	44
Farmers	49
Labour	20

Table 3: Distribution of Abnormal Spirometry According to Various Parameters

AGE	NUMBER OF PATIENTS	NUMBER OF PATIENTS WITH FEV1/FVC<70%	NUMBER OF PATIENTS WITH FEF25-75%<80%
20-25	34	NIL	2
26-30	24	1	4
31-35	42	3	15
36-40	39	3	18
OCCUPATION			
STUDENT	26	NIL	2
HOUSEWIFE	44	2	18
FARMER	49	3	13
LABOUR	20	2	8
DURATION OF DISEASE			
<5YRS	56	NIL	5
5-10YRS	48	3	19
>10 YRS	35	4	17

DISCUSSION

Ciprandi et al. stated that majority of the cases of allergic rhinitis fall in the age group of 20–30 years of age [23]. Sheldon J.M had maximum number of cases between 20 and 40 years of the age.[24] MacMillanD in his study, found maximum no. of patients between the age of 15 to 34 years.[25] Lim M.Y reported highest number of patients of allergic rhinitis between 20 and 40 years of age.[26] Hence we also chose the same age group which also decreased the chances of effects of other chronic diseases and prevalent very high level of pollution *Cliprandi et al.* demonstrated that both FEV1 and mainly FEV25-75 were impaired in patients with allergic rhinitis and perceiving nasal symptoms alone.[18] Also, *Kessel et al.* found eleven out of fifty children with moderate to severe persistent allergic rhinitis had reduced FEV25-75 and one of them had also reduced FEV1.[29] Gian Luigi Marseglia et al found that twenty subjects out of 58 had a reduced FEF(25-75), consistent with the definition of SAD.

A mean value of FEF (25-75) of 70.3 (SD, 8.5) was measured in patients with a reduced FEF(27).

Vjay k Poorey et al in their study found all the three spirometric parameters (FVC, FEV1 and FEF25–75 %) to be impaired in the 6 % of cases; while two parameters (FEV1 and FEF25–75 %) found impaired in 9 % of cases and only one parameter i.e. FEF25–75 % is found impaired in 64 % of cases. Remaining 21 % of cases do not show any spirometric parameter impairment (14); underlining the importance of FEF25-75%. A substantial proportion of children with allergic rhinitis (14 out of 20 patients (70%) had reduced FEF25-75 (<80%), have impaired pulmonary functions, mainly reduced FEF25-75 values which were significantly improved with treatment by intranasal corticosteroids. Patients with both asthma and rhinitis show an increase in asthma severity and have the worst pulmonary functions with great improvement by proper treatment of allergic rhinitis and asthma.[15]

CONCLUSION

When patients with AR seek treatment, the lower airway status should always be evaluated. Awareness of upper and lower airway linkage will lead to early and proper treatment before significant deterioration of lower airway function occurs. A suspicion of bronchial asthma should be raised especially in patients from an AR subgroup. Thus, this study provided evidence that an early bronchial impairment might be detectable by considering the FEF25-75.

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