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A clinical study of inhalant allergens in patients with allergic rhinitis

Suhas Y. Choudhari*, Aravind B. Sangavi

Department of ENT, Raichur Institute of Medical Sciences, Raichur, Karnataka, India

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***Correspondence:**
Dr. Suhas Y. Choudhari,
E-mail: rtkbisht@gmail.com

ABSTRACT

Background: The basis of diagnosis of allergy requires a good history and examination, however, the diagnosis cannot be confirmed on the basis of symptoms alone, because both allergic and non-allergic conditions can present with similar symptoms. Hence, allergy testing in the form of specific IgE (sIgE) measurement is an important aid in demonstrating both the presence and severity of such an allergy. The present study was undertaken to find out the common environmental allergens prevailing in Raichur causing allergic rhinitis, using carbohydrate cross reactive determinants (CCD), an in vitro test with high degree of sensitivity.
Methods: The present prospective study was conducted among 30 patients with allergic rhinitis. A detailed general and ENT examination were done, X-ray of PNS, CT scan of PNS, diagnostic nasal endoscopy and nasal smear examination for eosinophils, absolute eosinophil count and serum IgE levels using Euroimmun system of in vitro assay of specific IgE antibodies.
Results: Allergy to dust mite, D. faranie, corn, carnation flower, sunflower, sheep wool and straw dust were the most frequent allergens causing allergic symptoms among patients in Raichur area. Total serum IgE was elevated in all the patients, 60% were allergic to dust mite as found by anti CCD specific IgE.
Conclusions: Antibodies to dust mite D. faranie, rye, T. mothy grass was the commonest finding. Identification of inhalant allergens is an important factor in prevention and treatment of allergic rhinitis.

Keywords: Allergy, Allergens, CCD [Carbohydrate Cross-reactive Determinants], Allergic Rhinitis

INTRODUCTION

Immunoglobulin E (IgE) predominantly mediates immunity and immune responses against parasitic infections, but it is also an essential component of type I hypersensitivity reaction, which can cause anaphylaxis, asthma, atopic dermatitis, and allergic rhinitis.[1] Allergic rhinitis was defined in 1929, it is a symptomatic disorder of the nose induced after allergen exposure by an immunoglobulin E (IgE)-mediated inflammation of the membranes lining the nose. It is a global health problem that causes major illness and disability worldwide. The three cardinal symptoms in nasal reactions occurring in allergy are sneezing, nasal obstruction and mucous discharge.[2] It is the cause, coexisting disorder or predisposing factor in many cases of chronic sinusitis, serous otitis, increased susceptibility to upper and lower respiratory infections and orthodontic disorders such as overbite and maldeveloped dental archs.[3]

The basis of any diagnosis of allergy requires a good history and examination, which should then provide a certain degree of confidence as to whether or not allergy is present. However, the diagnosis cannot be confirmed on the basis of symptoms alone, because both allergic and non-allergic conditions can present with similar symptoms. Hence, allergy testing in the form of specific IgE (sIgE) measurement is an important aid in demonstrating both the presence and severity of such an allergy.[4]

The present study was undertaken to find out the common environmental allergens prevailing in Raichur causing allergic rhinitis, using carbohydrate cross reactive determinants (CCD), and an in vitro test with high degree of sensitivity.

METHODS

The present prospective study which was conducted among 30 patients with allergic rhinitis in the department of ENT and H/N surgery, Raichur institute of medical sciences, Raichur from January 2016 to March 2016. Patients with watery nasal discharge, stuffy nose, sneezing, itching of the nose, eyes and throat were included in the study. Exclusion criteria were patients with other causes of nasal obstruction, mucopurulent nasal discharge.

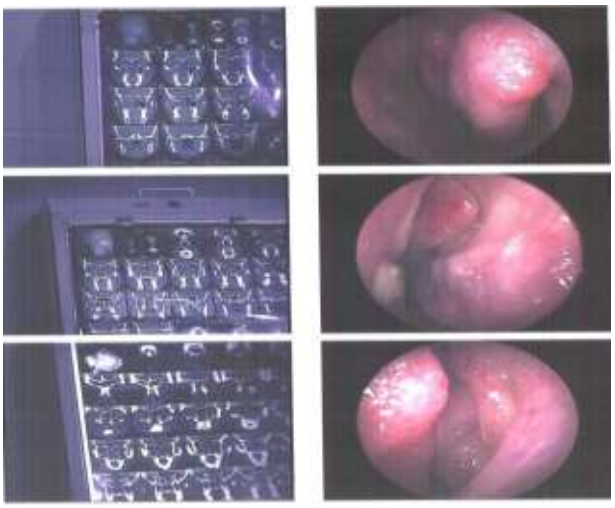

Figure 1: CT SCANS showing mucosal hypertrophy with in the nose and PNS and diagnostic nasal endoscopy showing pale edematous nasal mucosa.

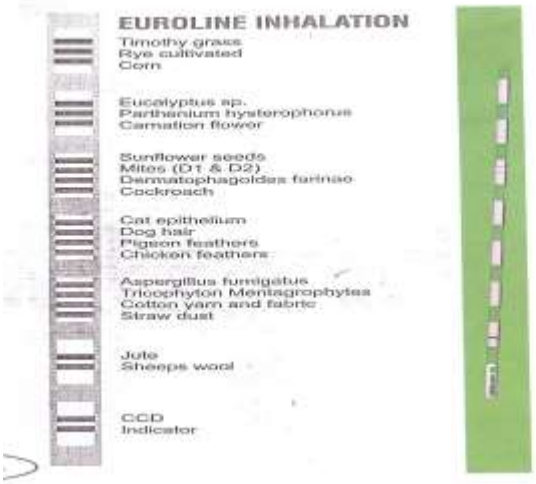

Figure 2: Euroimmune inhalational CCD Strip.

A detailed general and ENT examination were done, apart from routine hematological tests, X-ray of PNS, CT scan of PNS, diagnostic nasal endoscopy (figure -1) and nasal smear examination for eosinophils, serum IgE levels and absolute eosinophil count. Euroimmun system of in vitro assay of specific Ig E antibodies provides multiple indicator bands. Each band denotes the specific allergen, and darker the band, more the allergy in the test subject (Figure 2).

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The assessment of allergens was done by a in-vitro blood test to evaluate anti-CCD IgE in every sample. The CCD in vitro test and other cost were borne by the invigilators. The results were analyzed and depicted in bar diagrams, sector diagrams.

RESULTS

There were 13 males and 17 females. Sex ratio being 0.76:1, male: female. Age distribution ranged from 17 years to 75 years. All patients presented with watery nasal discharge, stuffy nose, sneezing, itching of the nose, eyes and throat. The results were analyzed and depicted in bar diagrams, sector diagrams. Total serum IgE levels were markedly increased (Figure 3).

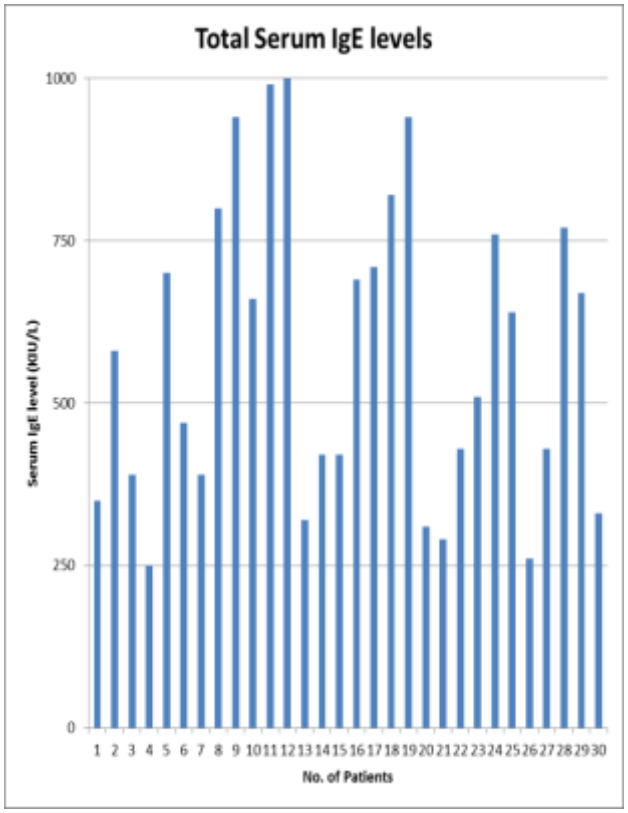

Figure 3: Bar Diagram showing markedly raised total serum IgE levels.

Table1: Percentage of allergens in the study subjects.

Allergens	No. of subjects tested positive	Percentage(%)
Timothy grass	13	43.33
Cultivated rye	17	56.67
Corn	16	53.33
Eucalyptus oil	12	40
Carnation flower	14	46.67
Sunflower	14	46.67
Dust mite	18	60
Dermatophagoides faranie	12	40
Cockroach danders	14	46.67
Cat epithelium	9	30
Pigeon feathers	7	23.33
Chicken feathers	13	43.33
Aspergillusfumigatus	10	33.33
Trichophytonmentagrophytes	9	30
Cotton yarn fabric	4	13.33
Rag weed	9	30
Straw dust	1	3.33
Jute	13	43.33
Sheep wool	14	46.67
Alternaria alternata	1	3.33

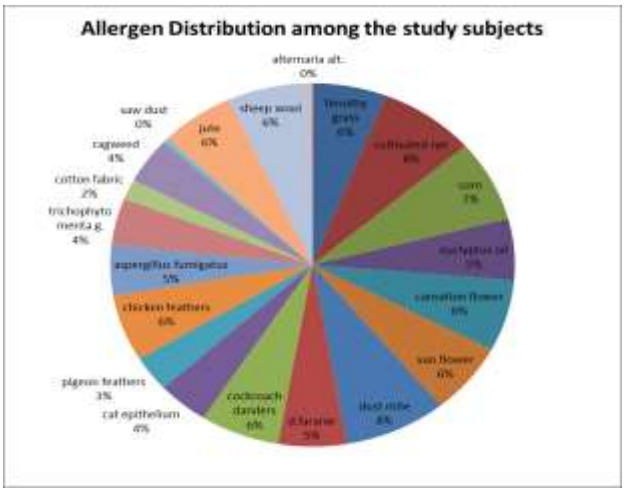

Figure 4: Showing the allergen distribution in sector diagram.

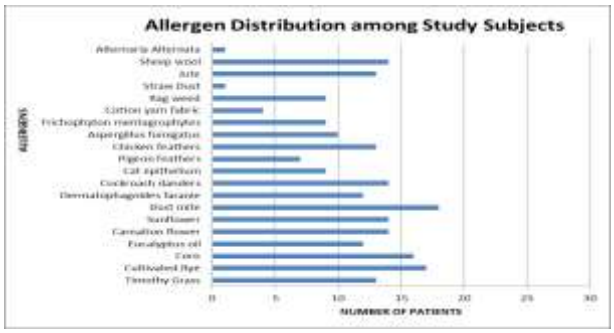

Figure 5: Bar diagram showing the frequency of the allergen in the cross section of the study subjects.

DISCUSSION

Rhinitis is a global health problem affecting up to 20% of the world population with an uprising incidence.[5] Around 1-15% of 6-7 year olds around the world have signs of allergic rhinitis. Around 2-40% of 13-14 year olds also have these signs. It is found in about 16% of adults. It can occur at any age.[6]

Rhinitis can be induced by different mechanisms, and it involves several etiological agents. Diagnosis is based on clinical manifestations and supported by a serum specific immunoglobulin E (sIgE) antibodies to aeroallergens.[5]

Allergic rhinitis along with bronchial asthma, atopic dermatitis and allergic conjunctivitis is included in atopic group of diseases.[7] Allergic rhinitis/conjunctivitis and allergic asthma are characterized by a T(H) 2-dominated immune response associated with increased serum IgE levels in response to inhaled allergens. Because IgE is a key player in the induction and maintenance of allergic inflammation, it represents a prime target for therapeutic intervention.[8]

Guerra et al carried out a study to determine the extent to which rhinitis is an independent risk factor for adult-onset asthma and found that rhinitis is a significant risk factor for adult-onset asthma in both atopic and nonatopic subjects. [9] Shabaan et al also found that rhinitis, even in the absence of atopy, is a powerful predictor of adult-onset asthma.[10]

In the present study, it was found that there was a mild female preponderance which can be attributed to the house hold allergens like house dust and D. faranie, ragweed present in and around the houses. The pattern of dominant allergens depend on geographic location.[11]

The allergy patterns show more severity as documented by the in vitro tests. The reason being; only the cases with allergic symptoms were included in the study. The cases were included after a thorough clinical examination, a diagnostic nasal endoscopic examination and CT scan of the nose and the paranasal sinuses was done in all of these patients. The common environmental allergens prevailing in Raichur causing allergic rhinitis were studied using carbohydrate cross reactive determinants (CCD), an in vitro test with high degree of sensitivity.

Cross-reacting carbohydrate determinants (CCDs) are antigenic structures shared by allergenic components from taxonomically distant sources. CCDs must be taken into account when evaluating the clinical relevance of positive results in in-vitro specific IgE assays, at least in the diagnosis of patients with pollen allergy. Commercial systems should be carefully assessed for the ability to detect specific IgE for carbohydrate determinants to avoid false-positive or clinically irrelevant results.[12]

Serum total IgE level is useful in the in vitro diagnosis of allergic rhinitis. In vitro testing for specific IgE may be unnecessary in patients with low serum total IgE, whereas high total IgE level suggests that in vitro testing would confirm specific sensitizations in patients with allergic rhinitis.[13]

In the present study serum IgE level was increased in all patients. In the study conducted by Naspitz et al, total IgE serum levels in the control group exhibited a tendency towards more elevated values in older children.[14] Values in the atopic group were significantly higher for all age groups, with significant increases with age. Lopez et al studied the relationship between total IgE serum levels and early wheezing in infants followed for the first year of life.[15] They found higher levels of total IgE in the cord blood of those that would later wheeze, but the difference was not significant. The newborn babies were monitored and there was a significant increase in IgE serum levels as they got older.

The symptoms of allergic rhinitis result from a complex allergen-driven mucosal inflammation caused by interplay between resident and infiltrating inflammatory cells and a number of vasoactive and proinflammatory mediators, including cytokines. Sensory nerve activation, plasma leakage, and congestion of venous sinusoids also contribute. Allergic rhinitis may be characterized by early-phase and late-phase responses. Each type of response is characterized by sneezing, congestion, and rhinorrhea, but congestion predominates in the late phase.[16]

Many patients with allergic rhinitis, but no history of asthma, have evidence of abnormal pulmonary function that occurs either spontaneously or after broncho-provocation with metacholine, histamine or cold air. Seasonal variation of airway responsiveness has been demonstrated in patients with seasonal allergic rhinitis.[17] Risk factors for inhalant allergies in children include a first-degree relative with allergies, food allergy in infancy, and atopic dermatitis. Although inhalant allergies are rare in infancy, inhalant allergies are common in older children and impair quality of life and productivity. Differentiating between viral and allergic rhinitis can be challenging in children, but the child's age, history, and risk factors can provide helpful information. Allergic rhinitis is a risk factor for asthma, and if one is present, medical consideration of the other is warranted.[18] It has been shown that the treatment of allergic rhinitis with intranasal corticosteroids improves rhinitis and asthma symptoms, and airway responsiveness, as measured by methacholine challenge. Direct anti-inflammatory action of the intranasal corticosteroid in the lung appears to be unlikely because less than 2% of the nasal medication is delivered to the chest. Nasal beclomethasone treatment has also been shown to prevent the increase in bronchial responsiveness that is associated with seasonal rhinitis and asthma.[17]

Environmental control measures are important in the treatment of respiratory allergies, started early in the homes of high risk children, they decrease exposure to inhalant allergen and, thus reduces the risk of sensitization.[19]

The most important part of the initial assessment of a patient suspected of having allergic disease is a thorough clinical history and relevant examination in order to guide subsequent investigations.[20] The use of specific IgE antibody determinations improves the clinical management of patients with allergy related symptoms in primary care, allowing advice to be given on specific allergen avoidance.[21,22]

CONCLUSIONS

Allergy to dust mite, D. faranie, corn, carnation flower, sunflower, sheep wool and straw dust were the most frequent allergens causing allergic symptoms. Specific serum anti CCD IgE detection is a definitive method of detecting the nature and type of the allergen, which is a safe, reliable technique, thereby guide the patient to avoid specific allergen, get the specific immunotherapy with good prognostic values and results.

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