



## BRONCHIAL CHALLENGE IN PERENNIAL ALLERGIC RHINITIS PATIENTS WITHOUT ASTHMA – A CLINICO SPIROMETRIC CORRELATION

**Dr. PRAKASH M<sup>1\*</sup>, Dr. HARI P M<sup>2</sup> AND Dr. PAVITHRA SAIKUMAR<sup>3</sup>**

<sup>1</sup>Asst. Prof. Dept. of ENT, Head and Neck Surgery, Sree Balaji Medical & Hospital, Asst. Director R & D, Bharath University, Chennai.

<sup>2</sup>HOD of ENT at Sree Balaji Medical college & Hospital Bharath University, Chennai.

<sup>3</sup>Intern at Sree Balaji Medical college & Hospital Bharath University, Chennai.

### ABSTRACT

The aim of the study is to study and categorize the drop of FEV<sub>1</sub> values in patients with Perennial Allergic Rhinitis patients without asthma after a bronchial challenge and have a clinic spirometric correlation. Also to estimate and analyze FEV<sub>1</sub> values in Perennial allergic rhinitis patients and to find out changes in FEV<sub>1</sub> values in Perennial allergic rhinitis after administering nebulized distilled water- bronchial hyper responsiveness test. Consenting patients were given a standard questionnaire and perennial allergic rhinitis patients were diagnosed based on the available criteria. Their base level FEV<sub>1</sub> were estimated and bronchial challenge with distilled water nebulization was done and the change in the FEV<sub>1</sub> recorded. It was found that 56 percent of patients with perennial allergic rhinitis had a significant reduction ie severe reduction [>20%] of FEV<sub>1</sub> values and only 5 percent had no change in their FEV<sub>1</sub> values. This confirms the very concept of allergic rhinitis as a risk factor for development of bronchial asthma and that of the unified airway. So adequate control measures of allergic rhinitis is essential to ensure that the patient does not suffer a lower respiratory illness secondary to allergic rhinitis. All these people with severe reduction will be the ones who develop bronchial asthma in the future. So they have to be monitored closely with serial spirometric tests so that we can diagnose likely asthmatics and institute appropriate measures.

**KEY WORDS:** Perennial allergic rhinitis, bronchial challenge, nebulized distilled water- bronchial, hyper responsiveness, FEV<sub>1</sub>, Spirometry, Unified Airway, Eczema, Family history



**Dr. M. PRAKASH. M.B., B.S., D.L.O, D.N.B(ENT), P.D.C.R**

Asst. Prof. Dept. of ENT, Head and Neck Surgery, Sree Balaji Medical & Hospital  
Asst. Director R & D, Bharath University, Chennai.

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## INTRODUCTION

The incidence of asthma is increasing<sup>1</sup>. It is estimated that around 70 -80% of patients with asthma would have had a previous H/O of allergic rhinitis. This association is independent of other known risk factors for the development of asthma<sup>2</sup>. The Patho physiology of allergic rhinitis and asthma are much similar as both the nasal mucosa and bronchial mucosa are common in structure & function<sup>3</sup>. They are also in continuum with each other so any pathology in one will reflect on the other<sup>4</sup>. This is called the concept of UNIFIED AIRWAY. Allergic rhinitis patients without overt symptoms of asthma would have a hyper responsive airway which will be reflected in the FEV<sub>1</sub> values after a bronchial challenge<sup>5</sup>. Literature says that around 84% of the allergic rhinitis patients may develop asthma which can be prevented or delayed by an early diagnosis through a spirometric study by estimating their bronchial hyper responsiveness reflected in FEV<sub>1</sub> values and by instituting appropriate interventions. It is important to identify and treat allergic rhinitis patients early, who have markedly reduced FEV<sub>1</sub> values because once they develop overt symptoms of asthma then it becomes a chronic debilitating lifelong problem requiring long term medications and admissions<sup>6</sup>. Such untreated asthmatics lead a poor quality of life and with the development of COPD and with subsequent Cor – Pulmonale their quality of life further reduces. This asthma would persist despite adequate measures, medical or surgical, to treat allergic rhinitis, as it leads to irreversible bronchial damage in the form of smooth muscle hypertrophy and narrowing of bronchial lumen. Asthma leads to poor quality of life, reduced performance due to disability and frequent absences to

school or work<sup>7</sup>. This may lead to increased medical expenses and poor economic growth, affecting the country as a whole when viewed in a broader sense<sup>8</sup>

## METHOD

The first timers and revision patients with history suggestive of allergic rhinitis were questioned and examined. The place of examination was the department of ENT Sree Balaji Medical College and Hospital Chromepet, a constituent institution of Bharath University Selaiyur Chennai. Patients were called to attend the out patients department on Mondays, Wednesdays and Fridays so as to ease the procedure of questioning and examination. Questioning was done using a standard questionnaire and Diagnostic Nasal Endoscopy [DNE] was done free of cost. 110 patients were recruitment in the study and based on the available criteria to diagnose Perennial allergic rhinitis The 110 patients were explained about the study in their language and informed written consent was obtained after adequate time. Pulmonary function test was performed before and after bronchial challenge [inhaled distilled water]. Adequate precautionary measures were taken to deal and combat the clinical situation in case the patient developed severe wheeze because of bronchoconstriction . Bronchodilators and adrenaline were kept ready and handy. Emergency injections like Deriphylline and Dexamethasone were also kept loaded for each patient tested and they were observed for one hour by a trained nurse and an intern post procedure in the procedure room of the department. The patients were categorized based on the % of reduction of FEV<sub>1</sub> values compared with the baseline value before and after inhaled distilled water challenge.

## RESULTS

**Table 1**  
**Descriptive Statistics**

	N	Minimum	Maximum	Mean	Std. Deviation
Age	110	20	45	34.96	6.104
Age of onset of allergic rhinitis	110	5	35	17.40	7.013
Duration of AR	110	1	37	17.49	8.299
Original FEV1	110	3.1	4.1	3.647	0.2622
FEV1 Post	110	2.7	3.9	3.364	0.2673
FEV1 Post Diff	110	0.2	0.6	0.274	0.0659
Valid N (listwise)	110				

**Table 2**

	Count	
History of Eczema	Yes	16
	No	94

**Table 3**

	Count	
Family history	Yes	41
	No	69

**Table 4**

	Count	
Gender	Male	67
	Female	43

**FEV1 diff Vs Duration of AR - Correlation**

Spearman's Rank correlation coefficient is used to identify and test the strength of a relationship between FEV<sub>1</sub> difference and duration of allergic rhinitis. The increase FEV<sub>1</sub> difference post challenge correlates with the longer duration of AR. Spearman's rank-order

correlation was run to determine the relationship between FEV<sub>1</sub> difference post challenge and the duration of AR. There was a, positive correlation between the two, which was statistically significant ( $r_s = .237, p = .006$ ).

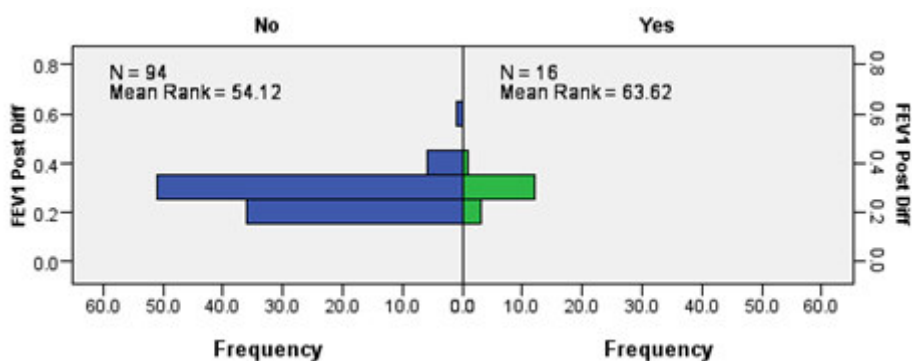
**Correlations**

		Duration of AR	FEV <sub>1</sub> post difference
Spearman's rho	Duration of AR	Correlation Coefficient	1.000
		Sig. (1-tailed)	0.237**
		N	110
	FEV <sub>1</sub> Post Diff	Correlation Coefficient	0.237**
		Sig. (1-tailed)	1.000
		N	110

\*\* Correlation is significant at the 0.01 level (1-tailed).

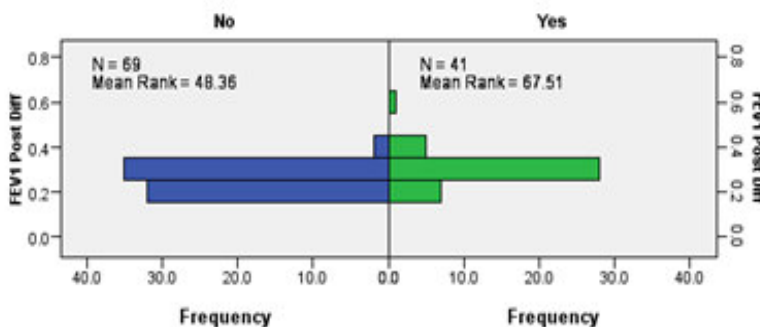
**Correlation of history of eczema and post difference in FEV<sub>1</sub> value is done as follows**

Comparison of the averages of two independent groups of samples, of which we cannot assume a normal distribution; is also known as Mann-Whitney U-test.



Total N	110
Mann-Whitney U	622.000
Wilcoxon W	5,087.000
Test Statistic	622.000
Standard Error	103.323
Standardized Test Statistic	-1.258
Asymptotic Sig. (2-sided test)	.208

So here the difference in distribution of the difference in post challenge FEV<sub>1</sub> scores among those with or without a history of eczema is not statistically significant. Hence whether patient has eczema or not it does not significantly affect the drop in the FEV<sub>1</sub> values.



Total N	110
Mann-Whitney U	922.000
Wilcoxon W	3,337.000
Test Statistic	922.000
Standard Error	141.707
Standardized Test Statistic	-3.475
Asymptotic Sig. (2-sided test)	.001

here the difference in distribution of the difference in post challenge FEV1 scores among those with or without a family history is statistically significant. i.e those with a family history had a higher drop in FEV1 post challenge.

### Review of literature

Allergic rhinitis and its impact on asthma is in short called ARIA. In 2001 the first document was published which was later revised in 2008 and 2010<sup>9,18</sup>. Both are Ig E mediated inflammations<sup>10,19</sup>. AR is a major independent risk factor for development of asthma which is calculated as 3 fold risk<sup>20</sup>. It is commonly found that AR precedes asthma in many number of cases<sup>11,17</sup>. 3 kinds of proven relationships are found between the two<sup>12</sup>

1. Epidemiological
2. Immunological and
3. Clinical

Interesting facts about AR and asthma<sup>13,15</sup>

1. 40% of AR patients have asthma
2. 80% of asthma patients have AR
3. 70% of AR patients have ocular symptoms

Untreated allergic rhinitis in asthma leads to

- a. Increased chances of respiratory infections
- b. Decreased cognition
- c. Impaired quality of life
- d. Decreased productivity
- e. Increased emergency visits to hospitals

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- f. Increased chances of hospital inpatient admissions
- g. Prolonged stay of inpatients

It is estimated that appropriate treatment of allergic rhinitis in asthma leads to 61% reduction in hospitalization as inpatients<sup>14,16</sup>

57% of adults and 88% of children with AR have sleep disorders

### CONCLUSION

The study concludes a lot of information about the bronchial hyper reactivity existing in patients with only allergic rhinitis without any clinical or spirometric evidence of asthma. It can be concluded that 56% of individuals with Perennial allergic rhinitis had a significant drop in FEV<sub>1</sub> values post bronchial challenge test which was associated positively with family history of allergic rhinitis and early onset of allergic rhinitis. The drop was not associated whether the patient is suffering from concomitant eczema or not. The association was statistically not significant. Sex also had no association with the drop in FEV<sub>1</sub> values. Hence it is important to follow patients with a severe drop in FEV<sub>1</sub> values because they are the candidates for development of asthma in the future especially those with a prolonged history of AR and with a family history of same.

### CONFLICT OF INTEREST

Conflict of interest declared none.

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