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SENSITIVITY PATTERN TO COMMON INHALANT ALLERGENS IN SUBJECTS WITH ALLERGIC RHINITIS IN KERALA

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ABSTRACT
The global prevalence of allergic diseases is on the rise with similar trends being observed in India also. Estimates reveal that over 20% of the world's population suffers from one or more IgE mediated allergic disease. The vast majority of allergic states can be diagnosed by eliciting a detailed history and focused physical examination; other appropriate laboratory tests have adjunctive and corroborative role. The definitive diagnosis of allergy requires identification of the culprit allergen and demonstration of temporal relationship between allergen exposure to symptom onset. The crucial test for the diagnosis of immunoglobulin E (IgE) mediated allergy is skin prick test (SPT). A positive SPT indicates sensitisation to tested allergen. In the present study, we describe the sensitisation pattern to common aeroallergens in subjects with allergic rhinitis and their correlation with disease severity.

KEYWORDS: Allergic rhinitis, skin prick test, aeroallergens, dust mite sensitisation, mold sensitivity.

BACKGROUND
Allergic rhinitis is an extremely common disease encountered by general practitioners, physicians and otolaryngologists across the globe. Literature reveals that 10 to 30 percent of children and adults in the United States and other industrialized countries have manifestations related to allergic rhinitis.[1.2] Allergic rhinitis is characterized by paroxysms of sneezing, rhinorrhea, and nasal obstruction, often accompanied by itching of the eyes, nose, and palate. It is frequently associated with other allergic diseases like allergic conjunctivitis, asthma and atopic dermatitis. The diagnosis of allergic rhinitis can be made on clinical grounds based upon the presence of characteristic symptoms and supportive findings on physical examination. Although not essential, allergy skin testing confirms the diagnosis in the presence of appropriate clinical background. In addition, some sensitization patterns are common in nasal allergy and may correlate with severe disease.[3] Idea about sensitisation to specific agents may allow for avoidance measures as well as allergen specific immunotherapy. The present study attempts to elucidate the occurrence of sensitisation to common aeroallergens in patients with allergic rhinitis.
Study Objectives

The objective of the study was to examine the prevalence of allergy to common aero-allergens in subjects with allergic rhinitis as determined by the allergic skin prick test and to correlate sensitivity pattern with disease severity.

METHODS
The present study was a retrospective analysis conducted among patients with allergic rhinitis attending the Otorhinolaryngology out-patient department of Rajagiri hospital, a tertiary care institute in Kerala South India. The study period extended from September 2017 to October 2018. The diagnosis of allergic rhinitis was made on clinical grounds. Pregnant and lactating females were excluded from the study. All the patients were subjected to detailed history and ENT examination, complete blood counts, total serum IgE, and X-ray of paranasal sinuses. In case of coexisting skin or airway symptoms or signs, consultation with respective (dermatology and pulmonology) departments were requested. Spirometry with bronchodilator reversibility testing was done in cases of suspected asthma. The antigens were obtained from Merck Allergo Pharma, Germany which included 2 types of dust mite, 5 varieties of grass and pollen each, fungal antigens, cat and cow epithelia. Test performance and interpretation was done as per prescribed standards.[4] The positivity to tested aeroallergens was noted in each case and was correlated with disease severity by the RCAT score.[5]

RESULTS

57 patients with allergic rhinitis underwent SPT for aeroallergens. The study subjects include 33 males and 24 females (Fig 1). The mean age of study subjects was 27.8 years. The comorbid allergic states in the study subjects include allergic conjunctivitis in 16 subjects, atopic dermatitis in 14 subjects and asthma in 13 patients. (Fig 2).

The reaction pattern of the study subjects is summarised in Table 1. Of the 57 study subjects, 43 (75%) had positive reaction to house dust mite and 33 (58%) had positivity to aspergillus species. Ragweed and Bermuda grass sensitivity was noted in 49% and 42% respectively. Multiple agent allergies (house dust mite, molds, grass and pollens) was noted in 32 out of 57 subjects.

Table 1: Incidence of positivity of common aeroallergens in SPT - number / percentage of subjects.

Aeroallergen	Positivity in spt (percentage)
House dust mite	43 (75)
Aspergillus species	33 (58)
Bermuda grass	24 (42)
Timothy grass	17 (30)
Ragweed	28 (49)
Corn	12 (21)
Penicillium	7 (12)
Cat epithelia	12 (21)
Cow epithelia	7 (12)

The mean score of the Rhinitis Control Assessment Test (RCAT) in the study subjects was 13.1. Table 2 A considerably lower mean score of 8.75 was noted in the 32 subjects who had multiple agent allergies as opposed to the 25 patients with limited agent (one or two broad allergen group) sensitivity. In the subgroup with limited agent allergy, the mean RCAT score was 18.8. However, even in the limited agent allergy subgroup, the symptom score was considerably lower in the set of patients where mold allergy was present. The mold allergy set had a score of 9.33, which was quite similar to the multiple agent allergy group. The relation between RCAT score and allergen pattern is shown in figure 3.

Table 2: Rhinitis symptom score in various subgroups of study subjects.

Nature of population	Rcat score	Clinical implication
Total study subjects	13.1	The subjects have moderate disease severity
Subjects with multiple agent allergy	8.75	Subjects with multiple agent allergy have more severe disease
Subjects with limited agent allergy	18.8	Subjects with allergy to 1 or 2 allergen classes tend to have milder disease
Limited agent allergy (mold allergy present)	9.33	Even if limited allergy, the presence of mold allergy predisposes to severe disease

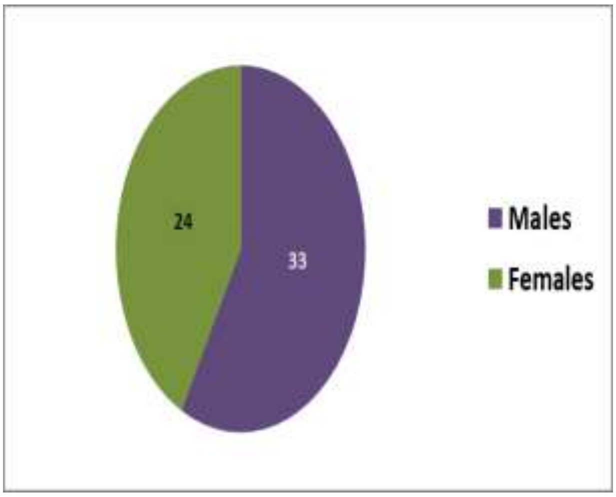

Figure 1: Gender of Allergic rhinitis patients who underwent SPT.

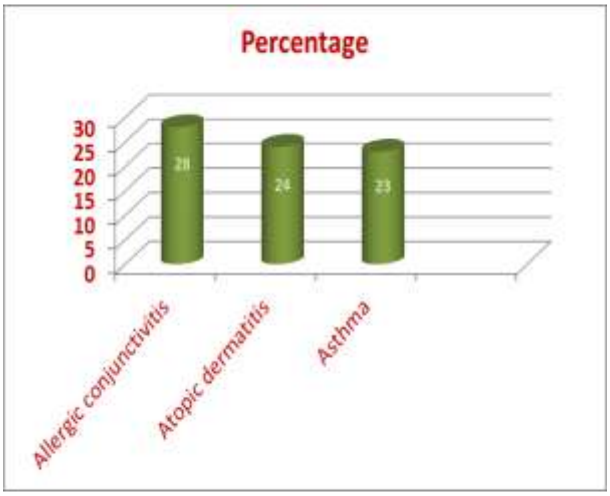

Figure 2: Comorbid allergic conditions in subjects with allergic rhinitis (in percentage).

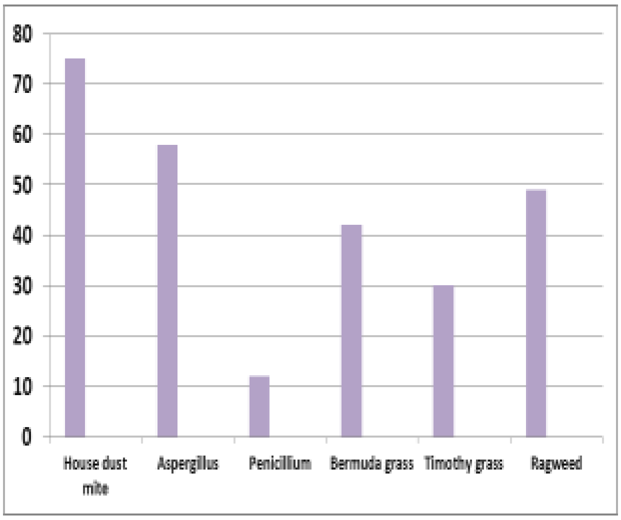

Figure 3: Percentage of individual agent sensitivity in the study population.

DISCUSSION

All patients who were subjected to SPT in the present study had reaction to at least one aeroallergen tested. This is in lines with previously published studies. Giridhar BH et al. reported 87.5% [6] sensitivity to at least one antigen.

A previous study conducted in Lucknow[7] in patients with nasobronchial allergy revealed that the common offending allergens were insects (21.2%), followed by dusts (12.0%), pollens (7.8%), animal dander (3.1%), and fungi (1.3%). The common fungal antigens were Aspergillus fumigates, followed by Aspergillus flavus, Alternaria teneis, and Fusarium sodani. Kerala being located in the Southern tip of India is much close to equator than Lucknow and the consequent high ambient moisture probably accounts for high atmospheric presence and sensitisation to molds in the present study. Holopainen[8] gave an account of the allergic pattern in patients of seasonal and perennial allergic rhinitis. Sensitivity to house dust was present in 44%, pollens in 30-40%, mite extract in 10%, and molds in 9%, whereas animal danders were not seen to have bearing on the SPT.

Another study conducted in the same geographic territory[9] (Central Kerala) revealed that housefly was the most common allergen observed in 53.26% of study subjects (74/139) followed by rice grain dust 47.5% (66/139). Insect allergens were more common in all allergic conditions (rhinitis, dermatitis and asthma) as compared to other allergens. Aspergillus sensitivity was seen in 16% of subjects in this study. Prawn was the most common food allergen identified. Regional variation exists in the pattern of allergic disease manifestation and nature of allergens. In addition, change of flora over a successive time period due to change in the climatic factors may account for varying results in studies conducted at vast time frames apart.

The present study has revealed a very high percentage of fungal sensitisation in subjects with allergic sinusitis. Previous studies from India which have reported occurrence of fungal allergenicity by SPT[10]. The incidence of sensitivity to Penicillium has been 17.3% in Rohtak city, a high value similar to that observed in the present study. A second study from Jalandhar[11] concluded that Caldosporium and Alternaria were the common fungal sensitivity noted in subjects with nasobronchial allergy. Increasing urbanization and construction work probably contributes to the ever-increasing atmospheric fungal load and allergy. Significant mold sensitization was found to have strong correlation with development of chronic and more severe allergic rhinitis and asthma.[12]

Multiple published evidences indicate that sensitivity to mold allergens is related to asthma severity.[13,14,15] A European community respiratory health survey of 1,132 adults with asthma found that sensitivity to the airborne molds alternaria alternata and Cladosporium herbarum are significant risk factors for severe asthma.[16] The relation between mold sensitivity and severity of allergic rhinitis is less well established, although the present study noted a significantly lower RCAT score(indicating severe allergic rhinitis) in those mold allergy as compared with the whole study population (RCAT score of 9.33 Vs 13.1). Subjects with multiple agent allergies also had more severe rhinitis symptoms.

Limitations of the study.

The present study used a limited aeroallergen panel that included substantially lesser number of aeroallergens than many of the previously conducted studies. This was an offshoot to the fact that the allergens manufactured by Merck Allergopharma has substantially more purified allergens resulting in significantly less false positivity and false negativity. The allergen panel did not have insect allergens which might have implications in the geographic location of the study. Nevertheless, all the study subjects revealed sensitivity to one or more the included antigens and thereby conclusively demonstrated the allergic nature of the disease.

CONCLUSIONS

The present study identified that all the study subjects with allergic rhinitis had sensitisation to one or more of the tested aeroallergens. 75% and 58% of the subjects had sensitivity to house dust mite and fungal allergens respectively. 32 out of the 57 study subjects had SPT reaction to multiple allergens. Severe rhinitis symptoms were noted in subjects with multiple agent allergies as well as those with mold sensitivity.

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