

Original Research Article

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Clinical profile and skin prick test analysis in children with allergic rhinitis of North Kerala, India

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ABSTRACT

Background: Allergic rhinitis (AR) is increasing in prevalence among children globally and in India. Allergens are factors which trigger allergic rhinitis. Skin prick test (SPT) is a rapid, sensitive and cost effective test to detect IgE-mediated allergic diseases. Identification of common aeroallergens in an area is necessary, in order to educate the patient on what allergens to avoid and also help find the best formulation of allergen immunotherapy for effective AR treatment. This study was done to find the clinical profile and skin sensitivity to common allergens by skin prick test in children with allergic rhinitis between six and fifteen years.

Methods: This cross-sectional study was conducted for a period of one year from January 2016 to December 2016. All children between 6 to 15 years with allergic rhinitis were included in the study. Skin prick test was done with seven most common allergens.

Results: A total of 60 children with allergic rhinitis were studied and 42 patients (70%) tested positive for SPT. The major symptoms were persistent sneezing (68%), nasal itching (33%), rhinorrhea (85%) and nasal congestion (42%). The proportion of sneezers-runners was higher than blockers (64% versus 36). We tested seven common allergens and house dust mite allergen yielded the highest number of positive responses (33%) followed by cockroach (25%), alternaria (16.66%), parthenium (10%), cat dander (8.35%), sorghum (5%) and dog dander (5%). Among patients with SPT positivity; eight were positive to one allergen, thirteen were positive to two allergens, sixteen to three allergens and five to four allergens.

Conclusions: Allergic Rhinitis with a number of allergic co morbidities has a significant impact on the quality of life and scholastic performance in children. Skin prick test which is a standardized, most rapid, sensitive and cost-effective test to detect IgE-mediated allergic diseases is helpful in identifying the common allergens. House dust mite is the commonest allergen tested positive in our study in children.

Keywords: Allergic rhinitis, Allergens, Skin prick test

INTRODUCTION

Allergic rhinitis (AR) is a chronic allergen specific IgE mediated hypersensitivity disorder characterized by nasal congestion, rhinorrhea, sneezing, nasal itchiness, and postnasal drip.¹ One fifth of the world population suffers from IgE mediated allergic diseases such as allergic rhinitis, asthma, eczema and anaphylaxis.² In India also

approximately same percentage of the population suffers from allergic diseases. The prevalence of allergic rhinitis globally has increased during last few decades possibly due to change in life styles and change in indoor and outdoor environment.

According to International study of asthma and allergies in childhood (ISSAC) phase 1 (1998), in India nasal

symptoms alone were present in 12.5% children in 6-7 years age group and 18.6% in 13-14 years age group, while allergic rhino-conjunctivitis was observed in 3.3% and 5.6% children, respectively. However, in ISSAC phase 3 (2009) study, prevalence of nasal symptoms increased to 12.9% and 23.6% in 6-7 and 13-14 year age groups, respectively, while that of allergic rhino-conjunctivitis increased to 3.9 and 10.4% respectively. Allergens are factors which trigger allergic rhinitis and other allergic diseases. Seasonal allergens like pollens from trees, grasses and weeds as well as outdoor moulds can contribute to intermittent rhinitis whereas dust mites, animal dander, cockroaches and indoor moulds contribute to perennial rhinitis.

Skin prick test (SPT) is a standardized, most rapid, sensitive and cost-effective test to detect IgE-mediated allergic diseases. Generally accepted indications for SPT include allergic rhinitis, asthma, atopic dermatitis, suspected food allergies, latex allergy, and conditions in which specific IgE is suggested to play a role in the pathogenesis. It provides information about the presence of specific IgE to protein and peptide antigens (allergens). Identification of common aeroallergens in an area is necessary, in order to educate the patient on what allergens to avoid and also help find the best formulation of allergen immunotherapy for effective AR treatment.

Allergic rhinitis can have negative impact on quality of life of children which can affect the scholastic performance of the child. So, this study was done to find the clinical profile and skin sensitivity to common allergens by skin prick test in children with allergic rhinitis less than fifteen years.

METHODS

This cross-sectional study was conducted for a period of one year from January 2016 to December 2016. All children between 6 to 15 years with allergic rhinitis were included in the study. The diagnosis of allergic rhinitis was based on typical history and physical examination findings and classification was done based on ARIA guidelines.

According to this guideline, allergic rhinitis is defined if two or more symptoms of rhinorrhea, nasal itching, nasal blockage, or sneezing are present in a patient for at least one hour per day for 4 days or more a week and also for 4 or more weeks a year.³ Based on duration, symptoms are intermittent (<4 days/week or <4 weeks/year) or persistent (>4 days/week or >4 weeks/year).

Severity grading is either mild or moderate-severe based on the absence or presence of sleep disturbance and impairment in daily activities, school, and work, respectively.¹ Patients' symptoms were categorized as sneezers-runners and blockers based on the predominant symptoms. Patients whose main complaints include sneezing, rhinorrhea, and itchy eyes and nose were classified as sneezers-runners, while those with nasal

blockage, postnasal drip, and difficulty with breathing were classified as blockers.

Children having an acute exacerbation of asthma during the time of presentation were excluded from the study. Informed consent was obtained from parents after clearly explaining the mode of procedure and the inherent risks which can develop due to skin prick test. A total of seven most common allergens were used for the test. The allergens tested include house dust mite mix (*Dermatophagoides pteronyssinus* and *Dermatophagoides farina* mix), mold (*Alternaria tenuis*), Johnson Grass (*Sorghum Halepense*), parthenium, Dog dander, Cat dander and cockroach extracts. Those with recent anaphylaxis, extensive eczema, severe uncontrolled asthma and on long term corticosteroids were excluded from SPT.

The volar aspect of the forearm was wiped with alcohol and nine points each spaced at least 2 cm apart and at least 2-3 cm from the wrist and the antecubital fossae were marked with a pen. Histamine hydrochloride (1%) and normal saline (0.9%) were used as positive and negative controls respectively.

SPT was performed and interpreted by the same investigator. The test is read within 15-20 minutes. Negative saline control is interpreted as acceptable between 0-3 mm in diameter. Positive histamine control has to be 3mm larger than the negative control. A positive reaction is a wheal \geq 3mm in diameter than the negative saline control. The positive skin reactions which correlated well with the history were considered as clinically significant reactions.

Oral antihistaminic were stopped two days prior and oral sympathomimetic drugs were stopped for at least 12 hours before skin prick test.

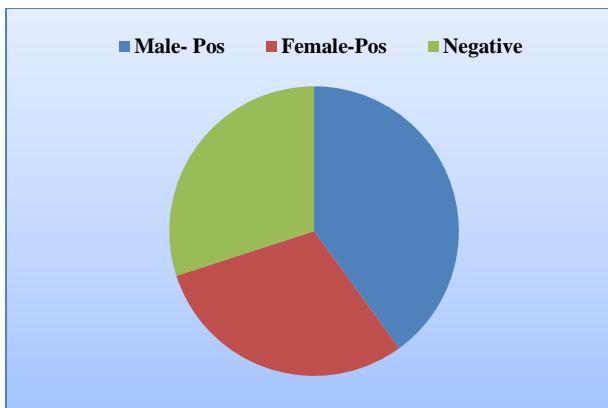
RESULTS

A total of sixty children below fifteen years with allergic rhinitis were studied and there were thirty six boys (60%) and twenty four girls (40%). The youngest was 6 years and the oldest was 15 years. There were 20 children below 10 years (11 boys and 9 girls) and 40 children were between 11-15 years (25 boys and 15 girls) (Table 1).

Table 1: Age and gender distribution of children with allergic rhinitis.

Age(yrs)	Boys	Girls	Total
6-10	11	9	20
11-15	25	15	40
Total	36	24	60

Forty two patients (70%) tested positive for SPT and 18 (30%) were negative. Among those with positive results, twenty four (57%) were boys and eighteen (43%) were girls (Figure 1).

**Figure 1: Skin prick test results.**

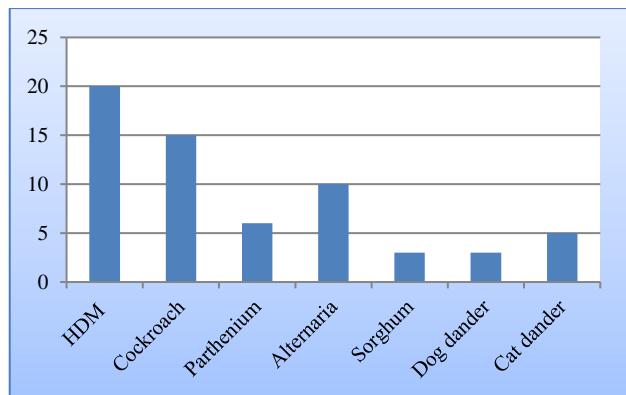
The major symptoms of these children with allergic rhinitis were persistent sneezing (68%), nasal itching (33%), rhinorrhea (85%) and nasal congestion (42%) (Table 2).

Table 2: Allergic rhinitis symptoms and co-morbidities.

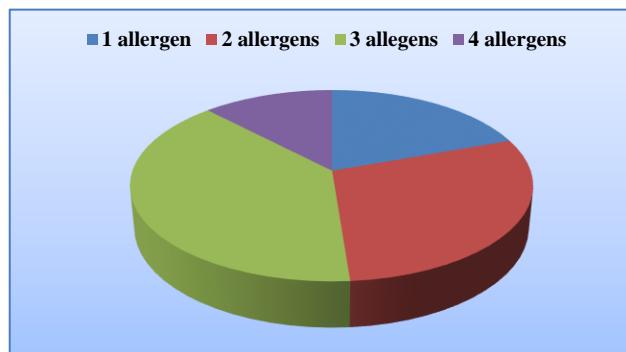
Symptoms	Percentage
Sneezing	68
Nasal itching	33
Rhinorrhea	85
Nasal Congestion	42
'Sneezers-Runners'	64
'Blockers'	36
Co-morbid illness	
Bronchial Asthma	25
Atopic dermatitis	18
Allergic Conjunctivitis	10
Sinusitis	18
Urticaria	3.3

The important clinical signs were pale nasal mucosa (53%), rhinorrhea (75%), DNS (40%), transverse nasal crease (40%), allergic shiners (35%), conjunctival congestion (10%) and cobble stoning of pharynx (8%). According to predominant symptoms the proportion of sneezers-runners was higher than blockers (64% versus 36%). Based on ARIA guidelines intermittent mild and moderate/severe were seen in 43% and 21 % while persistent mild and moderate/severe were seen in 20 % and 16% respectively.

The prevalence of co morbidities was asthma (25%), urticaria (3.3%), allergic conjunctivitis (10%), sinusitis (18.3%) and atopic dermatitis (18%). Positive family history of atopic diseases was seen in 63% of patients with allergic rhinitis. In our study we tested seven common allergens and house dust mite allergen yielded the highest number of positive responses (33%) followed by cockroach (25%), alternaria (16.66%), parthenium (10%), cat dander (8.35%), sorghum (5%) and dog dander (5%) (Figure 2).

**Figure 2: SPT results.**

Among the forty two patients with SPT positivity; eight were positive to one allergen, thirteen were positive to two allergens, sixteen to three allergens and five to four allergens (Figure 3).

**Figure 3: Skin prick test sensitization to different allergens.**

DISCUSSION

The prevalence of allergic diseases is increasing worldwide and the burden of these diseases is increasing in prevalence and severity in India as well. The common allergic diseases include asthma, rhinitis, anaphylaxis, drug and food allergy, eczema, urticaria and angioedema. Among these allergic diseases, Allergic Rhinitis is an extremely common disease worldwide, affecting 10 to 25% of the population.⁴

A total of sixty children age ranging from six to fifteen years with allergic rhinitis were studied. Allergic rhinitis can usually present from early childhood. Sensitization to outdoor allergens can occur in children older than 2 years; however, sensitization is more common in children older than 4-6 years. Clinically significant sensitization to indoor allergens may occur in children younger than 2 years with significant exposure. Allergic rhinitis like symptoms may begin as early as age 18 months. In a report from the pollution and asthma risk: an Infant Study (PARIS), 9.1% of the 1859 toddlers in the study cohort reported allergic rhinitis-like symptoms at age 18 months.⁵ Though symptoms can develop at younger age in our study

we included only children above the age of six years. In this group there were more boys than girls with M: F ratio of 3:2. Sex specific differences in prevalence of allergic rhinitis and asthma over the life span were recognized, showing a higher prevalence of allergic rhinitis and asthma as single entities in boys than in girls during childhood followed by an equal distribution in adolescence.^{6,7} In adulthood more women than men are affected by asthma.^{8,9}

The higher incidence of allergic rhinitis in boys may be partly due to more exposure to outdoor aeroallergens. In this study allergic rhinitis was diagnosed based on typical history and physical examination findings and classification was done based on ARIA guidelines. The major symptoms of these children were rhinorrhea in 85% and persistent sneezing in 68%. The important clinical signs were rhinorrhea in 75%, pale nasal mucosa in 58%, DNS in 40% and allergic shiners in 35%. According to the predominant symptoms the proportion of sneezers-runners was higher than blockers (64% versus 34%). The recent classification of allergic rhinitis as suggested by ARIA (Allergic Rhinitis and its Impact on Asthma) guidelines, on this basis allergic rhinitis is classified:

- Duration as intermittent or persistent disease,
- Severity of symptoms and quality of life as mild or moderate-severe.

Patients with intermittent AR have sneezing, eye symptoms and watery secretions; while patients with persistent AR have sero-mucous secretions, postnasal drip, smell disturbances, nasal obstruction and may be associated with asthma and chronic sinusitis. In present study based on ARIA guidelines intermittent mild and moderate/severe were seen in 43% and 21% while persistent mild and moderate/severe were seen in 20% and 16% respectively. The prevalence of co morbidities was asthma (25%), urticaria (3.3%), allergic conjunctivitis (10%), sinusitis (18.3%) and atopic dermatitis (18%).

In a study conducted by Kim YH et al the prevalence of allergic rhinitis in children with asthma was 64.3% and that of asthma in children with allergic rhinitis was 21.6%, in present study also we had approximately similar prevalence of bronchial asthma.¹⁰ Positive family history of atopic diseases was seen in 63% of patients with allergic rhinitis. In present study we tested seven common allergens and house dust mite allergen yielded the highest number of positive responses (33%) followed by cockroach (25%), alternaria (16.66%), parthenium (10%), cat dander (8.35%), sorghum (5%) and dog dander (5%).

A study conducted by Rasool R et al in Kashmiri population with allergic diseases, skin prick test was positive in 38 (86.4%) with allergic asthma, 74 (68.5%) patients with allergic rhinitis and 4 (1.6%) patient with urticaria, respectively.¹¹ The most common allergen in that study was pollens followed by house dust mite (*D. pteronyssinus*). In a study done by Ghaffari et al showed

that most common SPT reaction in allergic patients was with house dust mite, i.e., *Dermatophagoides pteronyssinus* (25.3%) and *Dermatophagoides farina* (24.8%), followed by cockroach (15.7%) and feather (7.5%).¹² In present study also the most common allergen tested positive was house dust mite. Among the forty two patients with SPT positivity; eight were positive to one allergen, thirteen were positive to two allergens, sixteen to three allergens and five to four allergens.

CONCLUSION

Allergic Rhinitis with a number of allergic co morbidities has a significant impact on the quality of life and scholastic performance of children. So, studying the clinical features and identifying allergens responsible for precipitating allergic rhinitis in the region is essential to implement appropriate treatment and prevention strategies. Skin prick test which is a standardized, most rapid, sensitive and cost effective test to detect IgE- mediated allergic diseases is helpful in identifying the common allergens. House dust mite is the commonest allergen tested positive in present study.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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