

Incidence of Allergen Specific IgE in Atopic Dermatitis Patients by Immunoblot Assay

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Objective: To determine the incidence of allergens specific IgE by immunoblot assay in atopic dermatitis patients.

Design: Prospective study.

Setting: South Riyadh, Dermatology clinic Alfalah International Hospital, Saudi Arabia.

Method: Sixty-five adult patients and twenty volunteer controls sera were collected from atopic dermatitis patients. IgE antibodies specific to allergens of food, pollens, animal epithelia, house dust mites, *and* moulds were determined using an immunoblot assay.

Result: The sensitization rate of all allergens was found to be 65% (42/65; 26 males, 39 females). The subjects were most commonly allergic to pollen (35.2%), food (31.5%) and animal epithelial dander (21.0%). House dust mite (11.4%) and mould (0.9%) were less frequent than the others were.

Conclusion: The result indicates that pollen allergens, food allergens, animal epithelia and dander should be taken into account as possible exacerbating factors in adult patients with AD within the specific geographical area studied.

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Atopic dermatitis (AD) is a rather common disorder as its name implies, it is often associated with the presence of IgE-mediated hypersensitivity and with other IgE-mediated disease states. Often diagnosed in infancy it can have its onset at any age in life. There is no definitive laboratory test which is able to define atopic dermatitis.

Double-blind placebo controlled food challenges have documented that certain foods can exacerbate dermatitis in patients in whom there is immediate skin test reactivity to food extracts¹.

The role of aeroallergens in AD is far from clear because positive patch tests to aeroallergens were found in some atopic patients with no history of dermatitis². However, some people who have AD with an elevated IgE are likely to have allergies to allergens from food or environment.

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Immunohistochemical studies have shown that IgE receptors (low affinity-receptor FcR11 and high affinity receptor FcR1) as well as IgE molecules are present on epidermal cells in patients with atopic dermatitis³. Pollen allergens from a rich variety of plant species were recognized as major causes of allergic manifestation in humans.

Several plant species are associated with pollen production: Alder is an annual which grows up to 20 meters and is common in dry barren landscapes, its minuscule flowers bloom in the early spring, it belongs to the same family as the birch tree; Hazel pollen develops in the late summer and is released in late winter or early spring; Mugwort common in Asia, which is a coarse perennial weed which can be found in waste places, roadsides, and shores; Rye grass is blended in lawn seed mixtures and cultivated in temperate Asia; Rye grass may flower almost all summer.

Food allergy is more common in children under age three than adults and cause urticaria, gastrointestinal bleeding, eczema and even anaphylaxis. Rowntree et al reported egg-specific IgE antibodies in more than 65% of children with eczema symptoms⁴.

Bjorksen et al (1977) studied the radioallergosorbent test (RAST) to determine IgE antibodies specific to wheat flour proteins in the sera of seven groups of patients, he found a good agreement between intracutaneous skin test results and specific IgE with rye and wheat in bakers and children with eczema⁵.

House dust mites (*Dermatophagoides pteronyssimus*, *Dermatophagoides farinae*) are widely suspected to be an important factor in the pathogenesis of atopic dermatitis. As early as 1928, the presence of mites is documented⁶.

This study was undertaken to determine the incidence of allergens specific IgE by immunoblot assay.

METHOD

Sixty-five adult patients attending outpatient dermatology clinic were chosen as the subjects of this study. The study group had no history of asthmatic episodes. They constituted 26 males and 39 females; all forms of treatment were excluded. Human ethical committee clearance was obtained and informed consent was secured. Twenty volunteer controls, matched age, sex, and social classes but without evidence of atopic dermatitis or any type of allergy were included in this studies.

Blood was collected and serum was separated from dermatitis patients as well as control subjects. IgG specific antibodies for 20 different allergens were determined using RIDA Allergy Screen 2002 (r-Biopharm, Germany).

Statistical Methods

All analyses were performed using the InStat (InStat Biostatistics, Graphpad Package, USA). Fisher's exact tests were used when data were compared between present and absent allergens. The two sided p-value was applied and a value of less than 0.05 was considered significant.

RESULT

The incidence of allergen-specific IgE in this group of patients was 65%, and no statistical significance was found between the presence and absence of allergens between males and females (Table 1). On the other hand, none of the control healthy subjects had shown any allergen present on their serum. Consultations were performed by a single dermatologist and all the medical history data were carefully reviewed and discussed with each patient.

Table 1: The Relationship between Absence and Presence of Allergen Specific IgE in Atopic Dermatitis Patients

Patients	Allergen Absence	Allergen Presence	Total
Male	9 (14%)	17 (26%)	26
Female	14 (22%)	25 (38%)	39
Total	23 (35%)	42 (65%)	65 (100%)

In this study, accumulative prevalence is defined as the total proportion of patients with past and present symptoms and incidence is a measure of new cases existing at a designated studies. Allergic reactions in patients were commonly associated with positive serum IgE antibody specific to their corresponding allergens. The sensitization rate among patients with atopic dermatitis tested were as follows-*Dermatophagoides pteronyssinus* (5.7%), *Dermatophagoides farinae* (5.7%); cat epithelia-dander (11.0%), horse (2.4%) dog (7.6%); aeroallergens-alder (5.2%), birch (3.8%), hazel (3.8%), grasses (6.2%), rye (9.5%), mugwort (4.8%), plantain (1.9%); mould- *A. alternata* (0.9%); food- egg white (2.9%), cow's milk (3.8%), wheat flour (4.7%), peanuts (2.9%), soybeans (5.2%), hazelnuts (5.7%), carrots (6.7%), see table 2.

Table 2: Distribution of Allergen Antibodies in Atopic Dermatitis Patients

Allergen (antigen system)	Allergen Antibodies (presence) on patients			(% Allergen Antibodies in patients	(% Antibodies Allergen (as system)
	No	M	F		
House dust Mites					11.4
Derm. <i>pteronyssinus</i>	12	5	7	5.7	
Derm. <i>farinae</i>	12	4	8	5.7	
Animal epithelia dander					21.0
Cat	23	5	18	11.0	
Horse	5	1	4	2.4	
Dog	16	2	14	7.6	
Pollens (Aeroallergens)					35.2
Alder	11	5	6	5.2	

Birch	8	4	4	3.8	
Hazel	8	4	4	3.8	
Grasses	13	5	8	6.2	
Rye	20	11	9	9.5	
Mugwort	10	7	3	4.8	
Plantain	4	3	1	1.9	
Mould					0.9
<i>Alternaria alternata</i>	2	0	2	0.9	
Food					31.5
Egg white	6	3	3	2.9	
Cow's milk	8	2	6	3.8	
Wheat flour	9	5	4	4.3	
Peanuts	6	3	3	2.9	
Soybeans	11	7	4	5.2	
Hazelnuts	12	6	6	5.7	
Carrots	14	8	6	6.7	
Total	210	90	120	100	100

M: males (no of cases Ab. from males)

F: females (no of cases Ab. Females)

No: number of patients

Table 3 shows the most frequent combination of allergen antibodies present in the patients who developed two or more allergies. Figure 1 shows the frequency of allergens present on these patients.

Table 3: Patients with One or Multiple Allergen Antibodies Developed

No. of allergen Antibodies developed	No of patients & percentage	Immunized patients Percentage
1	08 (12.3%)	20.1 %
2	15 (23.1%)	37.7 %
3	02 (3.1%)	05.1 %
4	03 (4.6%)	07.5 %
5	01 (1.5%)	02.4 %
7	01 (1.5%)	02.4 %
8	03 (4.6%)	07.5 %
9	03 (4.6%)	05.1 %
10	01 (1.5%)	02.4%
12	01 (1.5%)	02.4%
13	01 (1.5%)	02.4%
14	01 (1.8%)	02.4 %
Total	61.3	100

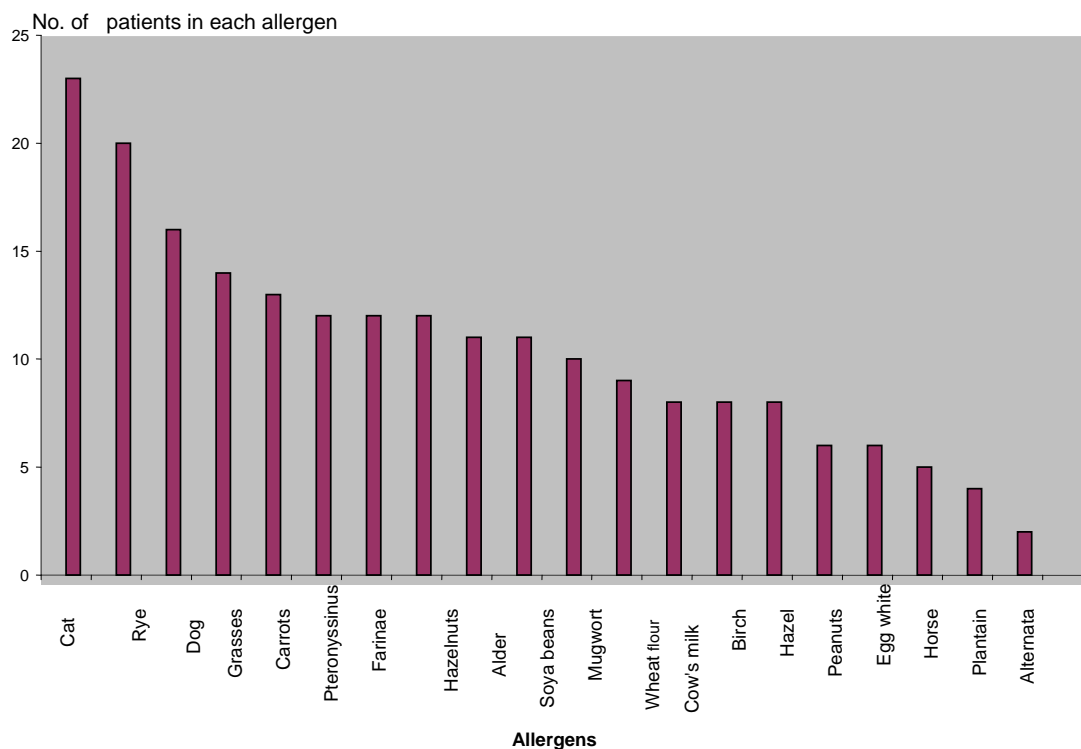


Figure 1: Frequency of Allergens Present in Atopic Dermatitis Patients

DISCUSSION

Analysis of allergen extracts used for diagnostic testing indicates that they are complex mixtures of proteins, carbohydrates and nucleic acid⁷. Variable response of the IgE system is thought to be influenced by genetic factors⁷. People whose genetic code is programmed to produce IgE antibody under normal low dose environmental conditions such as inhaling a substance or eating certain food subsequently develop a form of allergy. On the other hand, there are many substance which are quite abundant in inhaled air or in food but do not cause allergy because of the structure of the allergens itself.

A claim that the majority of adults with atopic dermatitis do not have food allergies is not true. In our study 31.5% of subjects reacted positively with food allergens. The most frequent food allergen was found to be in the carrots, soybeans, hazelnuts, wheat flour, cow's milk, egg white, and peanuts. The reaction may be acute urticaria or abdominal pain.

The RIDA test uses multiple allergens and can be used for screening for atopy, none of the normal controls showed any allergen. Careful interpretation is required as some tests especially those involving fruits or vegetables can be unreliable and false-negative reactions are common.

Either skin testing or specific IgE antibody testing can be used to determine the etiology of allergic disease⁸. Intradermal skin testing is the most sensitive and least specific method. Disadvantages of in vitro testing include longer turnaround time of results and higher cost.

Critical factors influencing mite (house dust mites) are relative humidity and temperature of both outdoor and indoor air. This study shows the relatively high incidence of mite allergens (11.2%) in South Riyadh Region. Holm et al found *Dermatophagoides farinae* to be the most frequent species while this study showed that *Dermatophagoides pteronyssinus* and *Dermatophagoides farinae* had equal degrees of occurrence which could be attributed to a high degree of cross-reactivity between the two species⁹. IgE antibodies to *Alternaria alternata* was found to be rare in this group of patients (0.9%) compared with other international studies¹⁰. Mould spores can be found in outdoor or indoor environment but exposure can also occur by having contact with saprophytic species and can cause atopic dermatitis¹¹. *Alternaria alternata* is not well defined as a seasonal allergen and probably causes problems indoor with fewer people than do major allergens from cats, mites or food. A significant portion of the atopic population does have underlying sensitivities to fungal spore allergens although subjects sensitized to a single species are quite rare.

CONCLUSION

This study showed that sensitization rate to pollen, food and dander measured with an IgE-specific allergen is high among adult patients with AD in the South Riyadh region. The severity of dermatitis seemed to be increased by mite exposure in relatively highly sensitized patients. This study also indicates that one has to take food, pollens and dander allergens into account when discussing aggravating factors in adult patients with atopic dermatitis.

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