THE STUDY OF IMPACT OF NASAL ALLERGY ON SPIROMETRY- A PROSPECTIVE STUDY

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ABSTRACT

BACKGROUND

Allergic rhinitis is characterised by an IgE-mediated inflammatory response of nasal mucosa to allergens and it has a close association with bronchial asthma. It has been observed that persons having nasal allergy has a strong risk of developing bronchial asthma in adults. Usually, patients suffering from allergic rhinitis will have impaired FEV_1 (n forced expiratory volume at timed interval of 1s and $FEF_{25-75\%}$ forced expiratory flow). Early bronchial impairment in nasal allergy can be evidenced by a reliable marker, i.e. $FEF_{25-75\%}$. Hence, nasal allergy can become a first step in the progression of respiratory allergy towards asthma. It has been noted that $FEF_{25-75\%}$ is useful in predicting the airway hyperresponsiveness. Compared to FEV1, $FEF_{25-75\%}$ is more sensitive indicator of chronic airway obstruction. In ARIA guidelines, it has been clearly stated the role of allergic rhinitis as a risk factor for development of bronchial asthma. Spirometric abnormalities in patients with nasal allergy is well documented. Hence, the present study has been undertaken to evaluate the impairment of spirometric parameters, especially FEV1, $FEF_{25-75\%}$ and forced vital capacity in patients with nasal allergy.

MATERIALS AND METHODS

It is a prospective study carried out on 200 patients suffering from allergic rhinitis attending ENT Outpatient Department and in each case the clinical diagnosis of nasal allergy is made on the basis of characteristic history and clinical findings on complete ENT examination.

RESULTS

In this study, 112 (56%) are males and 88 (44%) are females; male:female ratio being 1.27:1. The age ranges from 12 to 49 years. Majority 35% of cases are between 11 to 30 years, followed by 27% cases in the group of 31 to 40 years, 15% cases is the least in the group of 41 to 50 years.

CONCLUSION

Allergic rhinitis frequently present bronchial hyperresponsiveness even in the absence of asthmatic symptoms. Hence, nasal allergy and asthma can be considered as components of a single syndrome involving two parts of the respiratory tract and from previous studies, it is evident that these two disorders affect each other.

KEYWORDS

Spirometry, Forced Expiratory Volume, Absolute Eosinophil Count.

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BACKGROUND

Nasal allergy prevalence is increasing worldwide and is one of the commonest seen in the patients attending ENT outpatient department. Closed association between asthma and nasal allergy has been demonstrated in several studies. Asthma is still underdiagnosed despite the fact that prevalence of asthma is increasing worldwide especially with children and young adults. Allergic rhinitis has been demonstrated in several studies to be a strong risk factor for the onset of asthma in adults. Forced Expiratory Volume at one second (FEV_1) is considered to be main parameter to evaluate bronchial obstruction.[1,2]

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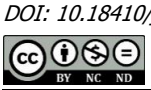

Aims and Objectives

Asthma is characterised by reversible airflow obstruction, hence FEV1 is an important parameter to evaluate bronchial obstruction. There is an increasing interest to consider the involvement of small airways in the pathogenesis of asthma. Though there is no direct parameter to assess the obstruction in the small airways, it has been assumed that the forced expiratory flow at 25% and 75% of the pulmonary volume might be considered as a measure of the caliber concerning small distal airways. Especially, patients with mild or initial stages of asthma with normal FEV_1 may show impaired $FEF_{25-75\%}$.

It is also observed in many patients of allergic rhinitis having bronchial hyperresponsiveness, which is a paramount

feature of bronchial asthma. Hence, impaired spirometric parameters in patients with perennial nasal allergy could be considered as predictive for such cases to progress to develop asthma.[3,4]

MATERIALS AND METHODS

It is a prospective study carried out on 200 patients suffering from allergic rhinitis attending ENT Outpatient Department, and in each case, the clinical diagnosis of nasal allergy is made on the basis of characteristic history and clinical findings on complete ENT examination.

A detailed clinical history and a complete physical examination including allergy evaluation is performed and subjected to spirometry.

Inclusion Criteria- Patients having history of nasal allergy for at least 1 year.

Exclusion Criteria- Known case of asthma especially having history of smoking.

RESULTS

In this study, 112 (56%) are males and 88 (44%) are females; male:female ratio being 1.27:1. The age ranges from 12 to 49 years. Majority 35% of cases are between 11 to 30 years, followed by 27% cases in the group of 31 to 40 years, 15% cases is the least in the group of 41 to 50 years (Table 1).

Occupational history was also taken in which maximum number of cases (39%) are students followed by household workers (24%), agriculture field workers around 17% (Table 2).

Out of 200 cases, 27% have family history of single parent suffering from allergy. 24% having the history of their siblings suffer from allergy in one or the other form. 15% have history of both parents affected. 34% didn't have any significant family history (Table 3).

Majority of cases susceptible for exposure to dust (32%). 20% patients showed seasonal changes, around 16% showed food allergy, in 10% of cases, no significant history of exposure could be elicited (Table 4).

Absolute Eosinophil Count (AEC) is found to be raised in majority of cases, i.e. more than 400/mm^3 in 84%. Around 45% are found to have AEC between 401 to 800 mm^3 followed by 34% cases with AEC in between 401 to 500/mm^3, 16% with AEC below 300/mm^3. Only 5% of patients having AEC more than 800/mm^3 (Table 5).

In this study, all the 3 spirometric parameters (FVC, FEV_1 and $FEF_{25-75\%}$) are impaired in 6% of cases. In 9% of cases, only 2 parameters (FEV_1 and $FEF_{25-75\%}$) are impaired and in 64% of cases only one parameter, i.e. $FEF_{25-75\%}$ found impaired. Rest of the cases doesn't show any impairment in spirometric parameter. Table 6 shows statistical assessment of impairment of spirometric parameters in association with the epidemiological factors, including sex, occupation and predisposing factors. The 'p' value is significant for $FEF_{25-75\%}$ as 0.001 and for FVC as 0.037.

Sl. No.	Age Group (Years)	Gender		Total Percentage
		Male	Female	
1.	11-20	26	20	23
2.	21-30	38	32	35
3.	31-40	30	24	27
4.	41-50	18	12	15
Total		**200**		**100**

Table 1. Age and Gender Distribution

Sl. No.	Occupation	Male	Female	Total Percentage
1.	Student	48	30	39
2.	Household workers	Nil	48	24
3.	Agriculture field workers	30	4	17
4.	Office worker	10	6	8
5.	Shopkeeper	16	Nil	8
6.	Painter	8	Nil	4
	Total (200)	**112**	**88**	**100**

Table 2. Association with Occupation

Sl. No.	Family History of Allergy	Number of Cases	Total Percentage
1.	Single parent	54	27
2.	Both parents	30	15
3.	Siblings	48	24
4.	No family history	68	34
	Total	**200**	**100**

Table 3. Association With Family History

Sl. No.	Predisposing Factor	% Male	% Female	Total
1.	Dust	30	34	32
2.	Seasonal changes	24	16	20
3.	Foods (fish or milk products)	22	10	16
4.	Others (smoke flowers)	24	8	16
5.	Wheat flour	2	10	6
6.	No allergic factor	10	10	10
	Total (200)	**112**	**88**	**100**

Table 4. Predisposing Factors

Sl. No.	Absolute Eosinophil Count (AEC)	Percentage of Cases
1.	Up to 400/cu mm	16
2.	401 to 500/cu mm	34
3.	501 to 800/cu mm	45
4.	>801/cu mm	5
	Total	**100**

Table 5. Absolute Eosinophil Count

	FEV 25-75%		P Value	FEV 1		P Value	FVC		P Value
Gender	< 80 %	> 80 %	0.540	< 80 %	> 80 %	0.715	< 80 %	> 80 %	0.557
Female									
No	72	16		12	76		4	84	
%	82	18		14	86		5	95	
Male									
No	86	26		18	94		8	104	
%	77	23		16	84		7	93	
Occupation									
Agriculture			0.304			0.914			0.858
No	28	6		4	30		2	32	
%	82	18		12	88		6	94	
Household workers									
No	34	14		6	42		2	46	
%	71	29		13	88		4	96	
Others									
No	28	12		6	34		4	36	
%	70	30		15	85		10	90	
Students									
No	68	10		14	64		4	74	
%	87	13		18	82		5	95	
%	88	13		13	88		0	100	
%	61	39		6	94		0	100	
%	82	18		18	82		9	91	
Predisposing factor									
Dust			0.001			0.205			0.037
No	54	10		12	52		2	62	
%	84	16		19	81		3	97	
Others									
No	52	0		6	46		4	48	
%	100	0		12	88		8	92	
Seasonal									
No	36	4		4	36		0	40	
%	90	10		10	90		0	100	
Smoke									
No	16	8		8	16		6	18	
%	67	33		33	67		25	75	

Table 6. Effect Over Spirometric Parameters

DISCUSSION

Ciprandi et al stated that majority of allergic rhinitis cases are between the age group of 20-30 years.[5] Lim M. Y. reported highest number of patients of allergic rhinitis between 20-40 years of age.[6]

The incidence of allergic rhinitis in this study is maximum in the age group of 21-30 years about 35%, which is in accordance with various studies.

Wallace D. V. in their study reported 66.3% male and 33.7% female with male-to-female ratio being 1.96:1.[7]

In the present study, the incidence of allergic rhinitis is little higher in males with male-to-female ratio of 1.27:1, which is in accordance with various other reports.

Lim M. Y. found 43% had positive family history.[6] Ciprandi et al found family associations in 60% of cases.[5]

In this study, 66% have positive family history. Davila in the study of genetic aspects of allergic rhinitis emphasised the role of genetics and family history.[8]

Occupational incidence being more in students, household workers and agricultural field workers clearly indicates association to increased and continuous allergen exposure. In the present study, majority of cases are susceptible to dust exposure. Seasonal changes and food stuffs also seems to be an important factors to initiate allergic response.

Douglas MacMilan in a study of 50 cases of perennial rhinitis found majority of cases being sensitive to dust.[9]

Absolute Eosinophil Count (AEC) is found to be raised in majority of cases, i.e. more than 400/mm^3 in 84%. Around 45% are found to have AEC between 401 to 800 mm^3 followed by 34% cases with AEC in between 401 to 500/mm^3, 16% with AEC below 300/mm^3. Only 5% of patients having AEC more than 800/mm^3.

D MacMillan reported eosinophilia in 8 out of 15 cases of allergic rhinitis.[9] Lowell F C et al also had similar results.[10]

In this study, all the 3 spirometric parameters (FVC, FEV_1 and $FEF_{25-75\%}$) are impaired in 6% of cases. In 9% of cases, only 2 parameters (FEV_1 and $FEF_{25-75\%}$) are impaired and in 64% of cases only one parameter, i.e. $FEF_{25-75\%}$ found impaired. Rest of the cases doesn't show any impairment in spirometric parameter.

G. Ciprandi et al studied 100 cases and found 5 cases with reduced FEV_1 and 48 with reduced $FEF_{25-75\%}$.[4]

G. Ciprandi et al found 6% cases with FVC <80%, 12.8% cases with FEV_1 <80% and 87% cases with $FEF_{25-75\%}$ <80% of predicted.[5]

Ciprandi G et al concluded that impaired $FEF_{25-75\%}$ values constitute a relevant predictive factor for severe bronchial hyperresponsiveness.[6]

CONCLUSION

Allergic rhinitis frequently present bronchial hyperresponsiveness even in the absence of asthmatic symptoms. Hence, nasal allergy and asthma can be considered as components of a single syndrome involving two parts of the respiratory tract, and from previous studies, it is evident that these two disorders affect each other.[11] In the subjects having normal FEV_1 values, bronchial hyperresponsiveness maybe envisaged as a marker of susceptibility to develop asthma. On the other hand, in mild asthma patients during interval of acute attacks, lung function maybe normal concerning FEV_1 values. Further, asthma is a chronic inflammatory disease of airways, and using other parameters, it has been demonstrated as a persistence of inflammation, also in absence of symptoms, mainly involving smaller airways.[12,13] In these cases, abnormal $FEF_{25-75\%}$ values maybe observed. It has been reported that 25-75% maybe reduced in asthma patients with normal FEV1 and FVC values.[13] It has been suggested that $FEF_{25-75\%}$ be considered as a marker of small airways impairment in mild asthma patients with normal FVC values.[2]

This study further strengthens the impaired spirometric parameters indicate progression of allergic rhinitis to asthma. Also, highlights the frequent coexistence of bronchial impairment in patients with nasal allergy, thereby supporting strong link between upper and lower respiratory tract.

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