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A Study on Profile of Allergens and the Severity of FEV1 in Allergy Patients in a Tertiary Care Centre in Mangalore, India

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ABSTRACT

Background: *Bronchial asthma and allergic rhinitis are the conditions which are co-existent and are a part of the inflammatory cascade. Allergens trigger the inflammation and initiate the allergic march. The pattern and the frequency of allergenicity may bring out changes in spirometric parameters.* ***Aim:*** *To identify the pattern of allergen sensitization in patients with bronchial asthma (BA) and allergic rhinitis (AR). To correlate the severity of FEV1 (forced expiratory volume at a time interval of 1 sec) in patients with allergy. To delineate the offending allergen geographically based on the coastal and the non-coastal region.* ***Type of Study:*** *Retrospective study.* ***Materials and methods:*** *The data regarding the skin prick test (SPT) and spirometry were collected along with demographic and clinical symptoms from the patients who visited the Department of pulmonary medicine in K S Hedge Medical Academy. SPT was performed using standard kits and procedures accordingly. Spirometry performed pre and post-bronchodilator according to ATS guidelines.* ***Results:*** *Total 100 patients were enrolled in the study, with almost equal gender distribution (males were 49% and females were 51%), 58% were using inhaler medications at the time of SPT. Predominant symptoms were breathlessness (77%), cough (68%) and sneezing (66%). SPT showed sensitivity predominantly to aeroallergens like house dust mites (84%) followed by acacia (58%), and mesquite (58%). The mean FEV1 was 1.74 L in the study group.* ***Conclusion:*** *Aeroallergens causes more significant impairment of FEV1 than food allergens.*

Keywords: Bronchial asthma, Allergenicity, Sterile

INTRODUCTION

Bronchial asthma and allergic rhinitis are the conditions which are co-existent and are a part of the inflammatory cascade. One may predispose an individual to another [1-3]. Allergens trigger inflammation and initiate the allergic march. The pattern and frequency of allergenicity may bring out changes in pulmonary function test. The prevalence of aeroallergens is different in various areas owing to the geographic area, climate, and vegetation [4].

Pollen allergens, mold spores, house dust mites, animal allergens, insect allergens and food allergens constitute a wide spectrum of allergenicity in individuals. These have been attributed to the increase of symptoms in atopic asthma. In our current study, we aim to investigate the pattern of allergens and FEV1 severity in atopic asthmatic patients.

PATIENTS AND METHODS

Patients who were treated with the pulmonary medicine at K S Hegde Medical Academy, Mangalore for allergic rhinitis, bronchial asthma, and other atopic conditions were included in the study.

Patient demographics like age, gender, BMI, occupation, prior history of the inhaler and allergic medications, geographic lineage, clinical symptoms, childhood and family history of asthma were collected.

The skin prick test panel was customized with an array of aero and food allergens, for the corresponding geographical area. Buffered saline and histamine were used as negative and positive controls, respectively. Skin prick test was performed by applying a drop of antigen to the healthy skin of the volar surfaces of the forearm and was prickled with a sterile lancet. Reading was interpreted after 15 to 20 minutes. Assessment of skin reactivity was done by calculating the mean diameter of wheal (D+d)/2; D=largest diameter, and d=orthogonal or perpendicular diameter at the largest

width of D after 15 to 20 minutes. A positive result (2+ and above) to a specific allergen is indicated by a mean wheel diameter measuring 3 mm or more, greater than the negative control (buffered saline) [5].

Spirometry was done using Helios system with acceptable reference values and procedures followed according to the ATS guidelines [6].

RESULTS

Total 100 patients were enrolled in the study, with equal gender distribution (female: 51% and males: 49%), and the majority of the patients were belonging to <25 age group (28%). Normal BMI was seen in the majority of the patients (69%). Around 58% of patients had a prior history of inhaler medications, while 76% had a prior history of allergy medications intake. The subjects were typified as those coming from a coastal region (<50 km from sea shore) (84%) and those from the non-coastal region (>50 km) (16%) (Table 1).

Table 1 Patient demographics

Patient Demographics	N=100
Age	
<25	28
25-40	27
40-55	26
>55	19
Gender	
Male	49
Female	51
BMI	
<18 (Underweight)	16
19-25 (Normal)	69
26-30 (Overweight)	12
>30 Obese	3
Occupation	
Housewife	23
Student	28
Carpenter, Mason, Shopkeeper, Baker, etc.	24
Agriculture	10
Driver	2
Tailor	3
Clerk, Office, teacher, etc.	10
History of inhaler medication	
Present	58
Absent	42
Prior history of allergy medications	
Present	76
Absent	24
Geographic	
Coastal	84
Non-coastal	16
Childhood history of BA	
Present	16
Absent	84

The predominant clinical symptoms in patients included breathlessness (77%), cough (68%), sneezing (66%), wheeze (43%), were observed, whereas, 16% patients had a childhood history of bronchial asthma (Figure 1).

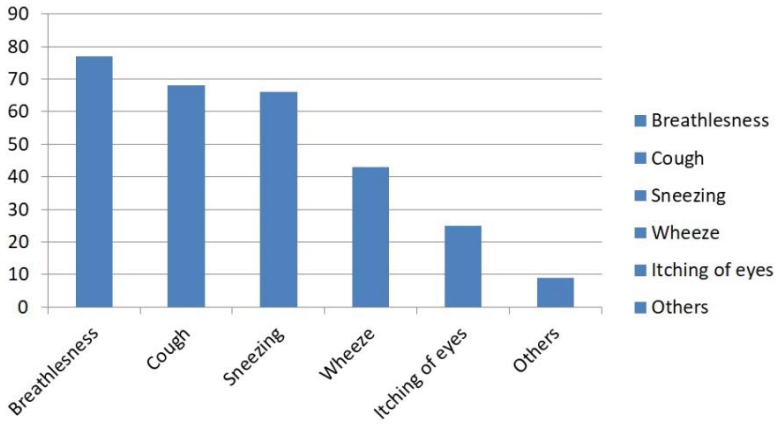

Figure 1 Patient symptomatology

Predominant allergens observed were house dust mites (Mix) (84%), acacia (58%) and mesquite (58%). The most common allergens seen in the patients from the coastal region was house dust mite (92.7%), acacia (86%) and codfish (73%) (Table 2). The common allergens in patients from non-coastal regions were house dust mites (97.1%), mesquite (86%) and acacia (70%) (Table 3, Figures 2-5).

Table 2 Geographical distribution of most common allergens

Geographic	Most Common Allergen 1	Most Common Allergen 2	Most Common Allergen 3
Coastal	House Dust Mite (92.7%)	Acacia (86%)	Codfish (73%)
Non Coastal	House Dust Mite (97.1%)	Mesquite (86%)	Acacia (70%)

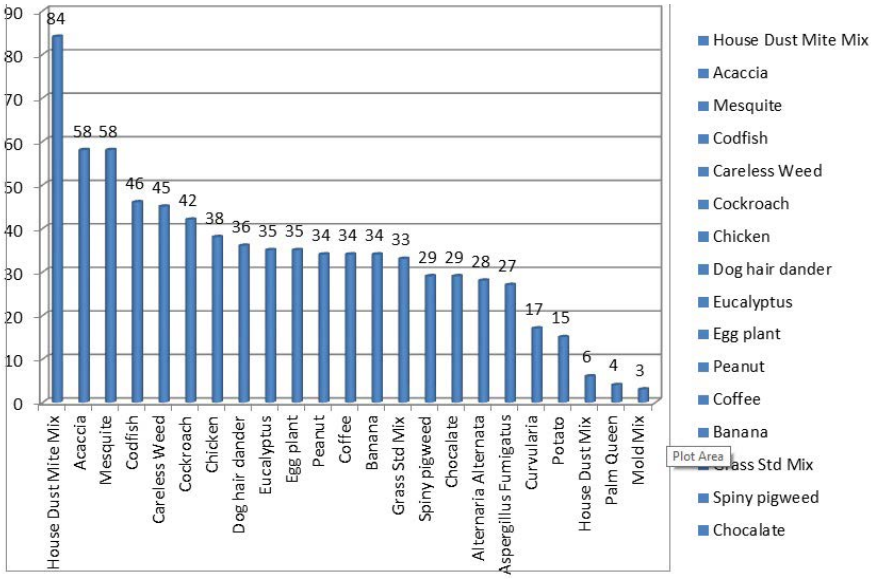

Figure 2 Pattern of allergenicity

Table 4 FEV1 severity

Severity N=100	
Mean FEV1	**1.74 L**
Mild >80%	45
Moderate 60-80%	31
Severe <60%	24

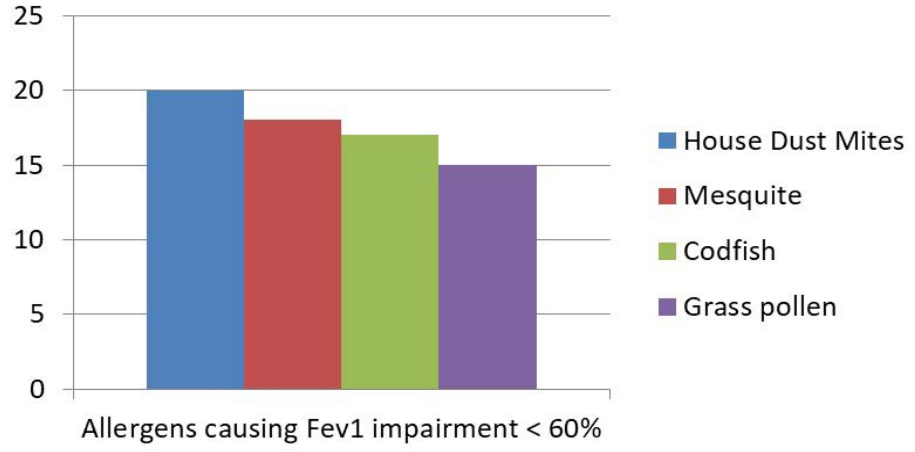

Figure 3 Pattern of allergenicity in FEV1<60%

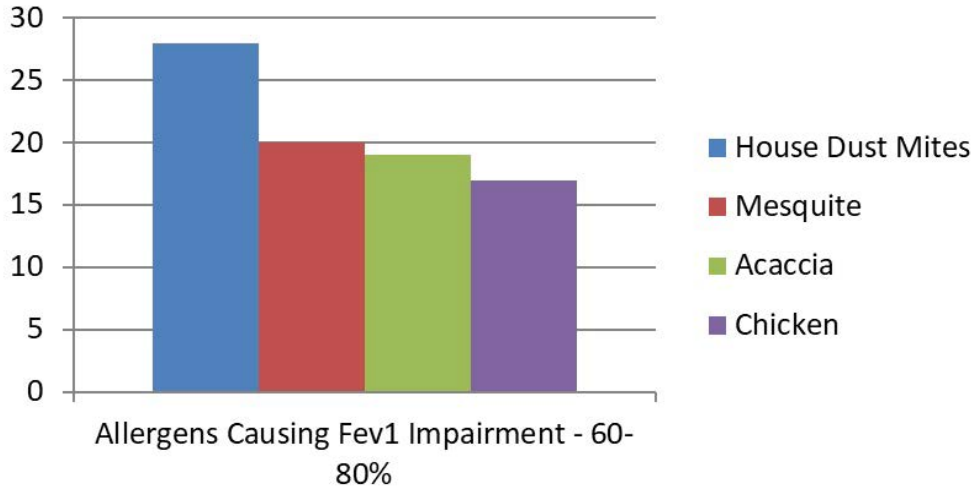

Figure 4 Pattern of allergenicity in FEV1-60-80%

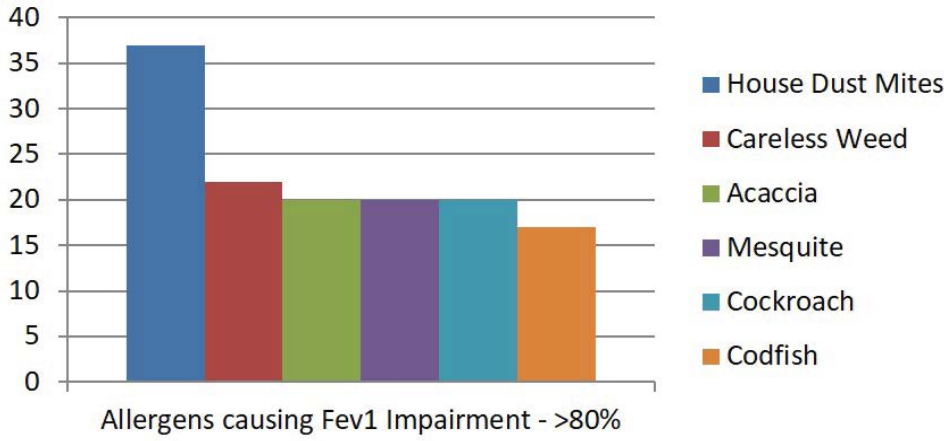

Figure 5 Pattern of allergenicity in FEV1>80%

DISCUSSION

Bronchial asthma is a chronic inflammatory disease of airways, which is prevalent worldwide with variable geographical and seasonal pattern. Atopy is considered as a strong risk factor for the development of asthma, increasing the risk by 10-20 fold compared with those who are non-atopic [7]. It was observed that if atopy was a factor in aggravating

asthma, the severity of asthma would increase with an increase in allergy defined by symptoms and numbers of positive prick skin tests [8]. Allergic rhinitis is a recognized risk factor for bronchial asthma, with 20%-30% of such patients having bronchial asthma, conversely, 60%-80% of patients with bronchial asthma have co-existing AR.

Different types of environmental aeroallergens and food allergens are known to play a role in triggering or exacerbating BA or AR. Identification of the most prevalent aeroallergens in each area has a very important role in the diagnosis and the treatment of BA and/or AR.

Our study observed that majority of the patients in the younger age group suffering from atopy and allergy had skin test sensitivity to aero & food allergens. This was observed in similar studies where maximum cases (>50%) were seen in the age group of 16-30 years [9,10].

Our study populations had breathlessness and cough as a most predominant presenting symptom, also reported by Aggarwal, et al., [11].

We have observed the prevalence of allergenicity among coastal and non-coastal regions wherein we found that majority of the patients were allergic to house dust mites irrespective of the geographical location. However, patients from coastal regions also had allergies predominantly to acacia and codfish, while, non-coastal patients having allergies to mesquite and acacia. The variation in the prevalence of aeroallergen reactivity in the different region could be due to different geo-climatic condition and adaptation of specific microbiological flora and fauna in specific climate and varying food habits.

The pattern of allergenicity in these patients was observed and the most common were the house dust mite, acacia, mesquite, etc. Study by Ghaffari, et al., and Almorgen showed that most common SPT reaction was with house dust mites [12,13]. Our study has consistent findings with this.

Total 55% of allergic patients had airflow limitation (moderate to severe). The pattern of allergenicity and pulmonary impairment was observed among varying grades of airflow limitation. These findings were in continuity with other studies where they observed increased bronchial responsiveness to be associated with lower levels of lung function [14].

Ulrik, et al., have found that subjects with new or persistent atopy to house dust mites had significantly increased bronchial responsiveness compared with non-atopic subjects, and moreover, pre-challenge FEV1 percent predicted was significantly correlated with the bronchial responsiveness [15].

In another study, according to the spirometric lung function and skin prick test results among asthmatic children, atopy, a positive skin test reactions to house dust mite and cat and lower level (as % of predicted) in FEV1 were associated with an increased variation in PEF [16].

The possible explanation could be that the basic immune mediator-induced mucosal injury is similar in both atopic and non-atopic patients. However atopic patients may be associated with more easily identified stimuli of mediator release than non-atopic patients. If there is an allergic-extrinsic component in the patient, chronic non-specific stimulation of the mast cell allergen-induced late-phase immune reactions may create a prolonged non-specific airway hyperreactivity, which can produce bronchospasm even in the absence of identifiable extrinsic factor [17,18].

CONCLUSION

Allergens are the prominent causes of allergic symptoms in patients with BA or AR. Different types of environmental allergens are known to play a role in triggering or exacerbating BA or AR. Identification of the most prevalent allergens in each area has a very important role in the diagnosis and the treatment of BA and/or AR. The skin prick test is the recommended initial investigation to find out the offending allergens.

Our study demonstrates the pattern of allergenicity seen in allergic patients in Mangalore and concludes that major aero and food allergens can cause airflow limitation in patients with allergy. Further studies like bronchial provocation etc. may be needed to establish this.

DECLARATIONS

Conflict of Interest

The authors have disclosed no conflict of interest, financial or otherwise.

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