

Association of rice allergy with asthma and serum IgE levels in different age groups

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Objective: To determine the prevalence of rice allergy in Hyderabad, Sindh and adjoining areas and to investigate association of rice allergy with respiratory symptoms and serum IgE Levels in different age groups

Methodology: 407 questionnaires were filled by the patients who had positive serum IgE response. Breakdown of positive IgE up to rice allergy in male and female was calculated and 30 rice allergic patients were selected for further study. Patients were classified into 3 groups according to their age. Serum IgE levels was determined through ELISA and the association of Asthma with Serum IgE levels (group A up to 25 years, group B 26-45 years, and group C > 45 years, was examined.

Results: Frequency of food allergy in 407 patients was 7.37%. Females were 62.5% and males were 37.5%. A strong positive correlation coefficient of age with their serum IgE concentration, of rice allergic asthmatic patients was found in male age group up to 25 years and in female age group >45 years ($p < 0.05$).

Conclusion: The rice allergy was not common in Hyderabad and adjoining areas. In young males, respiratory symptoms were higher with elevated serum IgE level. In females, asthma more likely developed after age 25. (Rawal Med J 2014;39: 257-260).

Key words: Rice allergy, demography, IgE level, asthma.

INTRODUCTION

Rice allergy has been reported from the East Asia, where rice is a staple food.¹ Although raw rice is more allergenic than cooked, some of the allergens are heat stable and resist proteolysis.² Using radio-allergosorbent test (RAST) with eight allergens were found in rice and were closely related to corn.³ In other studied, bronchial asthma, allergic rhinitis and atopic dermatitis were found positive for rice allergy.^{4,5} Symptoms reported in rice-allergic individuals include abdominal cramping and pain, nausea & vomiting,⁶ rhinitis, asthma,⁷ contact urticaria,⁸ Eczema, atopic dermatitis,⁹ angioedema, anaphylaxis¹⁰ and food protein-induced enterocolitis syndrome.¹¹ A number of food allergens lead to increased level of IgE antibodies determined through ELISA (Enzyme linked Immunoassays)¹²⁻¹⁷ The aim of this study was to determine the association of serum IgE levels and respiratory allergic diseases among different age groups in district Hyderabad and adjoining areas.

METHODOLOGY

A questionnaire composed of different questions

was filled by 407 patients with positive IgE history to find out the prevalence of rice allergy, incorporating information regarding age, gender, symptom of allergic reaction such as eczema or other rash, allergic rhinitis, asthma or chronic cough, duration, causes such as the allergens retained, dust mites, pollens, latex, food, or other allergens. Their living environment along with work places, whether the person is a health care worker, worked in the rubber, food, or latex industry, in a restaurant or in a flour mill and having a family history of allergy. In the case of food allergy, further questions were asked to find out the specific name of foods causes such reactions. If the specific food was rice, how long they were able to eat rice, after eating a diet of rice if the symptoms get worse or it was due to inhalation of rice flour. Medical test reports suggested by physician were also collected.

Total serum IgE was determined using the Immuno-Cap-100 System (Phadia, Sweden) by ELISA kit method (Genesis Diagnostic Ltd, Eden Research park, Henry Crabb Road, Littleport, Cambridgeshire CB6 1SE, UK). Statistical analysis was performed using SPSS 16.0. Data were

analyzed by ANOVA using Excel 2007. A $p < 0.05$ was considered as statistically significant.

RESULTS

Total 407 patients, 255 male and 152 female, diagnosed by the physician having positive IgE, were questioned (Fig. 1).

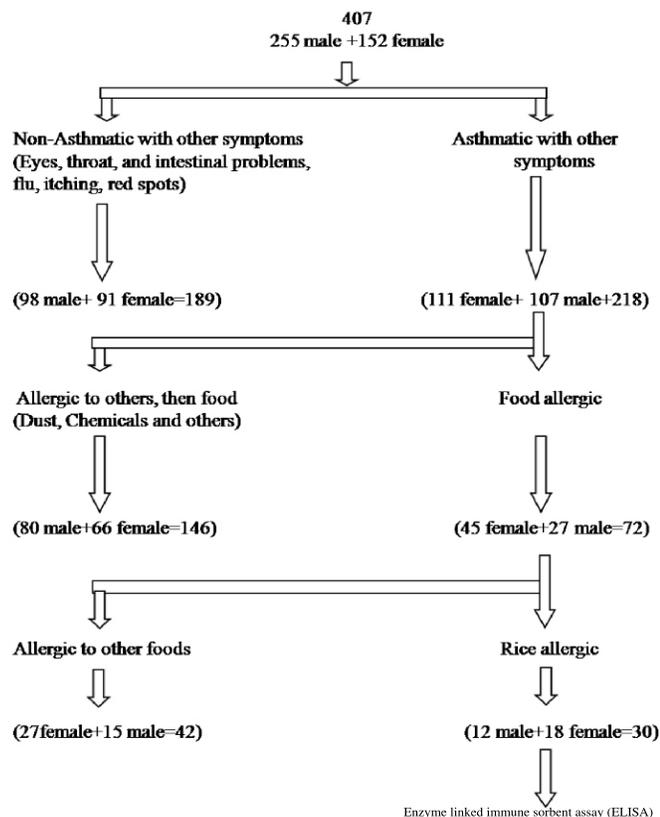


Fig. 1. Breakdown of positive IgE up to rice allergic patients.

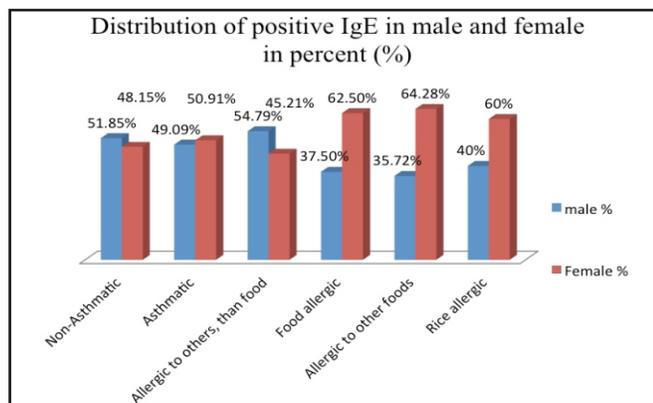


Fig. 2. Distribution of positive IgE in total 407 male and female patients in percent.

At every stage of study, female were found more affected to allergy than male except non asthmatic patients with positive IgE (51.85% male and 48.15% female) and asthmatic patients allergic other then food (54.79% male, 45.21% female). 60% females had rice allergy (Fig.2).

To determine clinical characteristics (Concentration of IgE (IU/ml), serum samples of 30 study rice allergic patients with respiratory symptoms, were collected and Enzyme linked immune sorbent assay (ELISA) was performed.

Table 1. Distribution of rice allergic male and female patients in different age groups.

Age groups year wise	Male	Female	Total
	n (%)	n (%)	n (%)
Up to 25	06 (20)	04 (13.3)	10 (33.33)
26-45	04 (13.3)	11 (36.6)	15 (50)
> 45	02 (6.6)	03 (10)	05 (16.66)
Total	12 (40)	18 (60)	30 (100)

$p > 0.05$

Up to 25 year of age, males were more prone to develop respiratory disease but in the case of 26-45 year, 36.6% showed higher respiratory symptoms (Table 1).

Table 2. Age wise calculation of Mean and Std. deviation of rice allergy.

Rice allergic Patients (n=30)	(Mean & Std. deviation)		P value
	Male	Female	
Up to 25 years	17.5±2.5	20±3.91	(P > 0.05)
26-45 years	33.5±3.51	35±6.007	(P > 0.05)
Above 45 years	51.5±4.95	49.33±3.05	(P > 0.05)
P value	(P < 0.05)	(P < 0.05)	

Mean age in male and female was not different ($P > 0.05$), while among different age groups of male and female, it was significant ($P < 0.05$) (Table 2).

Table 3. Distribution of serum IgE conc: (IU/ml) of rice allergic male and female in different age groups.

Rice allergic Patients (n=30)	(Mean & Std. deviation)		P value
	Male	Female	
Up to 25 years	836.017± 288.6	724.925± 133.8883	(P > 0.05)
26-45 years	727.875± 117.3	1054.327± 275.968	(P < 0.05)
Above 45 years	1018.5 ± 48.8	778.534± 92.33988	(P < 0.05)
P value	(P > 0.05)	(P < 0.05)	

Major IgE response was seen in 26-45 years age female patients with respiratory symptoms while above 45 years age group male showed higher response ($P < 0.05$) (Table 3).

Table 4. Correlation Coefficient of age and their IgE concentration, of rice allergic asthmatic patients in different groups.

Rice allergic Patients (n=30)	Correlation	Coefficient
	Male	Female
Up to 25 years	0.724*	0.147
26-45 years	-0.140	0.594
Above 45 years	1**	0.862**

Correlation coefficients are indicated.

*Correlated, ** Strongly correlated

Correlation Coefficient of age and serum IgE concentration of 30 asthmatic patients in different age groups showed that an increase of age was a major factor related to strong positive correlation after 45 years age (Table 4).

DISCUSSION

Allergic response triggered by elevated IgE concentration in the blood usually lead to the lungs inflammation. Out of 407 patients, 218 were asthmatic, having other allergy problems, such as reddish eyes, swelling of lips and throat, flue, itching and red spots on skin, or intestinal problems. While 189 patients showed the same problems were non asthmatic. Asthmatic patients further distributed due to the causes of the allergy either food allergy or others. 146 patients reported that the cause of allergy was dust or chemicals, environment or their work places. i. e lived or worked at industrial area, fields, flour mills. Low molecular weight proteins especially 14-16, 26, 33 and 56 kDa rice proteins have been demonstrated as rice allergens.¹⁸ Inhalation and exposure to rice flour dust is the frequent cause of Baker's asthma.¹⁹⁻²² Epidemiologic data on food allergy in adulthood seems to be less common and the prevalence of food allergic adverse reactions are rare.²³ Out of 407 IgE positive patients, 30 asthmatic patients reported that their sign and symptoms of allergy get worst if they consume rice. Asthma, a symptom of rice allergy, was more common in female (50.91%) than male (49.09%),

while in non asthmatic patients, male percentage were higher (51.85%) than female (48.15%). Asthma caused by food was higher in female (62.50%) than male (37.50%). 54.79% male as compared to 45.21% female, showed positive IgE due to environmental factors i-e. chemical, dust, paints, of flour particle because they work outside such as industries, fields, and mills. In case of rice allergy, female percentage (60%) was higher than (40%) male.

Among children, the incidence of asthma is highest.²⁴ Young males have more asthma and wheeze than young females. According to our study, frequency of rice allergic male and female patients, distributed in different age groups positively correlated. Highest numbers of asthmatic patient (36.6%) were female as compared to (13.3%) male. A highest average value of serum IgE was observed in female of 26-45 years age group followed by >45 years age male group.

CONCLUSION

Rice allergy was not common and it is often associated with respiratory disease asthma. In young males, respiratory symptoms were higher with elevated serum IgE level. In females, asthma more likely developed after age 25 and showed a strong positive correlation.

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