



## FOOD ALLERGY AND CROSS-ALLERGIC REACTIONS IN CHILDREN UNDER HOT CLIMATE

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### Article history:

**Received:** March 20<sup>th</sup> 2023

**Accepted:** April 22<sup>nd</sup> 2023

**Published:** May 24<sup>th</sup> 2023

### Abstract:

**Objective:** To identify allergens that cause food allergies in children with allergic diseases using safe in vitro diagnostics.

**Material and methods:** in 186 patients with allergic diseases (bronchial asthma, allergic rhinitis, allergic rhinoconjunctivitis, atopic dermatitis, acute and chronic urticaria) aged 1-18 years in blood serum using the method of immunoblotting (Rida qLine Allergy R-Biopharm, Germany) ) antibodies to specific immunoglobulins E.

**Results:** the most common food allergens in children in our republic were gluten, wheat flour, buckwheat, rice, cow's milk, eggs, nuts, yogurt.

**Conclusions:** timely detection of an allergen that poses a danger to the patient, elimination of the "culprit" of the allergen is important in therapy.

**Keywords:** food allergy, children, food products, allergens, polysensitization

**INTRODUCTION.** To date, allergic diseases are multifactorial diseases, under the influence of hereditary and environmental factors tend to increase [1]. Among allergopathology, food allergy (FA) is the dominant pathology in children and adults [2].

Non-IgE-related allergies caused by primary sensitization to tree pollen represent the most common cross-reaction, which is based on an immunological cross-reaction between Bet v 1, the main birch pollen allergen, and structurally similar (homologous) proteins from the PR-10 family, which are also found in plant products, pome fruits, stone fruits, hazelnuts, carrots, soybeans, etc. The spectrum of trigger foods is individual for each patient and, if properly diagnosed, serves as the basis for sound avoidance recommendations [5, 8].

Primary sensitization most often occurs to inhaled allergens (eg, Bet v 1, the main birch pollen allergen). IgE can be activated by various cross-reactive allergens and lead to a variety of clinical manifestations. As a rule, local and mild, and in rare cases also severe and systemic reactions occur immediately after consumption of products containing cross-reactive allergens from the Bet v 1) family [8].

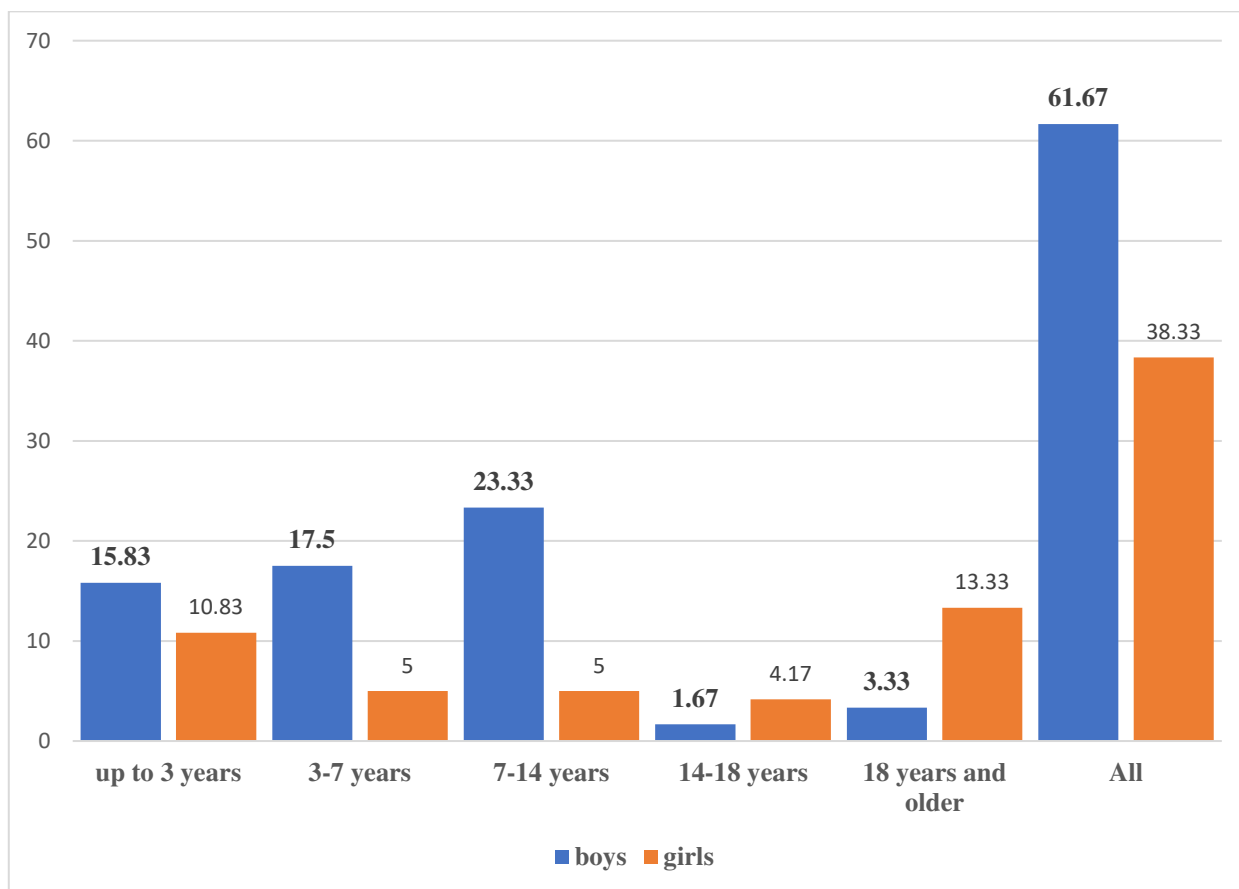
The high lability of homologous Bet v 1 allergens involved in heat treatment, oxidation processes and gastrointestinal digestion contributes to the occurrence of local symptoms in the oral cavity and pharynx. Severe

systemic reactions are less common, for example after consuming lightly processed soy products; [3, 6]. In patients with atopic dermatitis, worsening of the condition may occur after the use of plant products [5, 7].

The sharp increase in the prevalence and severity of food allergies in many countries around the world dictates the development of effective strategies. Often, food allergy occurs as a result of a violation of the mechanisms of immune tolerance, which is modulated by the function and structure of the intestinal microbiota, in turn, dysbiosis contributes to the development of food allergy. Low fiber and high fat levels in the diet of the average person, as well as lack of breastfeeding, frequent use of antiseptics, especially in the context of coronavirus infection, drugs may be associated with the development of food allergies [4].

**MATERIALS AND METHODS.** In order to identify plant and animal food allergens, we examined the sera of 186 children with allergic pathology aged 1-18 years who received treatment at the Republican Scientific and Specialized Allergological Center and the Republican Scientific and Specialized Center for Dermatovenereology and Cosmetology, in private clinics Medik-as, TTD.

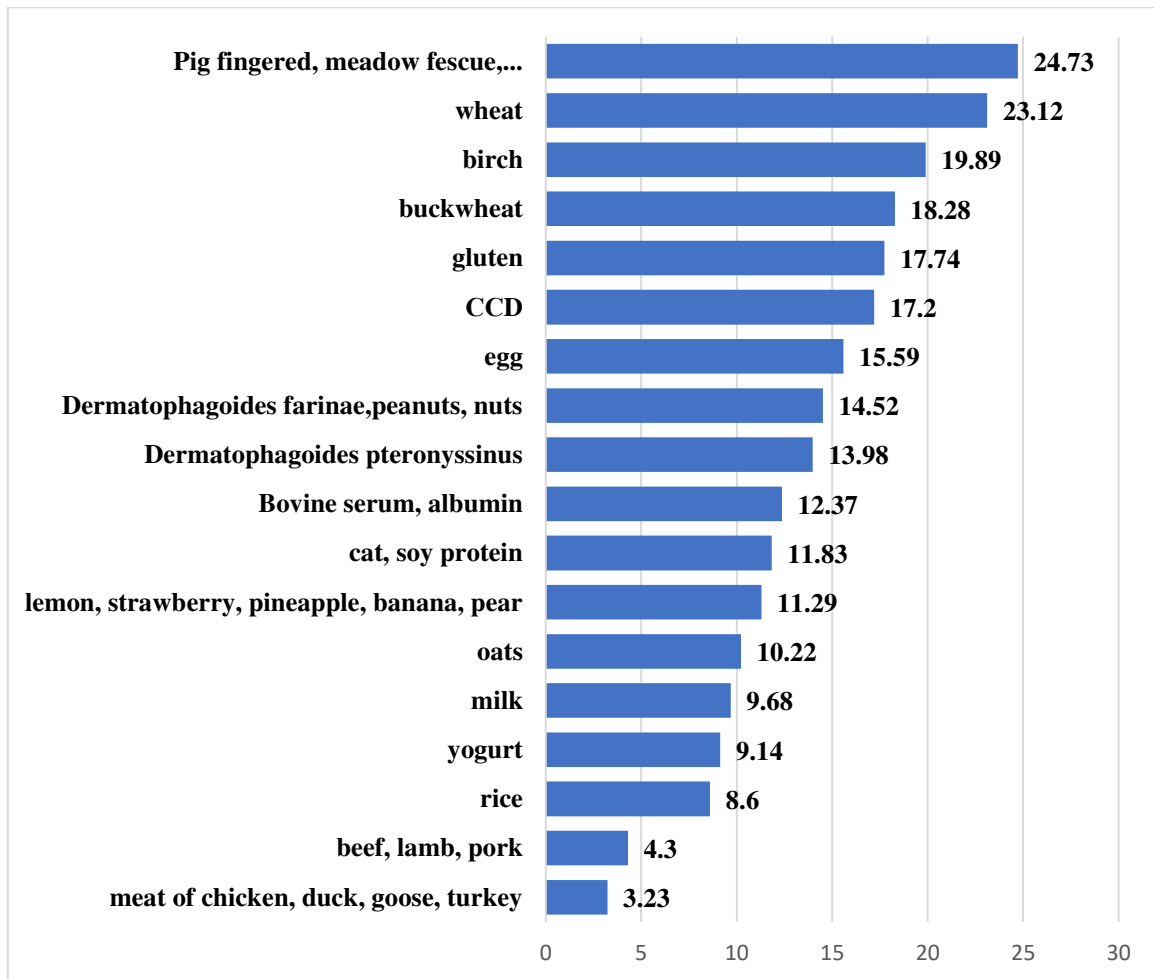
Of the 186 patients, 110 boys and 76 girls, whose mean age was 11.77±7.98 years.



**Figure 1. Distribution of patients by sex and age (n=186)**

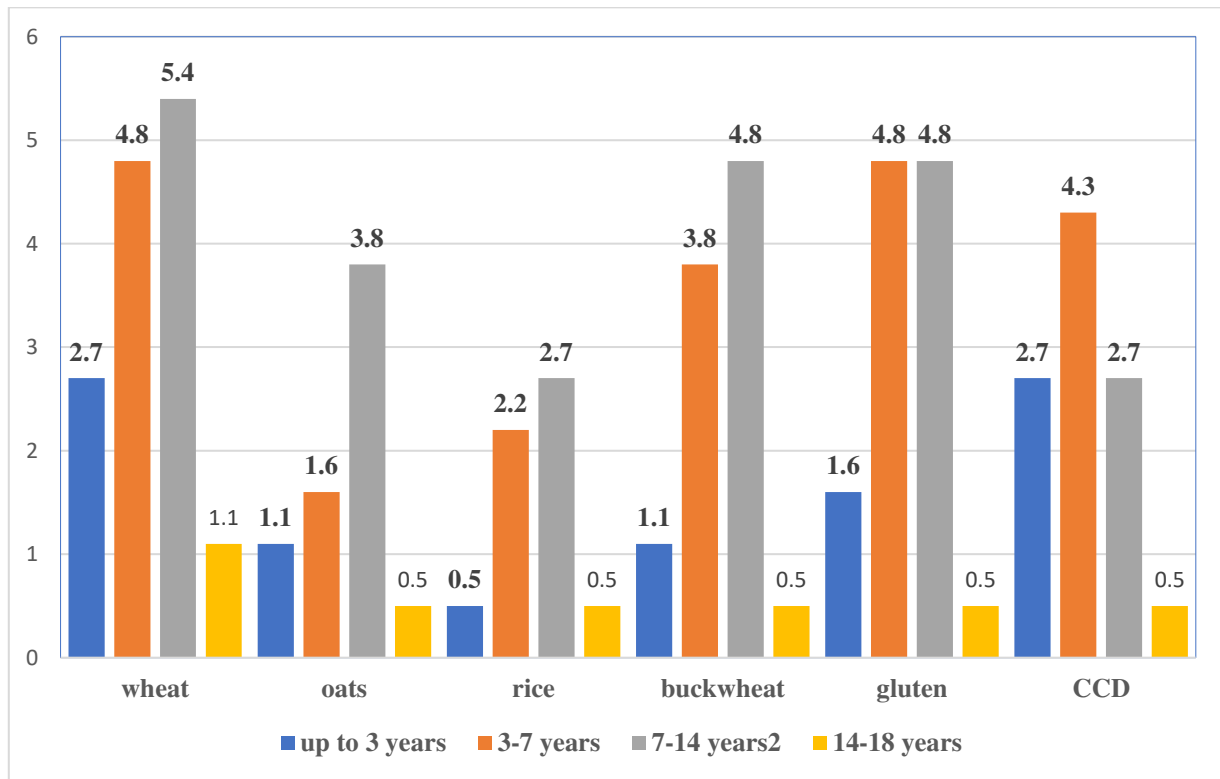
It should be noted that high rates of sIgE for food allergens were noted: wheat (23.12%), buckwheat (18.28%), gluten (17.74%), chicken eggs (15.59%), peanuts and nuts (14.52%), soy protein (11.83%), lemon, strawberry, pineapple, banana, pear (11.29%), oats (10.22%), cow's milk (9.68%), yogurt (9.14%), rice (8.6%), beef, lamb, pork (4.3%), chicken, duck, goose and turkey meat (3.23%). Among plant allergens: pig finger, meadow fescue, chaff, meadow

timothy, rye (24.73%), birch (19.89%), carbohydrate antigen (17.2%); household allergens: Dermatophagoides farinae (14.52%) and Dermatophagoides pteronyssinus (13.98%); animal allergens: bovine serum albumin (12.37%), cat allergen (11.83%). It should be noted that food allergy was more common in individuals with allergic multimorbidity than in individuals diagnosed with a single allergic disease.



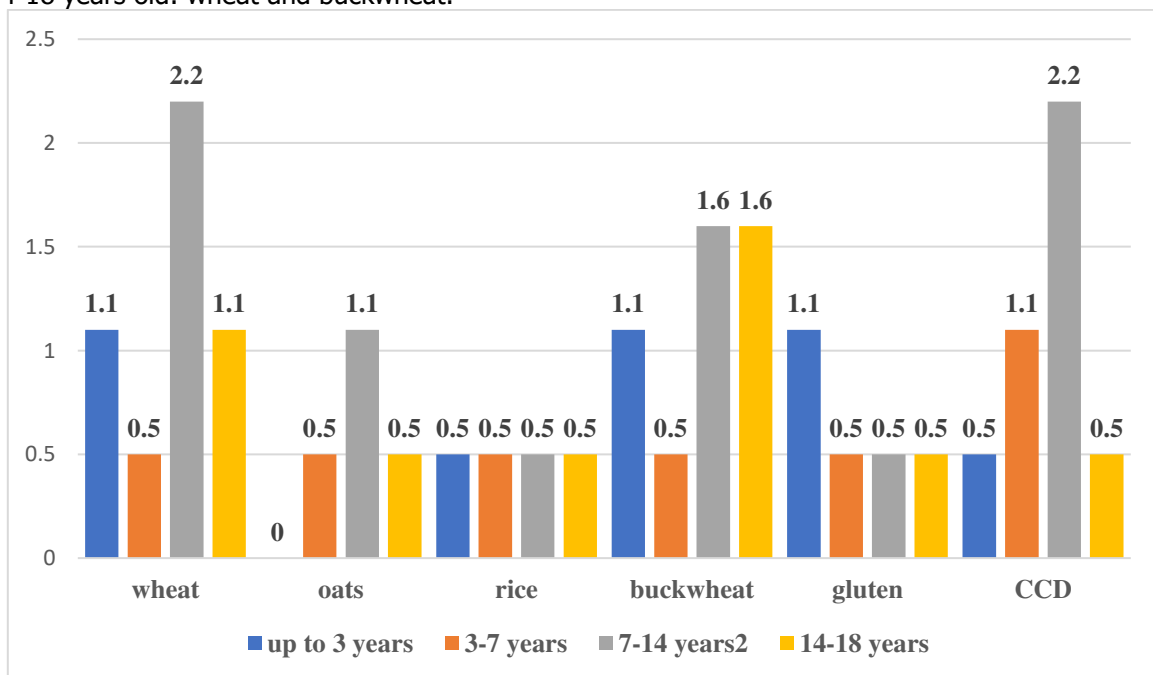
**Figure 2. Sensitization to household, food and plant allergens**

The detection of various food-specific IgE antibodies in allergic children indicates that boys are more likely to develop food allergies than girls.



**Figure 3. Sensitization to plant food allergens in boys in %, P (n=186)**

Among plant allergens in children under 3 years old, sIgE was detected for wheat, buckwheat, gluten, in children 3-7 years old: for wheat, gluten, buckwheat, oats; in children 7-14 years old: wheat, gluten, buckwheat, oats, rice; in children 14-18 years old: wheat and buckwheat.



**Figure 4. Sensitization to plant food allergens in girls (n=186)**



Among animal food allergens, we studied in patients under 3 years old and 3-7 years old chicken egg and cow's milk prevailed, in patients 7-14 years old their frequency decreased for goat's milk, cheese, lamb, veal, pork, horse meat; meat of chicken, duck, goose, turkey, chicken eggs; fish (cod, shrimp, salmon, edible mussel, tuna), bovine serum albumin, as you know, meat contains 2 types of protein: serum albumin and  $\gamma$ -globulin.

It should be noted that, according to Martelli, A., De Chiara, A., Corvo, M., Restani, P., & Fiocchi, A. (2002) it was proved that the presence of sensitization to bovine serum albumin is a marker of allergy to cow's milk in children with a food allergy to beef.

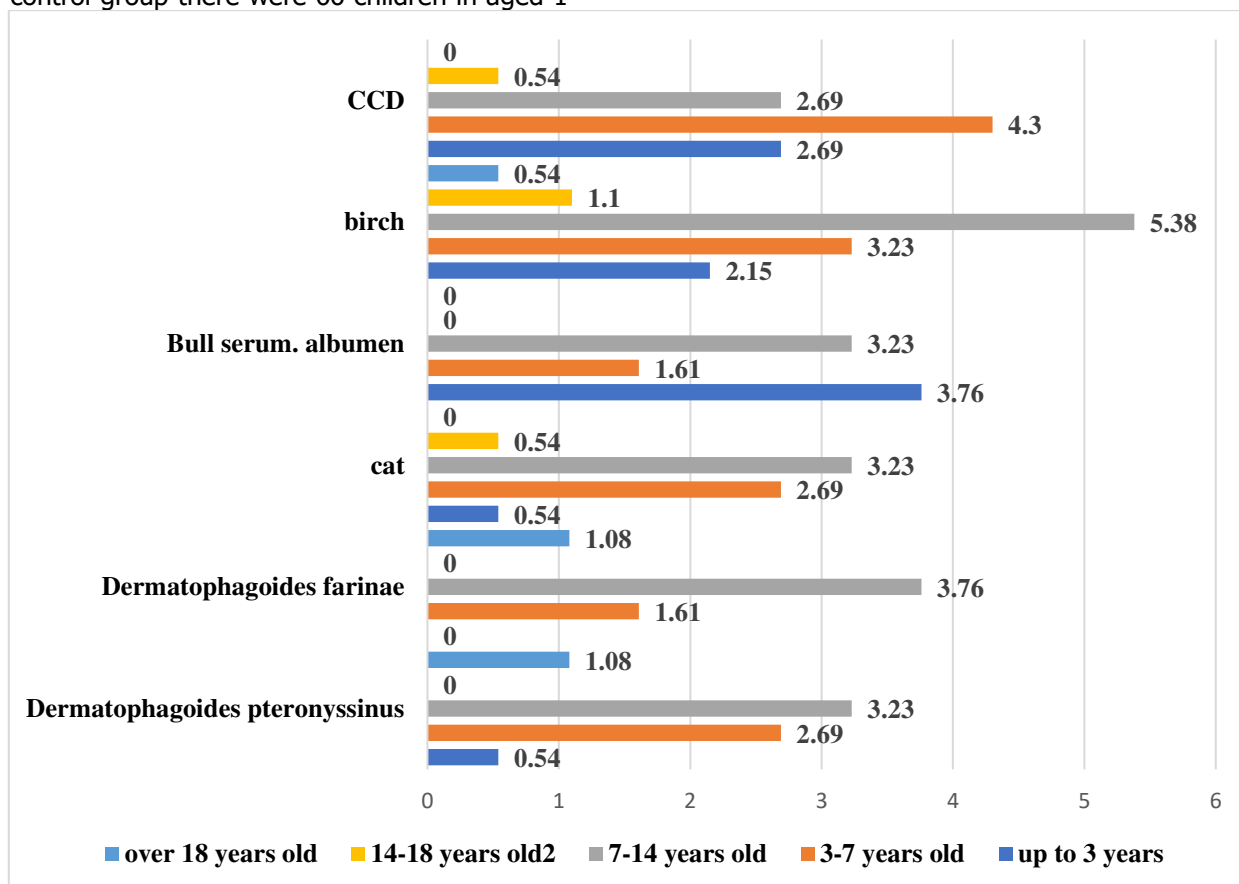
In children aged 1-18 years in the main group, food allergy prevailed in boys compared to girls, monosensitization was observed in 22 (11.82%) children, polysensitization in 98 (52.69%) children, and in the control group there were 66 children in aged 1-

18 years: 36 boys and 30 girls, who were not found to be sensitized to food and other groups of allergens.

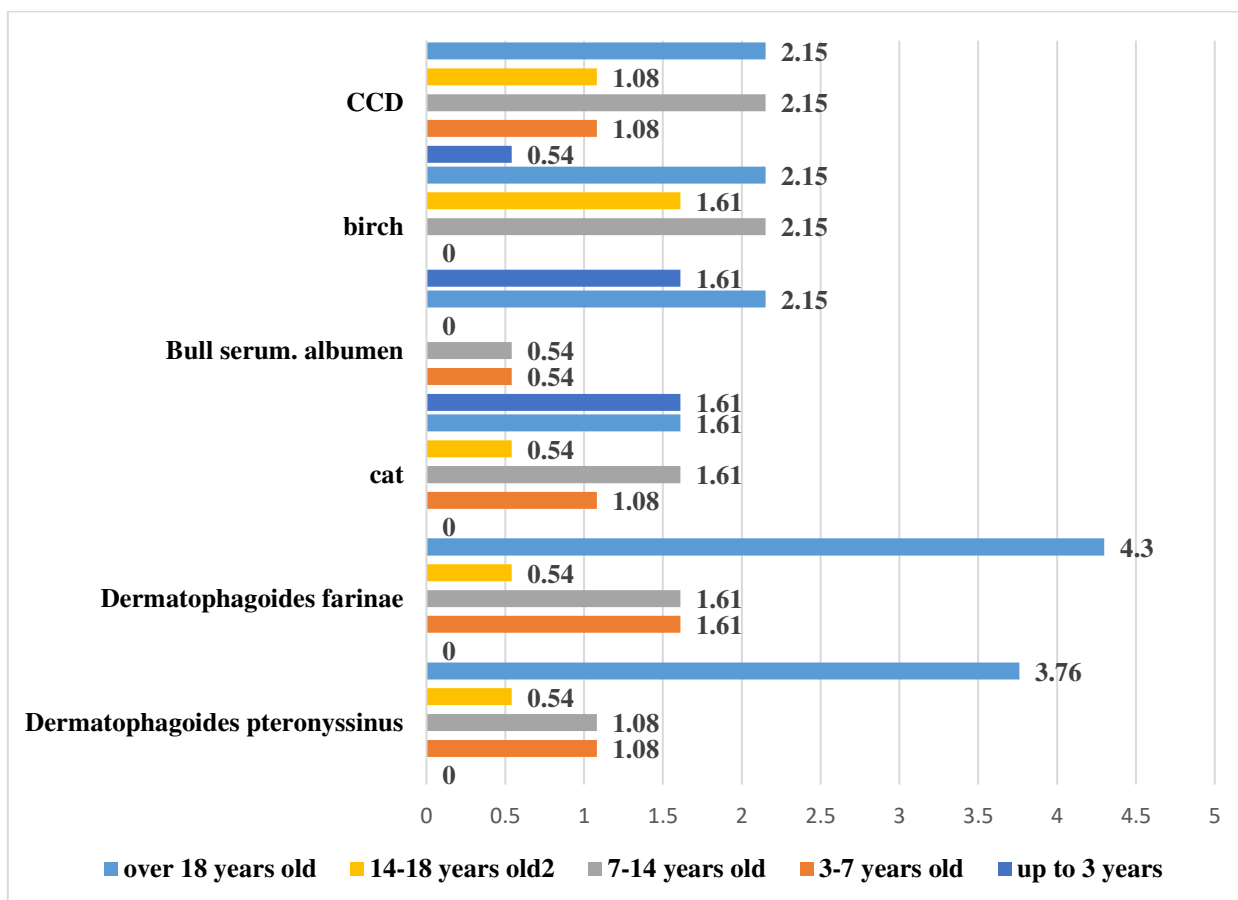
As the results of the study showed, in children in the control and main groups, boys predominated (59.1%), more than half of the children had polysensitization, sensitivity to several allergens.

Among plant and household allergens in children, sensitization was noted for birch allergen in 11.3% of boys and 7.52% of girls, for cat allergen in 6.46% of boys and 4.84% of girls, for dust mites of the genus *Dermatophagoides farinae* in 6.45% of boys and 8.06% of girls, *Dermatophagoides pteronissinus* in 7.54% of boys and 6.46% of girls.

Among animal allergens, sIgE for bovine serum albumin was found in 8.6% of boys and 4.84% of girls (Figures 5 and 6).



**Figure 5. Sensitization to household allergens in boys**



**Figure 6. Sensitization to household allergens in girls**

As you know, food allergens are of plant and animal origin. As a result of research, we have identified the most common allergens in children, such as wheat (23.12%), buckwheat (18.28%), gluten (17.74%), EC (15.59%), peanuts and nuts (14.52%), lemon, strawberry, pineapple, banana, pear (11.29%), oats (10.22%), KM (9.68%), yogurt (9.14%), rice (8.6%), beef, lamb and pork (4.3%), poultry meat: chicken, duck, goose, turkey 3.23%.

To detect cross-allergic reactions, an allergenic birch extract was added to the allergen panel; sIgE for birch was found in 19.89% of patients, which proves the presence of cross-allergic reactions. In addition, a component of molecular diagnostics, carbohydrate antigen CCD, was added to the allergen panel. This marker is an indicator of cross-allergic reactions and is very informative for diagnosing true reactions, including PA to plant foods. In our studies, this marker was positive in 17.2% of the examined.

It should be noted that in the presence of patients with sensitivity to chicken eggs, food allergy was noted to cow's milk (9.68%), products containing

milk components, i.e. yogurt (9.14%), bovine serum albumin (12.37%).

**CONCLUSIONS.** Thus, sensitivity to the components of chicken egg allergens in early childhood is a predictor of the development of atopic march in the future. Carbohydrate antigen CCD is an indicator of cross-allergic reactions, it is also informative for diagnosing allergic reactions that proceed according to the type of immediate hypersensitivity, especially for revealing latent sensitivity to allergens of plant origin.

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