"Sensitization to Inhalant and Food Allergens in Atopic People Living in and Around Kanpur by in Vitro Total and Specific IgE Assay"

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Abstract

Introduction: Allergy is a condition in which immune system produce a response against antigens (also known as allergens) that results in excessive or exaggerated reactions leading to tissue damage, disease or even death. It is initiated after the first contact with an antigen (e.g. usually harmless microbes, allergens, or self antigens) which "sensitize" the immune system after the second contact leading to overwhelming, uncontrolled strong immunological and pathos-physiological reactions.

Aim: To find out the prevalence of inhalant and food allergies in and around Kanpur, UP.

Material and Methods: 250 peripheral blood samples were taken from atopic patients so that IgE serum levels specific to inhalant allergens and food allergens. Total IgE serum levels (RAST, Phadiatop-250) could be assayed. Specific IgE levels (RAST) greater than or equal to 0.35 UI/ml were defined as positive.

Results: There were no differences according to gender. Total IgE serum levels were observed among atopic. The frequency of main inhalant allergens were: Dermatophagoides Pteronyssinus = 49.2%, Timothy grass = 43.2%, Cotton = 36.4%, Bermuda grass = 32...8. In relation to food allergens we observed: Banana = 71.2%, Lemon = 40%, Carrot = 37.6%, Milk = 34.4%. With respect of age, food allergen sensitization predominates in young children whereas the inverse occurs with inhalant allergens.

Conclusion: There was a predominant frequency of sensitization to inhalant allergens, mainly house dust mites in the evaluated patients. Food allergens were also responsible for a significant proportion of sensitization mainly banana.

Key Words: Allergen, Sensitize, RAST..

Introduction

The prevalence of atopic diseases in people has significantly been increasing in the past few decades [1-3]. As the prevalence of atopic diseases in the population increases, early identification of atopic people is desirable. Early sensitization to allergens has consistently been identified as a risk factor for developing allergic respiratory diseases [4]. Assessment of allergen sensitization therefore is considered to be important in diagnosing and managing atopic diseases throughout the people [5]. Allergic sensitization generally occurs first to food allergens. Immunoglobulin E (IgE) is a critical component of allergic diseases. Although several studies have shown an association between the prevalence of atopic diseases and total serum immunoglobulin E (IgE) levels, total serum IgE levels are most useful in screening for atopic predisposition, rather than in the diagnosis or management of atopic diseases [6-8]. However, a moderate amount of specific IgE to a particular allergen may have much greater significance For a relatively lower total IgE level [9]. Allergen-specific IgE antibodies also provide useful serological information in the differential diagnosis on IgE-mediated atopic diseases in people with allergy-like symptoms [10]. Some persons with significant allergy problems can have normal, moderately or strongly elevated IgE levels. Although an elevated IgE level is associated with an increased risk of atopic diseases, the impact of sensitization to different allergens on the total serum IgE levels and the development of allergic diseases are still not well-defined.

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Material and Methods

The study was carried out in the Department of Microbiology, RMCH& RC, Mandhana, and Kanpur for a period of 1 year i.e, from January 2020 to December 2020. A total of 250 peripheral blood samples (PBS) were taken from atopic patients so that the IgE serum levels specific to inhalant allergens and food allergens be tested. Total IgE serum levels (RAST, Phadiatop-250) could be assayed. The Specific IgE levels (RAST) if it was greater than or equal to 0.35 UI/ml were defined to be positive.

Results

In our study the distribution of gender as shown in [Table: 1 and Fig 1]. Total IgE serum levels were observed among atopics. The frequency of main

inhalant allergens were: Dermatophagoides Pteronyssinus = 49.2%, Timothy grass = 43.2%, Cotton = 36.4%, Bermuda grass = 32...8. In relation to the food allergens we observed that with Banana = 71.2%, Lemon = 40%, Carrot = 37.6%, Milk = 34.4% as shown in [Table: 2]. with respect of age, food allergen sensitization predominates in young children whereas the inverse occurs with inhalant allergens

Table No1: Gender wise distribution of cases

Male	Female	Total
131	119	250

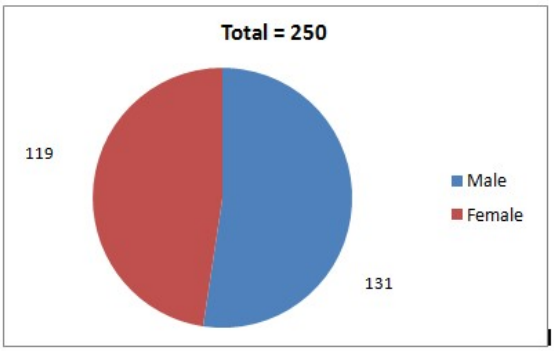

Figure No: 1 Gender wise distribution of cases

Table No2 Patients according to specific IgE (RAST) to different allergens. Data (%) shown regarding the total number of positive patients in each category

Allergen	10-Jan	20-Nov	21-30	31-40	41-50	51-60	TOTAL
	n %	n %	n %	n %	n %	n %	n %
Bermuda grass	2 25.3	9 11.3	15 18.9	12 15.1	24 30.3	17 21.5	79 31.6
Timothy grass	6 5.4	14 12.6	24 21.6	23 20.7	28 25.2	16 14.4	111 44.4
Johnson grass	3 2.9	10 9.7	22 21.3	27 26.2	29 28.1	12 11.6	103 41.2
Cultivated rye	4 3.4	15 12.9	29 25	23 19.8	26 22.4	16 13.7	113 45.2
Dermatophagoides pteronyssinus	5 4	15 12	32 25.6	32 25.6	21 16.8	20 16	125 50
Dermatophagoides farina	5 4.2	12 10.1	23 19.4	23 19.4	25 21.1	20 16.9	108 43.2
Penicillium notatum	3 3.2	9 9.7	24 26	17 18.4	27 29.3	12 13	92 36.8
Cladosporium herbarum	5 4.8	7 6.7	24 23.3	24 23.3	24 23.3	19 18.4	103 41.2
Aspergillus fumigates	1 1.0	12 12.3	25 25.7	17 17.5	30 30.9	12 12.3	97 38.8
Mucor racemosus	2 1.9	15 14.5	18 17.4	18 17.4	23 22.3	12 11.6	88 35.2
Candida albicans	3 3.6	11 13.4	22 26.8	17 20.7	17 20.7	12 14.6	82 32.8
Alternaria alternata	4 3.5	9 8.0	29 25.8	28 25	26 23.2	16 14.2	112 44.8
Rhizopus nigricans	7 6.2	16 14.2	25 22.3	27 24.1	22 19.6	17 15.1	114 45.6
Cotton	2 2.9	8 11.7	12 17.6	10 14.7	27 39.7	9 13.2	68 27.2
Straw dust	1 1.4	10 14.7	17 25	14 20.5	14 20.5	13 19.1	69 27.6
Jute	5 7.3	12 17.6	24 35.2	28 41.1	24 35.2	14 20.5	107 42.8
Sheep‘s wool	4 3.5	12 10.5	26 22.8	29 25.4	26 22.8	17 14.9	114 25.6
Ethylene oxide	2 2.1	6 6.5	24 26.3	18 19.7	24 26.3	17 18.6	91 36.4
Ethylene anhydride	1 1.0	10 10.4	26 27.0	17 17.7	22 22.9	20 20.8	96 38.4
Formaldehyde	0 0	11 11.1	25 25.2	23 23.2	24 24.2	16 16.1	99 39.6
Tomato	3 30.9	9 9.2	26 26.8	27 27.8	15 15.4	17 17.5	97 38.8
Potato	3 3.4	10 11.6	22 25.5	14 16.2	21 24.4	16 18.6	86 34.4
Kiwi	2 2.5	7 8.9	20 25.6	19 24.3	15 19.2	15 19.2	78 31.2
Carrot	2 1.85	14 12.9	22 20.3	19 17.5	23 21.2	14 12.9	108 43.2
Celery	6 5.6	10 9.4	29 27.3	22 20.7	23 21.6	16 15.0	106 42.4
Garlic	6 5.5	10 9.1	26 23.8	20 18.3	24 22.0	23 21.1	109 43.6
Spinach	3 2.7	10 9.2	25 23.1	22 20.3	23 21.2	25 23.1	108 43.2

Cucumber	3 2.9	14 13.8	26 25.7	24 23.7	23 22.7	11 10.8	101 40.4
Cat dander	3 3.2	11 11.9	24 26.0	22 23.9	20 21.7	12 13.0	92 36.8
Dog dander	3 3.2	11 12.0	22 24.1	23 25.2	16 17.5	16 17.5	91 36.4
Pigeon feathers	2 2.3	12 14.2	19 22.6	21 25	16 19.0	14 16.6	84 33.6
Chicken feathers	0 0	12 11.6	22 21.3	24 23.3	27 26.2	18 17.4	103 41.2
Cheese	3 3.0	12 12.3	22 22.6	22 22.6	20 20.6	18 18.5	97 38.8
Lemon	5 5.1	9 9.1	21 21.4	22 22.4	28 28.5	13 13.2	98 39.2
Wheat	3 3.4	8 9.1	17 19.5	22 25.2	19 21.8	18 20.6	87 34.8
Rice	2 2.2	11 12.5	22 25	20 22.7	20 22.7	13 14.7	88 35.2
Banana	5 3.8	14 10.8	31 24.0	26 20.1	35 27.1	18 13.9	129 51.6
Pineapple	3 3.0	10 10.1	20 20.2	27 27.2	22 22.2	17 17.1	99 39.6
Orange	2 1.9	15 14.4	27 25.9	24 23.0	24 23.0	12 11.5	104 41.6
Apple	4 3.4	15 12.8	30 25.6	23 19.6	28 23.9	17 14.5	117 46.8
Milk	1 1.2	10 12.8	24 30.7	11 14.1	20 25.6	12 15.3	78 31.2
Chicken	1 1.4	8 11.2	14 19.7	12 16.9	20 28.1	16 22.5	71 28.4
Egg white	3 4.6	9 13.8	15 23.0	14 21.5	16 24.6	8 12.3	65 26.0
Egg yolk	3 3.5	8 9.5	24 28.5	22 26.1	14 16.6	13 15.4	84 33.6
Meat	4 4.1	13 13.4	17 17.5	26 26.8	20 20.6	17 17.5	97 38.8
Fish	3 4.5	7 10.6	13 19.6	15 24.2	17 25.7	11 16.6	66 26.4

Discussion

Sensitization to allergens has been recognized as the most important risk factor for atopic diseases. In our study we found out that there were no differences in accordance to the gender which was similar to the study conducted by Naspitz C et al. in 2004 [11]. Total IgE serum levels were observed among atopics. The frequency of main inhalant allergens were: Dermatophagoides Pteronyssinus = 49.2%, which was similar to the study by Naspitz C et al. where D Pteronyssinus was 66.7%, Timothy grass = 43.2%, Cotton = 36.4%, Bermuda grass = 32..8. In relation to the food allergens we observed that with Banana = 71.2%, Lemon = 40%, Carrot = 37.6%, Milk = 34.4% which correlates with the study [11] where it was 23.1% With respect of age, food allergen sensitization predominates in young children whereas the inverse occurs with inhalant allergens [11].

Conclusion

In conclusion, sensitization to food is mostly common in early life, in parallel with the rising prevalence of sensitization to inhalant allergens at older age. Serum total IgE levels appear to be associated with the response to different types of allergens. Sensitization to food, especially banana followed by lemon and milk is highly related to eczema, whereas sensitization to inhalant allergens appears to be more specific to the development of rhinitis and asthma. A combined sensitization to food and inhalant allergens not only has an additive effect on serum IgE antibody production but also increases the risk of developing atopic diseases. A fully understanding of the prevalence of allergen sensitization in different age would help early diagnosis and intervention of atopic diseases in early childhood.

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