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SENSITIZATION PATTERNS TO FOOD ALLERGENS IN CHILDREN OF GOMEL CITY

Introduction

Allergic diseases, having reached the scale of a global medical and social problem in recent decades, demand close attention. In paediatric practice, food allergy (FA) presents a particular challenge, with a prevalence, according to 2024 World Health Organization data, reaching 8% among children under 5 years, 6% in the 5–14 age group, and 4% in adolescents aged 15–18 years [1]. Childhood food allergy is often the first step in the "allergic march," predisposing to the development of inhalant allergies in later life. The clinical presentation of FA is characterized by a polymorphism of symptoms affecting the skin, gastrointestinal tract, and respiratory system, ranging from mild manifestations such as urticaria and cough to life-threatening conditions, including bronchospasm and anaphylaxis [2].

Food allergy is immunologically defined as an adverse immune reaction to food proteins and is classified into IgE-mediated and non-IgE-mediated [3]. The diagnostic algorithm for suspected FA begins with a thorough history taking and physical examination, aimed at identifying causative foods and likely immunological mechanisms. Skin prick testing is widely used for the diagnosis of IgE-mediated reactions; however, its capabilities are limited. Confirmation of FA diagnosis and in-depth diagnostics often require the use of more accurate methods, such as quantitative determination of specific IgE (sIgE) in serum [4]. Although molecular allergy diagnostics offer increased sensitivity and specificity, their high cost and limited availability contribute to the continued relevance of allergen extract-based tests, in particular immunoblotting, especially in resource-constrained settings. Immunoblotting, with its analytical advantages, represents a valuable alternative for the identification of allergen-specific IgE.

A key aspect of personalized management of patients with food allergy is understanding individual sensitization patterns. Currently, the significant influence of geographical factors and dietary habits on the formation of sensitization profiles is recognized [5]. Timely and accurate diagnosis of allergic diseases in childhood is of fundamental importance not only for the adequate selection of treatment tactics and patient management, but also for the potential prevention of allergic process progression.

Goal

To study sensitization to food allergens in children of Gomel city.

Material and methods of research

We studied 55people (32 boys, 23 girls) aged 1–18 years who were observed Gomel Central City Children's Clinical Polyclinic during the period January to December in 2023. All patients were observed for diseases – bronchial asthma, allergic rhinitis, atopic dermatitis. The material for the study was blood serum, which was incubated with a solution blocking

CCD cross-reacting carbohydrate determinant (bromelain, horseradish peroxidase, ascorbate oxidase) to eliminate false positives. The sIgE levels to the antigens: Hazelnut, Peanut, Walnut, Almond, Cow milk (paste), Egg – protein, Egg- yolk, Casein, Potato, Pepper, Carrot, Tomato, Strawberry, Orange, Apple, Wheat flour, Fungus Cladosporium herbarium, Soybeans, Fish mix, Banana, Cherry, Pork, Chicken, Beef, Kiwi, Sesame crushed seeds, Grapes were determined by immunoblotting. Quantification of specific IgE was performed using a scanner and special software.

Results were recorded according to the criteria: 0 not present [0.00–0.34 IU/ml]; 1 low level [0.35–0.69 IU/ml]; 2 enhanced level [0.70–3.49 IU/ml]; 3 very enhanced 98 level [3.50–17.49 IU/ml]; 4 high level [17.5–49.9 IU/ml]; 5 very high [50.0–100.0IU/ml]; 6 excessive values [>100 IU/ml]. The results were treated statistically.

The results of the research and their discussion

The results of the analysis of the frequency of detection of allergen-specific IgE in the examined patients are presented in Table 1.

Table 1 – Frequency of Specific IgE to Food Antigens in Children

Allergens	Positive sample rate							
	≥0.35IU/ml		≥0.70IU/ml		≥3.5IU/ml		≥17.5IU/ml	
	n	%	n	%	n	%	n	%
Hazelnut	3	5.45	1	33.33	1	100	–	–
Peanut	4	7.27	2	50	1	50	–	–
Walnut	5	9.09	3	60	1	33.33	–	–
Almond	1	1.81	–	–	–	–	–	–
Cow milk (paste)	11	20	5	45.45	2	40	–	–
Egg protein	5	9.09	2	40	1	50	–	–
Egg yolk	5	9.09	1	20	–	–	–	–
Casein	2	3.63	–	–	–	–	–	–
Potato	4	7.27	3	75	–	–	–	–
Pepper	4	7.27	1	25	–	–	–	–
Carrot	2	3.63	–	–	–	–	–	–
Tomato	3	5.45	–	–	–	–	–	–
Strawberry	–	–	–	–	–	–	–	–
Orange	3	5.45	–	–	–	–	–	–
Apple	3	5.45	1	33.3	–	–	–	–
Wheat flour	3	5.45	–	–	–	–	–	–
Fungus Cladosporium herbarium	–	–	–	–	–	–	–	–
Soyabeans	–	–	–	–	–	–	–	–
Fish mix	3	5.45	–	–	–	–	–	–
Banana	3	5.45	–	–	–	–	–	–
Cherry	8	14.54	4	50	–	–	–	–
Pork	4	7.27	1	25	–	–	–	–
Chicken	2	3.63	–	–	–	–	–	–
Beef	2	3.63	–	–	–	–	–	–
Kiwi	2	3.63	–	–	–	–	–	–
Sesame crushed seeds	7	12.72	1	14.28	1	100	1	100
Grape	9	16.36	1	11.11	–	–	–	–

Of the 55 patients we examined, Polysensitization – the presence of specific immunoglobulin E to 2 or more allergens, was found in 52 patients.

The maximum number of patients who are allergic to are with cow's milk (n=11; 20%), Grapes (n=9; 16.36%), cherry (n=8; 14.54%), and sesame crushed seeds (n=7; 12.72%). Sensitization to food antigens of very high and extreme levels was not detected in children. The food allergens to which high levels of immunoglobulin E were detected were sesame crushed seeds, cow's milk, Hazelnuts, Peanuts, Walnut, Egg protein being in the class 3 and 4, However, there were few such patients – only 1–2 patients. The production of specific serum IgE is not registered in Fungus Cladosporium herbarium and strawberry.

There are divergent opinions regarding the correlation of sIgE titer with the severity of clinical manifestations of atopy and the risk of developing clinical manifestations of the disease, as they depend not only on IgE levels, but also on the ability of allergy mediators to be released, the response of the target organ to the mediators and other factors. However, most researchers support the view that a higher concentration of sIgE in the blood corresponds to a higher risk of clinical manifestations. Resolution of food-allergic disease is accompanied by a decrease in serum food-specific IgE level so these levels can be serially followed to help predict disease resolution [6]. The sensitisation to cow's milk, Grapes, cherry, sesame crushed seeds although the most frequent, was of an enhanced but not critical level.

Conclusion

The presented results demonstrate the patients with different serum IgE levels of food allergens in Gomel that can provoke aggravation of atopy access and maintain allergic inflammation. We found most frequent allergens in children is cow's milk. Slightly less frequent was found in grapes, cherry, sesame crushed seeds. And no specific IgE was found in strawberry and Fungus Cladosporium herbarium. The high frequency of sensitisation to such foods as cow's milk, grapes, cherry, sesame crushed seeds revealed in our study may indicate the need to include them with caution in the diet of a young child, especially with atopic predisposition.

LITERATURE

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