Analysis of IgE antibody profiles to food and pollen plant allergens in children with birch allergy and oral allergic syndrome

SCO — краткое сообщение

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M. A. Snovskaya [1], E. L. Semikina [1], S. G. Makarova [1,2], O. A. Ereshko [1], D. S. Yasakov [1], A. A. Galimova [1]

[1] *Federal state autonomous institution of the Russian Federation Ministry of Health «National Medical Research Center for Children's Health», Moscow, Lomonosovsky prospect, 2, building 1, 119991, Russia*

[2] *Moscow State University named after M. V. Lomonosov, Moscow, st. Kolmogorova, 1, 119991, Russia*

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Анализ профилей антител IgE к пищевым и пыльцевым растительным аллергенам у детей с аллергией на березу и оральным аллергическим синдромом

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М. А. Сновская [1], Е. Л. Семикина [1], С. Г. Макарова [1,2], О. А. Ерешко [1], Д. С. Ясаков [1], А. А. Галимова [1]

[1] *ФГАУ «Национальный медицинский исследовательский Центр Здоровья Детей» Министерства здравоохранения Российской Федерации, Москва, 119991, Ломоносовский проспект, д. 2, стр. 1, Россия*

[2] *ФГБОУ ВО «Московский государственный университет имени М.В. Ломоносова», Москва, 119991, ул. Колмогорова, д. 1, Россия*

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Food allergy, particularly oral allergy syndrome, is widely spread among patients with birch allergy [1, 2, 3]. Clinical symptoms of sensitization to birch can appear at any age, but most often the onset of the disease occurs in childhood [1, 4, 5]. Choosing pathogenetic therapy requires precise identification of the disease trigger factors and their impact reduction [2, 4, 6].

Objective — comparison of IgE-response profile to pollen and food allergens of plant origin in children with birch allergy along with oral allergy syndrome.

Materials and methods

The study included 102 patients (aged 4–14 years) with birch allergy along with oral allergy syndrome (OAS). By means of immunofluorescence method (automatic analyzer ImmunoCAP, Thermo Fisher Scientific) the concentrations of IgE-antibodies to a mixture of cereal allergens and weed allergens, food allergen extracts (an apple, pear, peach, cherry, banana, tomato, carrot, potato), to allergic components of birch pollen (Bet v 1, Bet v 2, Bet v 4, Bet v 6) were identified in patients' serum samples. An antibody concentration greater than or equal to 0,35 kU/l was considered as diagnostically significant IgE rate in patients (posititve response).

Data analysis was held using IBM SPSS software (USA) and Microsoft Office Excel program (USA). Quantitative data analysis was conducted using the Mann-Whitney U-test, correlation analysis. The critical significance level for statistical hypothesis testing in the study was equal to $p = 0,05$.

Results

Evaluating the patients' sensitization to main and minor birch allergens, it was found that IgE-antibodies to Bet v 1, Bet v 6, Bet v 2 and Bet v 4 had 102 (100 %), 56 (54,9 %), 14 (13,7 %) and 2 (1,9 %) patients with OAS, respectively.

IgE-antibodies to weed pollen allergens were detected in 77 (75,5 %) studied patients, while

combined sensitization to cereals and weeds was diagnosed in 55 (53,9 %) children. The number of sensitization cases only to weeds was statistically greater than the number of sensitization cases only to cereal grasses: in 17 and 5 children (16,7 % and 4,9 %), respectively (p = 0,021). IgE-antibodies at least to one of the extracts of fruit allergens were found in 99 patients (97,1 %), and IgE to the extracts of vegetable allergens — 73 patients (71,6 %). Diagnostically significant levels of IgE-antibodies to the extracts of peach, pear, apple and cherry allergens were detected in 99 (97,1 %), 94 (92,2 %), 90 (88,2 %), 83 (81,4 %) patients, respectively, and combined positive IgE-response to all fruits — in 82 (80,4 %) children with OAS. The absence of IgE-antibodies to the extract of peach allergens was combined with the absence of sensitization to an apple, pear and cherry.

A large number of children with sensitization to the allergens of carrot — 70 (68,6 %), banana — 63 (61,8 %), potato — 48 (47,1 %), tomato — 42 (41,2 %) was found among the patients with OAS.

Antibodies to all considered extracts of food allergens were observed in 39 (38,2 %) patients with birch allergy, combined with OAS, while 37 of them also experienced combined sensitization to the extracts of cereal and weed allergens.

Statistically significant strong correlation was identified between concentrations of IgE-antibodies to the extracts of fruit allergens and IgE to the extract of birch allergens and Bet v 1 (Spearman's rank correlation coefficient, r = 0,726 ÷ 0,807, for all the compared pairs p = 0,000), correlation of moderate intensity between IgE-responses to the allergens of vegetables, banana and IgE-response to allergen extracts and the main birch allergen (r = 0,602 ÷ 0,671, for all the compared pairs p = 0,000), moderate intensity between IgE-response to the extract of birch allergens, and also Bet v 1, and IgE-response to weeds (r = 0,432, p = 0,002 and r = 0,357, p = 0,007, respectively) and cereal grasses (r = 0,458 и r = 0,456, respectively, p = 0,000).

There was no correlation between positive IgE-responses to minor allergic component Bet v 2 and Bet v 4 and allergens of fruits, vegetables and grasses. However, statistically significant moderate correlation was detected between IgE-response to Bet v 6 and fruit allergens (r = 0,455 ÷ 0,566, p = 0,000), vegetables (r = 0,516 ÷ 0,564, p = 0,001), cereal grasses (r = 0,515) and a strong correlation between IgE-response to Bet v 6 and banana (r = 0,729, p = 0,001).

Statistically significant correlation of moderate strength was also found between the concentration of IgE-antibodies to the allergen mixture of cereal grasses and IgE to fruits (r = 0,460 ÷ 0,537), banana (r = 0,683), potato (r = 0,590), tomato (r = 0,626), carrot (r = 0,428), weeds (r = 0,613); and between IgE-response to weeds and fruits (r = 0,478 ÷ 0,529), banana (r = 0,627), potato (r = 0,680), carrot (r = 0,503), and strong correlation with IgE-response to tomato (r = 0,775). The significance level is equal to p = 0,000 for all the mentioned pairs.

Conclusion

Patients with birch allergy combined with OAS have positive IgE-response to a wide range of plant allergens. There is a high frequency of combined sensitization to pollen allergens of weeds and cereal grasses, and also to food allergens of plant origin. The patients with positive response to all the studied food allergens in this work experienced simultaneous sensitization to weeds and cereal grasses in 94,9 % of cases. The absence of sensitization to a peach in patients with OAS is combined with the absence of sensitization to an apple, pear and cherry. The detection of IgE-antibodies to the extract of peach allergens is a predictor to sensitization to a wide range of fruit allergens. While sensitization to fruits, vegetables, banana is associated not only with reactivity to the main birch allergen Bet v 1, and to minor allergen Bet v 6, but with the equal degree to pollen allergens of grasses. Thus, patients with OAS need an extended examination with plant allergens for optimal selection of elimination diet and drug for allergen-specific immunotherapy.

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