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Original scientific article

FOOD ALLERGY IN ATOPIC DERMATITIS

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SUMMARY

The aim of the study was to determine wheather there is a significant dependence of reaction to a certain nutritive allergen on the age and sex of patients with atopic dermatitis. Relationship between the presence of allergen and adverse reaction based on cellular antigen stimulation test (CAST-ELISA) was analyzed.

Key words: *food allergy, adverse reaction to food, atopic dermatitis, food allergens, CAST-ELISA test*

INTRODUCTION

Atopic dermatitis (AD) is a chronic, inflammatory, multifactorial skin disorder associated with characteristically distributed areas of cutaneous eczema. It is associated with various immune alterations. Atopic dermatitis occurs more commonly in children of atopic parents. It is a genetic predisposition in the majority of cases.

Very important contributory factors to the disease are emotional stress, cutaneous infections, and contact irritants. Environmental allergens can also trigger atopic dermatitis, e.g., water, floor, nutriment, as well as systemic allergens exciting their effect through inhalation, oral or dermal application (Fig. 1) (1).

Food allergy is not the most common cause of adverse reactions to foods, but is one of the best understood. There is a wide range of symptoms caused by food allergy, affecting many parts of the body, and reactions are sometimes serious. These reactions can occur very quickly, often within minutes, and hence are termed immediate reactions. In the oral allergy syndrome, the lips, cheeks, tongue or throat may itch or swell within minutes of contact with foods such as eggs, nuts or peanuts. Similar reactions can affect the skin, lungs or digestive tract, causing symptoms such as wheals (urticaria), wheezing (asthma), vomiting and diarrhea.

Such allergies are more common in children than in adults. Foods commonly involved include eggs, cow milk, soy, wheat, fish, shellfish and nuts, but reactions can also occur to spices such as mustard and sesame or to vegetables, e.g., celery and tomato.

Food allergy involves the reaction of a food protein with antibodies produced against it by the immune system. The accompanying symptoms are the result of this inappropriate immune response. Allergens are antigenic molecules that can provoke the allergic reaction. Food allergens reacting with IgE antibodies are proteins.

The allergenic activity of some food allergens is easily neutralized by heating or other denaturation (e.g., apples), whereas others are resistant to denaturing such as cooking and digestion (e.g., egg and fish).

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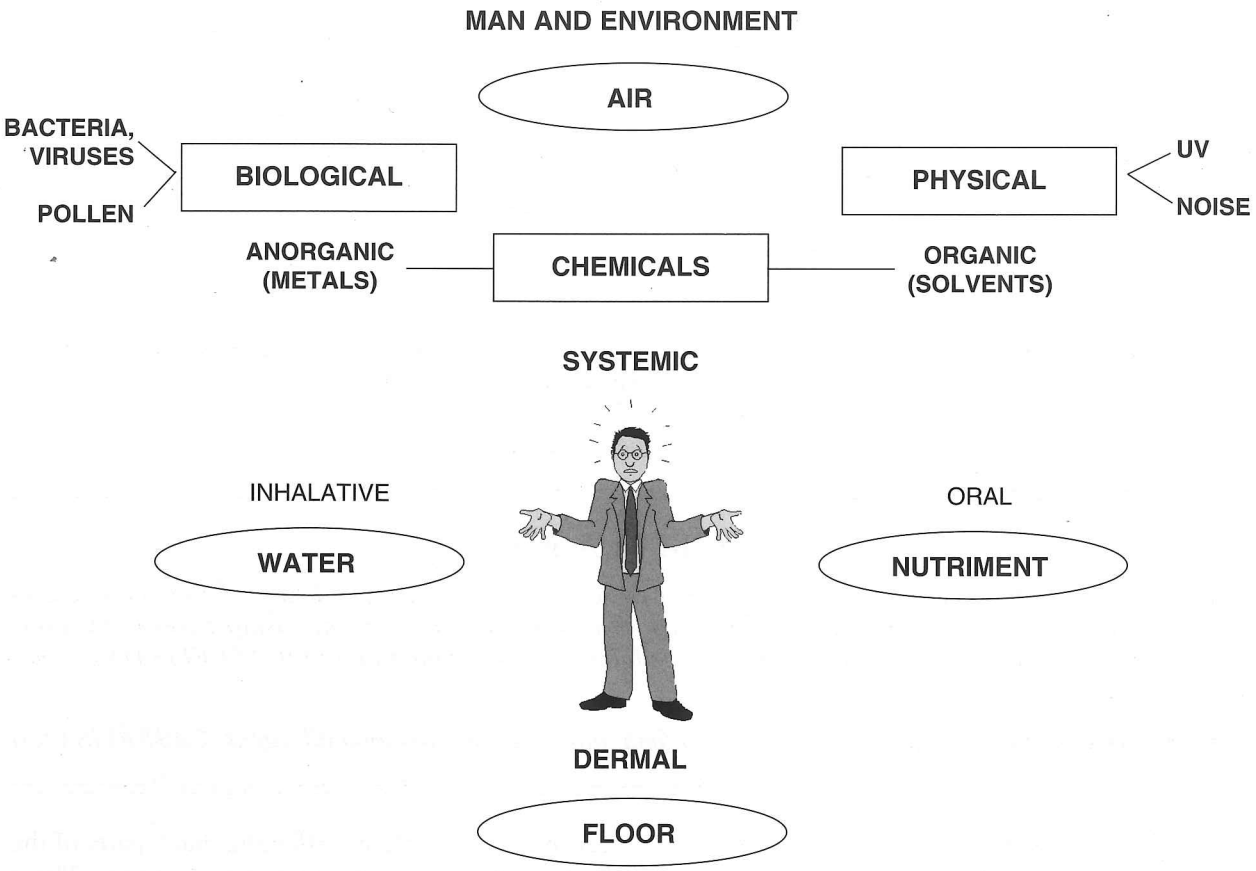

Fig. 1. Environmental factors with influence on man (Bayerl Ch, Jung EG. Aktuel Dermatol 1996; 22)

The role of food allergy in atopic dermatitis was first suggested by Grulee and Stanford in 1936 when they reported that cow milk feeding early in life was a contributory factor in atopic dermatitis (1) . An indirect evidence of the role of food allergy in atopic dermatitis is the significant improvement of skin lesions after institution of an appropriate elimination diet.

Several data suggest that the role of food in atopic dermatitis appears to be more relevant in infants and in preschool children. Imunoglobulin E antibodies to a large variety of foods are frequently detected in infants and preschool children with atopic dermatitis. The earliest response are IgE antibodies to egg white protein before any symptoms have occured. When the ingested food antigen comes in contact with the skin mast cells, histamine and other chemoattractants are released into local tissue. Clinical features may manifest in the gastrointestinal tract: vomiting, nausea, diarrhea, calcicolitis, dermatitis herpetiformis (DH), gluten enteropathy (celiac disease), oral allergy syndrome (OAS), eosinophilic gastritis (EG), ulcerative colitis (UC); generalized anaphylaxis; collapse; skin features: urticaria (general), angioedema, AD, eczema vasculitis, morbilliform eruptions, perianal eruptions; respiratory: stridor, rhinitis, cough, wheeze, tachypnea, allergic asthma; nervous system: irritability, syncope-collapse alone, convulsion and other manifestations: anemia, osteoporosis, grass gastroesophageal reflux, etc. (2).

The subcommittee of the European Academy of Allergology and Clinical Immunology (EAACI) on adverse reactions to food decided to write a position paper of consensus on terminology of the symptoms which have been proved to be due to adverse reactions to food, diagnostic procedures with double-blind, placebo-controlled oral provocation (DBPCOP) and therapeutic measures (2).

Adverse reactions to food are routine work in daily practice. The true prevalence of food allergy is unknown because properly performed epidemiological studies have not been done. North American reports claim the overall prevalence of food allergy to be 10% of the general population (13% of children and 7% of adults) (4). European reports suggest 0.3%-7.5% of children and 2% of adults (3). The prevalence among atopic individuals is higher: 10% has been reported (3,4). However, our knowledge of the structure of food allergens and the pathomechanisms involved is poor.

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Adverse reactions to food allergy are divided into toxic reactions and non-toxic reactions. Toxic reactions will occur in any exposed individual provided that the dose is high enough. The occurrence of non-toxic food reactions depends on individual susceptibility to a certain food (5).

The non-toxic adverse reactions to food are either immune mediated (food allergy) or non-immune mediated (food intolerance) (6). Food intolerance is divided into enzymatic, pharmacological, and undefined food intolerance (2).

Secondary lactase deficiency affects most of the adult world population, whereas most of the other enzyme deficiencies are rare inborn errors of metabolism (3). Pharmacological food intolerance is present in individuals who are abnormally reactive to substances such as vasoactive amines normally present in some foods. Unknown mechanisms are still included in food intolerance (3). Food allergy can be divided into IgE mediated and non-IgE mediated reactions. Food allergens are defined as antigenic molecules giving rise to immune response (2). The role of type I IgE mediated reaction in food allergy is well established. The symptoms include anaphylaxis and symptoms of the skin, respiratory and gastrointestinal tract, usually in combination (7,8). None of these symptoms are specific (2).

Acute, often severe, and sometimes fatal episodes of systemic anaphylaxis usually involve the gastrointestinal and respiratory tract and the skin (2, 11).

Foods inducing anaphylaxis include peanuts, nuts, seeds, egg, milk, spices, celery, and some fruits (2). Oral symptoms and/or pharyngitis appearing within minutes after the intake of certain foods may be the first symptom of generalized anaphylactic reaction or the only manifestation of oral allergy syndrome. There is a frequent association with pollen allergy, particularly birch and mugworth pollen allergy (2).

Clinical manifestations of celiac disease reflect the consequences of malabsorption. In children, it is often an acute disease with diarrhea and failure to thrive. The diagnostic procedure for celiac disease is based on the small intestine histology. Indicators include villous atrophy, crypt hyperplasia, and infiltration of lymphocytes (2).

Some dermatitis herpetiformis patients may have villous atrophy similar to that seen in celiac disease, even without gastrointestinal symptoms (2). Furthermore, antigliadin antibodies of both IgG and IgA isotypes are commonly found in DH (7).

Clinical manifestations of eosinophilic gastroenteritis include vomiting, abdominal pain, diarrhea, malabsorption, bowel obstruction, and ascites. The cause of eosinophilic gastroenteritis is unknown. The symptoms respond to the elimination of cow milk or soy protein (2).

Generalized urticaria and/or angioedema may be the symptoms of an acute systemic reaction to food. Sometimes, intense pruritus, localized or generalized erythema, and a feeling of warmth may last 6 weeks, but are not caused by food allergy (5, 9).

However, some cases of chronic urticaria/angioedema may be due to type I reaction to a hidden food or to different foods (9).

Many patients with atopic dermatitis, especially those with associated respiratory allergies, pollinosis, and asthma show high levels of IgE antibodies as well as positive prick or intracutaneous test to various food allergens (10). In young children, food allergens can induce atopic dermatitis lesions (2).

Perennial allergic rhinitis is usually not caused by allergy to food and is rarely the only clinical manifestation of food allergy (2, 11).

Food allergy occasionally contributes to allergic asthma (2, 12). Asthma may also occur after inhalation of certain food, e.g., flour, alpha amylase, green coffee, castor bean, soybean, eggwhite, and crustacean (12, 13).

Different proteins may share epitope structures, allowing antigenic and allergenic crossreactivity. Frequently, however, patients sensitized to pollen also suffer from adverse reactions to fruits and vegetables which crossreact with the pollen in question, and can provoke respiratory symptoms in sensitized patients (13, 15). Most patients allergic to birch pollen also react to raw apples, hazelnut, peach, apricot, cherry, raw carrot, and numerous other fruits and vegetables (14,15).

Many mugwort-sensitive persons react to vegetables of the family *Umbelliferae*: celery root, fennel, carrot, parsley, and spices (16,17). Ragweed-sensitive individuals may get symptoms when eating banana or melon (2). Patients allergic to latex proteins from *Hevea brasiliensis* (rubber tree) may have food allergy to avocado, kiwi, banana, and chestnut (18). Grass pollens and wheat flour share allergenic epitopes but do not commonly provoke food allergy.

The diagnosis of food allergy is based on clinical history supported by the demonstration of IgE antibodies to the food, and confirmed by positive oral provocation (2). For practical reasons, the skin prick test (SPT) remains the test of choice to demonstrate sensitization to defined food antigens in

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a patient. The only accepted test for confirmation of the diagnosis of adverse reaction to food is a properly performed double-blind placebo-controlled food challenge (DBPCFC) (2). A positive DBPCFC is the only conclusive evidence of a food allergy, provided it is properly performed. The DBPCFC should be performed in a hospital where emergency care is immediately available. If patients present only subjective symptoms that cannot be objectively verified (e.g. abdominal pain, itching, or headache), the number of provocations must be increased to obtain statistical significance. Negative results in DBPCFC should be followed by an open-meal provocation with normally processed food. Before initiation of the controlled program, other reasons for the patient's complaints should be excluded (2). Patients with food hypersensitivity always risk developing allergic symptoms after unintentional intake of a nontolerated food, especially when product labeling is lacking.

Intracutaneous tests (ICT) are sometimes used, as they are more sensitive than SPT. However, they are not recommended because of their low specificity and the potential danger of systemic reactions in highly sensitive individuals. If the method is used at all, it should be preceded by a negative SPT (19). The search for IgE antibodies in serum is an alternative to SPT (14,19). The advantage of the test is that many determinations can be done on a single blood sample. The disadvantages are mainly high cost and results that are not immediately available while the patient is still in the office. (2)

Recently, immunoassays for the determination of eosinophil-derived proteins, eosinophil cationic protein (ECP) and eosinophil peroxidase (EPX), as well as the mast-cell-derived enzyme, tryptase, have been introduced (20). Some new methods to diagnose food allergies have been recently reported including histamine release from duodenal mast cells, intragastric challenge, and measurement of histamine in the lavage fluid (2).

Elimination diets for 4 weeks can be used in patients with chronic symptoms when the food SPT and IgE assays to food are positive or when some foods are strongly suspected (14).

MATERIAL AND METHODS

The CAST-ELISA method (21-23) was used to test 30 patients (16 male and 14 female), mean age 7.5 years, with the diagnosis of atopic dermatitis, to the following allergens: *Dermatophagoides pteronyssinus*, egg, *Dermatophagoides farinae*, grass pollen, tomato, soy, carrot, milk, casein, *Parietaria officinalis*, *Parietaria judaica*, orange, and flour (Table 1).

RESULTS

Results of CAST-ELISA test according to age, sex and allergens are presented in Table 1.

The results obtained in AD patients were analyzed according to age groups. First group included 9 patients under the age of 1 year, mean age 0.43 years. Results of the CAST-ELISA test showed the following to be the most frequent allergens that caused adverse reactions: egg (1278), soy (288), flour (236), *Dermatophagoides pteronyssinus* (216), milk (145), and *Dermatophagoides farinae* (107) (Table 2).

Second group included 8 patients aged 1-5 years, mean age 2.1 years. The following allergens provoked the strongest reaction in this group: *Dermatophagoides pteronyssinus* (680), flour (610), egg (480), *Dermatophagoides farinae* (401), carrot (125), tomato (105), casein (100) and grass pollen (13) (Table 3).

Third group included 9 patients aged 6-18 years, mean age 13 years. Allergens that have provoked the strongest reaction in this group were grass pollen (2100), *Dermatophagoides pteronyssinus* (1034), *Dermatophagoides farinae* (848), and less significantly flour (116), egg (68), *Parietaria judaica* (65), tomato (43) and soy (25) (Table 4).

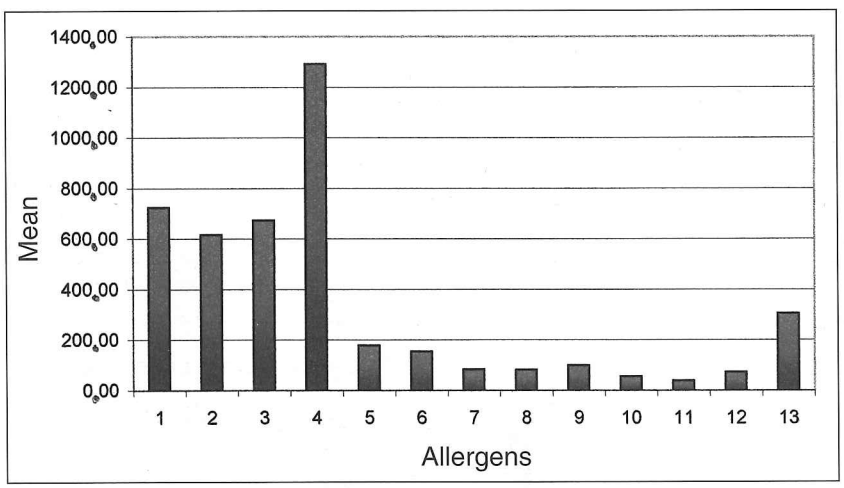
Fourth group included 4 patients aged 18 years, mean age 20 years. The most frequently detected allergens were: grass pollen (1595), *Dermatophagoides pteronyssinus* (1533), *Dermatophagoides farinae* (1248), tomato (600) and less significantly soy (110), carrot (80) and milk (45) (Table 5).

Analysis of the results on food allergens in our AD patients according to sex produced the following results: in male AD patients (n=16), mean age 7 years, exhibited have expressed the strongest allergic reaction to the following food allergens: egg (963), flour (379), tomato (208), soy (193), orange (85), carrot (84), milk (80) and casein (50); female AD patients (n=14), mean age 9.5 years, had strongest allergic reaction to the following food allergens: flour (163), egg (88), milk (68), orange (63), tomato (48), and soy (15).

Considering the CAST-ELISA test results in AD patients to allergens and age, the strongest reaction in patients aged 1 year was that observed to eggs. This sensitivity decreased later in life. Allergic reactions on cow milk and flour also decreased with time, however the sensitivity to grass pollen, *Dermatophagoides pteronyssinus* and *Dermatophagoides farinae* was found to greatly increase.

Table 1. Results of CAST-ELISA testing in atopic dermatitis patients according to age, sex and allergens

Sex	Initials	Age (m/y)	Dermat. pterony.	Egg	Dermat. farinae	Grass pollen	Tomato	Soya	Carrot	Milk	Casein	Pariet. offici.	Pariet. judaica	Orange	Flour
M	L.D.	3 m	200	230				190		140					150
M	A.M.	6 m	0	4200						54					150
M	D.D.	6 m	140	280	54			8		80					
M	D.K	4 m	0	1000				0		0					180
M	Đ.I.	4 m	750	2500				1030		520					700
M	F.M.	5 m	540	580						150					
F	M.B.	6 m	200	110				20		190					
M	K.G.	3 m	46	2006	160					125					
M	D.K.	10 m	70	600				480		48					2
M	K.B.	2 y	1050	1400	750		210	108	125	30	100	130		170	30
F	D.S.	1 y	1800	135	320					120					
M	T.K.	1 y	420	0			0	0		0				0	
F	K.V.	2 y	0	0	40	0				8				0	0
F	L.Č.	2 y	140	205	16					115				125	
M	T.C.	2 y		1500				0		0					1800
F	K.K.	3 y	1350	120	1250	34				28					
F	D.E.	4 y	0		30	4						38	14		
F	D.M.	7 y	380	30	310			25		0					200
M	Ž.M.	8 y		26			38	50	48	46					25
F	I.I.	13 y	360	50						6					
F	Z.O.	13 y	130	25	25					135					125
F	I.B.	14 y	105	54	54					155					
M	T.B.	18 y	1400	130		1600									
F	I.K.	15 y	0		0	0	48	0							
F	L.K.	16 y	3000	230	2700	4600				0					
M	D.P.	17 y	2900	0	2000	2200				25		0	65		
M	M.C.	20 y	200		245	1090	600	110	80	50					
F	M.P.	22 y			2100										
M	A.C.	20 y	3000		2400										
F	R.K.	21 y	1400	8	1100					40					
Mean			725.22	616.76	673.76	1292.00	179.20	155.46	84.33	82.60	100.00	56.00	39.50	73.75	305.64



1 *Dermatophagoides pteronyssinus*
2 Egg
3 *Dermatophagoides farinae*
4 Grass pollen
5 Tomato
6 Soya
7 Carrot
8 Milk
9 Casein
10 *Parietaria officinalis*
11 *Parietaria judaica*
12 Orange
13 Flour

Fig. 2. Results of CAST-ELISA testing in atopic dermatitis patients according to age, sex and allergens

Analysis of CAST-ELISA test results in patients with atopic dermatitis in the phase of exacerbation according to allergens and sex indicated female patients to react less intensely to almost all tested food allergens than males.

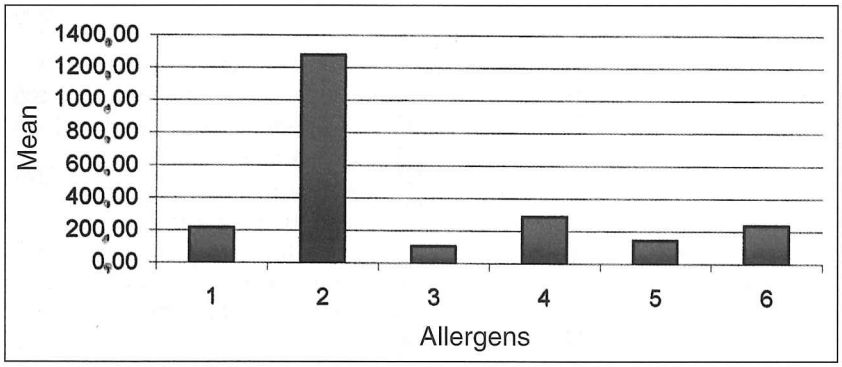
DISCUSSION

Many symptoms have been associated with adverse food reaction in children, including diarrhea, vomiting and blood loss from the digestive

Table 2. Results of CAST-ELISA testing in atopic dermatitis patients according to age, sex and allergens

Patients aged < 1 year (N=9)

Sex	Initials	Age (months)	Dermat. pterony.	Egg	Dermat. farinae	Grass pollen	Tomato	Soya	Carrot	Milk	Casein	Pariet. offici.	Pariet. judaica	Orange	Flour
M	L.D.	3	200	230				190		140					150
M	A.M.	6	0	4200						54					150
M	D.D.	6	140	280	54			8		80					
M	D.K.	4	0	1000				0		0					180
M	D.I.	4	750	2500				1030		520					700
M	F.M.	5	540	580						150					
F	M.B.	6	200	110				20		190					
M	K.G.	3	46	2006	160					125					
M	D.K.	10	70	600				480		48					2
Mean			216.22	1278.44	107.00			288.00		145.22					236.40

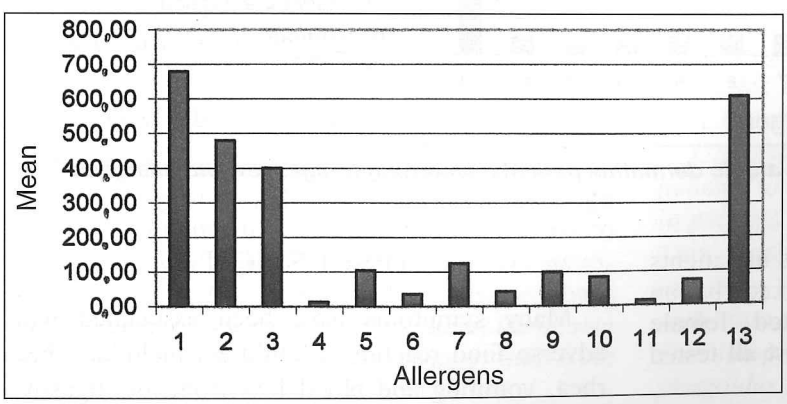


1 *Dermatophagoides pteronyssinus*
2 Egg
3 *Dermatophagoides ferinae*
4 Soya
5 Milk
6 Flour

Table 3. Results of CAST-ELISA testing in atopic dermatitis patients according to age, sex and allergens

Patients aged 1-5 years (N=8)

Sex	Initials	Age (years)	Dermat. pterony.	Egg	Dermat. farinae	Grass pollen	Tomato	Soya	Carrot	Milk	Casein	Pariet. offici.	Pariet. judaica	Orange	Flour
M	K.B.	2	1050	1400	750		210	108	125	30	100	130		170	30
F	D.S.	1	1800	135	320					120					
M	T.K.	1	420	0			0	0		0				0	
F	K.V.	2	0	0	40	0				8				0	0
F	L.Č.	2	140	205	16					115				125	
M	T.C.	2		1500				0		0					1800
F	K.K.	3	1350	120	1250	34				28					
F	D.E.	4	0		30	4						38	14		
Mean			680.00	480.00	401.00	12.67	105.00	36.00	125.00	43.00	100.00	84.00	14.00	73.75	610.00

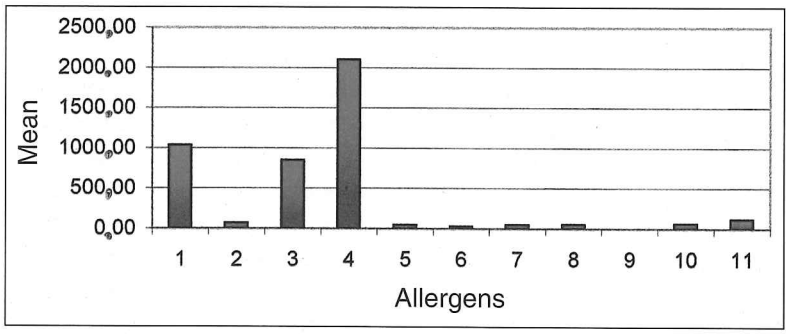


1 *Dermatophagoides pteronyssinus*
2 Egg
3 *Dermatophagoides farinae*
4 Grass pollen
5 Tomato
6 Soya
7 Carrot
8 Milk
9 Casein
10 *Parietaria officinalis*
11 *Parietaria judaica*
12 Orange
13 Flour

Table 4. Results of CAST-ELISA testing in atopic dermatitis patients according to age, sex and allergens

Patients aged 6-18 years (N=9)

Sex	Initials	Age (years)	Dermat. pterony.	Egg	Dermat. farinae	Grass pollen	Tomato	Soya	Carrot	Milk	Casein	Pariet. offici.	Pariet. judaica	Orange	Flour
F	D.M.	7	380	30	310			25		0					200
M	Ž.M.	8		26			38	50	48	46					25
F	I.I.	13	360	50						6					
F	Z.O.	13	130	25	25					135					125
F	L.B.	14	105	54	54					155					
M	T.B.	18	1400	130		1600									
F	I.K.	15	0		0	0	48	0							
F	L.K.	16	3000	230	2700	4600				0					
M	D.P.	17	2900	0	2000	2200				25		0	65		
Mean			1034.38	68.13	848.17	2100.00	43.00	25.00	48.00	52.43		0.00	65.00		116.87

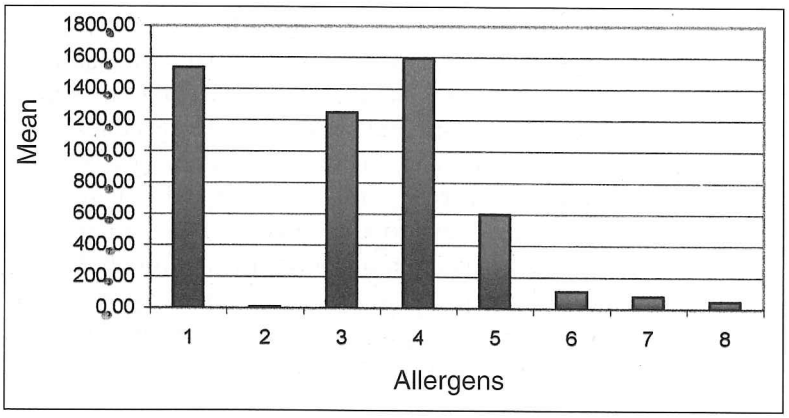


1 *Dermatophagoides pteronyssinus*
2 Egg
3 *Dermatophagoides farinae*
4 Grass pollen
5 Tomato
6 Soya
7 Carrot
8 Milk
9 *Parietaria officinalis*
10 *Parietaria judaica*
11 Flour

Table 5. Results of CAST-ELISA testing in atopic dermatitis patients according to age, sex and allergens

Patients aged > 18 years (N=4)

Sex	Initials	Age (years)	Dermat. pterony.	Egg	Dermat. farinae	Grass pollen	Tomato	Soya	Carrot	Milk	Casein	Pariet. offici.	Pariet. judaica	Orange	Flour
M	M.C.	20	200		245	1090	600	110	80	50					
F	M.P.	22				2100									
M	A.C.	20	3000		2400										
F	R.K.	21	1400	8	1100					40					
Mean			1533.33	8.00	1248.33	1595.00	600.00	110,00	80.00	45.00					



1 *Dermatophagoides pteronyssinus*
2 Egg
3 *Dermatophagoides farinae*
4 Grass pollen
5 Tomato
6 Soya
7 Carrot
8 Milk

tract, atopic eczema, asthma, wheals of the skin (hives or urticaria), swelling of the tissues (angioedema), migraine and anaphylaxis, as well as some less well defined conditions specially in severely affected children who are irritable or fail to thrive. An estimated three-quarter of these cases

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develop by the age of one year. Some of the conditions that occur in infancy and early childhood are predominantly diseases of early life, but others remain a lifelong problem (24). Recovery rates vary according to food. Children with an apparent intolerance to cow milk protein can often tolerate milk within months of the diagnosis. However, recovery is least likely to occur in children with allergies to other foods such as peanuts, nuts and fish (24). In our AD group of patients, egg, soya, flour, dermatophagoides and cow milk were the commonest allergens by the age of one year, and flour, egg, carrot, tomato, casein and orange at the age of 1-5 years.

In adults, the classic allergic symptoms of urticaria, asthma or anaphylaxis may be seen. Some foods provoke gastrointestinal symptoms. In our adults AD patients, the most frequent allergens were *Dermatophagoides pteronissinus* and *Dermatophagoides farinae* , grass pollen, tomato, soy, carrot and milk.

The most common allergenic foods are apples, nuts, tomatoes, milk, eggs, spinach, grapes, bananas, peanuts, cocoa, shellfish, soya, fish and chicken. Foods which cause intolerance reactions act directly on mast cells, e.g., chocolate, tomatoes, strawberries, eggs, fish, pineapples, spices or contain histamine: chocolate, tomatoes, shellfish, rhubarb, chess, herring, bananas, cod, peppers, nuts, wine, souer-crout and tunnyfish. Many foods contain coloring agents, flavoring agents, preservatives, etc., which can also cause symptoms of food intolerance. The coloring agents are E102, E107, E110, E122, E123, E124, E128 and E151. The flavoring agents are cinnamon, vanilla, eugenol and menthol. The preservatives are E210, E219, E200 and E203.

In 924 AD patients, Lipozenčić et al. found sensitivity to sodium benzoate in 42%, to acetylic acid in 40%, to potassium methylsulfite in 36%, and to tartrazine in 24% of patients (25).

In the recent years, soy and celery, kiwi, apples and crustacea are frequent causes of food allergies. Atopic eczema provoked by direct contact of the skin with food must also be taken into consideration. The role of food allergy in the pathogenesis of atopic dermatitis is still controversial, however, there is no doubt that, particularly in infants and young children, food allergens can induce AD or aggravate skin lesions (26).

The mean level of serum IgE in patients with AD is higher than in patients with allergic asthma or rhinitis, and varies with age, starting with IgE for food allergens such as cow milk, egg or peanut in infancy, and for environmental allergens after the age of 1 year (27). In our AD patients under the age of 1year, egg, soy, flour and milk were found to be food allergens worsening the clinical findings. There is evidence that the incidence of food protein hypersensitivity affects 5% to 8% of infants in the first 3 years of life, predominantly inducing the immediate anaphylactic-type response (28). Adverse reaction to foods underpins diseases like atopic dermatitis, reflux esophagitis and colic in the first 12 months of life. Together they affect up to 25% of infants (28). Considering atopic disposition, an increase in food allergy could be expected, e.g., "pollen-related food-allergy" or as a trigger of atopic eczema (29). In our AD patients, pollen allergy increased with age, likewise the allergy to tomato and other nutritive allergens.

Peanut allergy is one of the most common food allergies and probably the most common cause of death from food anaphylaxis in the USA. Allergy to egg and eczema are important predictors for peanut allergy in young children. The prevalence of peanut allergy was higher when the consumption of peanuts during pregnancy or breast-feeding was more common among mothers of probands aged <5 years than of those aged >5 years. Age of onset correlated inversely with the year of birth (30). Burks et al. have confirmed that most children with atopic dermatitis have food allergy that can be diagnosed by a prick skin test for seven foods (31).

Certain food allergens are more frequently responsible for specific skin manifestations (31). Thus, for fish sensitization, the most frequent skin manifestation is AD (50%), for egg sensitization angioedema (50%), and for milk urticaria (50%) (32).

Such allergies are more common in children than in adults. Foods commonly involved include eggs, peanuts, cow milk, soy, wheat, fish, shellfish and nuts, but reactions can also occur to spices such as mustard and sesame or to vegetables, e.g., celery and tomato. In our AD children aged 5 years, flour, egg, carrot, tomato, casein and orange were the commonest food allergens. Food allergy involves the reaction of food protein with antibodies produced against it by the immune system. The accompanying symptoms are the results of this inappropriate immune response.

CONCLUSION

Based on the results of the CAST-ELISA testing in our AD patients according to age and allergens,

deterioration of clinical findings demonstrated that eggs induced the most pronounced reaction in patients under the age of 1 year, whereafter this hypersensitivity was observed to decline. Flour induced the most pronounced reaction in 1-5 age old group of patients, whereafter it declined, while allergy to tomato and some other nutritive allergens increased.

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SAŽETAK

Ovo je istraživanje provedeno kako bismo vidjeli postoji li značajna ovisnost reakcije na određene nutritivne alergene o dobi ili spolu oboljelih od atopijskog dermatitisa. Posebno se analizirao odnos nalaza alergena i ekspresije u djece na temelju testa CAST-ELISA.

Ključne riječi: *alergija na hranu, neželjene reakcije na hranu, atopijski dermatitis, nutritivni alergeni, CAST-ELISA test*