

Analysis on relationship between specific IgG antibodies of 14 food allergens and allergic skin diseases.

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Abstract

Purpose: To analyze the relationship between the specific IgG antibodies of 14 food allergens and allergic skin diseases.

Method: 340 patients of allergic skin diseases treated in our hospital during March 2012-June 2014 are selected, including 164 males and 176 females. In addition, 30 cases of healthy people without anaphylactic reaction medical history based on the physical examination center of our hospital are selected as the control group. The food intolerance test kits (American BIOMERICA Corporation) are adopted, and the Enzyme Linked Immunosorbent Assay (ELISA) semi-quantitative detection method is applied to detect the concentrations of the antigenic IgG antibodies in 14 commonly seen foods including beef, milk, chicken and pork.

Results: The specific IgG antibodies of the 14 food allergens have different concentrations in serums of the patients; in which cod, crab, egg, milk, shrimp and soybean have relatively high contents of 15.43%, 41.76%, 52.04%, 32.43%, 21.45% and 8.92%, respectively. The specific IgG antibody positive rates of the three types of skin disease patients are significantly higher than that of the control group, in which the positive rate of the urticaria group is 77.73%, with significant difference with that of the control group ($X^2=173.24$, $P<0.05$). The positive rate of the eczema group is 89.35%, which is also significantly higher than that of the control group ($X^2=481.52$, $P<0.05$). The positive rate of the specific antibody of the atopic dermatitis group is 81.19%, which is also significantly higher than that of the control group ($X^2=274.38$, $P<0.05$). With the growth in ages, the positive rates of the specific IgG antibodies in serums of three groups show down trends of varied extents. The chi-square test is conducted on the antibody positive rates of the patients with ages under 3 y old and that during 25-50 y old, with the result that the patients of eczema have significant difference ($X^2=164.23$, $P<0.05$).

Conclusion: The serums of the allergic skin disease patients have food specific IgG antibodies, illustrating the correlation between allergic skin diseases and food intolerance. The detection on food specific IgG antibodies plays an important role in diagnosis on allergic skin diseases and prevention of food allergy.

Keywords: Food allergens, Specific IgG antibodies, Allergic skin diseases.

Accepted on August 28, 2017

Introduction

Allergic skin diseases refer to skin diseases of over immunoreactions of bodies induced by contact of certain sensitizers [1]. Generally speaking, such types of diseases are

allergic reactions mediated by IgE and non-IgE. The body immune system takes one or several foods as immunogens, to generate food specific IgG antibodies, which are combined with food particles to induce inflammatory response, presented

as general symptoms or diseases [2]. According to related data, 45% of people are intolerant to some foods to varied extents, mainly presented as gastrointestinal reactions or skin diseases [3]. The detection on food allergen IgG antibodies is helpful to screening of food allergic diseases mediated by non-IgE, which provides assistance to clinical diagnosis and treatment. On this basis, this article detects the allergen specific IgG antibodies of 14 frequent foods related to allergic skin diseases, so as to evaluate the relationship between the food allergen specific IgG antibodies and allergic skin diseases, providing references for clinical treatment.

Data and Methods

Clinical data

340 patients of allergic skin diseases treated in our hospital during March 2012-June 2014 were selected, including 164 males and 176 females, with ages of 3 months-76 y old, 32 ± 10.24 on average. The 340 patients included 145 patients of urticaria, 123 patients of eczema and 72 patients of atopic dermatitis. In addition, 30 healthy people without anaphylactic reaction medical history according to the physical examination center of our hospital were selected as the control group.

Method

The IgG antibody detection method: All the patients and the people in the control group were extracted with 3 mL venous blood which were placed in nonreactive drying tubes and serums were taken in a centrifugal way after standing. The food intolerance test kits (American BIOMERICA Corporation) were adopted, and the Enzyme Linked Immunosorbent Assay (ELISA) semi-quantitative detection method was utilized to detect the concentrations of the antigenic IgG antibodies (IgG Ab) in 14 commonly seen foods including beef, milk, chicken, pork, cod, rice, corn, shrimp, crab, soybean, egg white/egg yellow, tomato, mushroom and wheat. All the operations were required to be conducted strictly according to the specifications of the kits.

Evaluation on the detection results: Substituted the OD value into the standard curve to acquire the IgG concentration (U/mL), which was divided into 4 levels: the IgG concentration under 50 U/mL was Grade 0. The IgG concentration during 50-100 U/mL was Grade +1, i.e., slight intolerance; the IgG concentration during 100-200 U/mL was Grade +2, i.e., moderate intolerance; the IgG concentration above 200 U/mL was Grade +3, i.e., severe intolerance [4].

Statistical treatment: The SPSS 17.0 was adopted for statistical analysis on experimental data. The χ^2 detection was adopted for the enumeration data and $p < 0.05$ meant that the difference had statistical significance.

Table 1. Comparison of degrees of food intolerance of patients (%).

Type	+	++	+++	Total
Codfish	10.14	3.45	1.84	15.43

Crab	29.17	9.26	3.33	41.76
Egg	18.02	15.27	18.75	52.04
Milk	7.23	10.72	14.48	32.43
Shrimp	18.24	2.76	0.45	21.45
Soybean	6.17	1.71	1.04	8.92

Results

Results of specific IgG antibodies of 14 food allergens to patients

According to experimental results, the specific IgG antibodies of 14 food allergens had differences in serums of patients, in which cod, crab, egg, milk, shrimp and soybean had relatively high contents of 15.43%, 41.76%, 52.04%, 32.43%, 21.45% and 8.92%, respectively, indicating relatively serious risks on food intolerance-based skin diseases. In which crab was the most frequent food for slight intolerance, followed by egg and shrimp; egg and milk were the frequent foods for moderate and severe intolerance, and other foods had relatively low positive rates; as shown in Table 1.

Comparisons on detection results of serum specific IgG antibodies between three groups of allergic skin diseases and the control group

The positive rates of serum specific IgG antibodies of three skin diseases including urticaria, eczema and atopic dermatitis were 77.73%, 89.36% and 81.19%, respectively, and that of the control group was 14.21%. Based on the chi-square test results, the difference between them had statistical significance ($X^2=361.24$, $P < 0.05$), in which the positive rate of urticaria was 77.73%, with significant difference with that of the control group ($X^2=173.24$, $P < 0.05$). The positive rate of eczema was also significantly higher than that of the control group ($X^2=481.52$, $P < 0.05$). The positive rate of the atopic dermatitis was 81.19%, significantly higher than that of the control group ($X^2=274.38$, $P < 0.05$).

Comparisons on IgG antibodies of three allergic skin diseases of different age groups

Figure 1 was the result of comparative analysis on specific serum IgG antibodies of different age groups of three allergic skin diseases. The figure showed that the specific IgG antibody positive rates in serums of three skin diseases showed declining trends to varied degrees with the growth of ages. In which the positive rate of the eczema patients under 3 years old was 95.4%, with significant difference with that of 26-50 y old ($X^2=164.23$, $P < 0.05$). The positive rate of the urticaria patients under 3 y old was 90.2%, with significant difference ($X^2=114.23$, $P < 0.05$) when compared with that of 26-50 y old (59.2%). The positive rate of atopic dermatitis patients under 3 y old was 86.5%, significantly higher than that of 26-50 y old (59.3%) ($X^2=134.15$, $P < 0.05$).

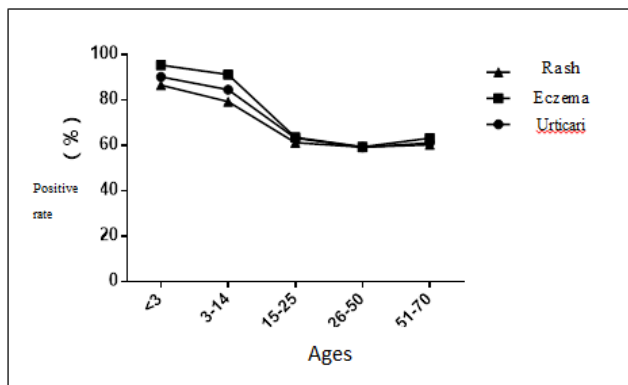


Figure 1. Three patients in different age groups Allergic compare IgG antibody.

Discussion

The food intolerance investigated in this article is different from the commonly known food allergy. Food allergy is a hypersensitivity mediated by immune globulin IgE, with obvious occurrence regularity, which can be self-prevented by patients according to experience [6]. Food intolerance is mediated by IgG, with indefinite pathogenesis and influencing factors [7]. According to a widely approved opinion at present, it has the following pathogenesis: some foods enter into the intestinal tract without complete digestion due to lack of corresponding enzyme which digests the special substance of the foods, which leads to immunoreactions because this substance is regarded as a harmful one by the immune system, and generates the food specific IgG antibody. The antibody is combined with food particles to form immune complex, which gives rise to a series of diseases [8].

This research detects the food allergic IgG antibodies of three types of allergic skin diseases, and analyzes the results. According to the results, there are differences on specific IgG antibodies of 14 foods to varied extents, in which the foods with relatively high positive rates include cod, crab, egg, milk, shrimp and soybean of 15.43%, 41.76%, 52.04%, 32.43%, 21.45% and 8.92%, respectively. In addition, patients have different intolerance extents on different foods, in which crab is the most frequent food of slight intolerance, followed by egg and shrimp; egg and milk are frequent moderate and severe intolerance foods, and the other foods have relatively low positive rates. Considering that seafood, egg, dairy products and beans contain high protein content, they often lead to relatively high possibility on incomplete digestion by bodies, which results in food intolerance [9].

Besides, this research detects the specific IgG antibodies of three allergic skin diseases; according to the results, the specific IgG antibody positive rates of urticaria, eczema and atopic dermatitis are 77.73%, 89.36% and 81.19%, respectively, with significant difference with that of the control group ($p < 0.05$). It illustrates significant correlation between the three kinds of allergic skin diseases and food specific IgG antibodies.

Based on the detection results, the specific IgG antibody positive rates of the three kinds of allergic skin diseases of different age groups gradually decrease with the growth of ages, and that of the patients under 3 y old is significantly higher than the specific antibody positive rate of the patients during 26-50 y old. It may be related to the reduction of the food intolerance occurrence rate due to gradual maturity of digestive tract barrier function with the growth of ages; it may also be involved in the generation of immune tolerance due to the simulation of various foods with the growth of ages [10,11].

Conclusion

Allergic skin disease patients have food specific IgG antibodies in their serums, indicating the correlation between allergic skin diseases and food tolerance; in addition, the detection on food specific IgG antibodies in serums plays an important role in diagnosis of allergic skin diseases and prevention to food allergy.

Funding

This work is supported by 2016 Medical Science and Technology Development Program of Yancheng City (YK2016074). This work is supported by Medical and Health Science Research of Zhejiang (2014KYA196).

References

- Dai Y, You T, Cai D. Research on correlation between food intolerance and allergic skin diseases. *Int J Laboratory Med* 2013; 34: 496-498.
- Made A. Clinical significance of IVT detection and food IgG antibody detection in allergic skin diseases. *Central South Univ* 2007.
- Shi Y, Jin Y, Wang H. Analysis on detection results on food intolerance of three kinds of common skin diseases. *Chin J Leprosy Skin Dis* 2013; 9: 617-618.
- Sun J, Yao Y, Gao L. Clinical observation on allergic skin diseases induced by food intolerance. *Progress Mod Biomed* 2010; 10): 1513-1514.
- Lixin AN, Zhang L, Lizhi AN, Zhou Y. Clinical study of determining food allergen IgG in serum of patients with allergic skin disease. *J Harbin Med Univ* 2009; 43: 500-503.
- Yang J, Yang Z. Food allergen test and dietary instruction on child patients of allergic skin diseases. *Shanghai Nurs J* 2009; 9: 50-52.
- Zhang X, Yang J, Yu N. Analysis on allergen test results of 3969 cases of allergic skin diseases. *J Ningxia Med College* 2009; 31: 630-631.
- Yang Z, Chen T, Yang J. Application of serum specific IgE and IgG detection of allergen of child atopic dermatitis. *J Clin Pediatr* 2011; 29: 240-243.
- Patriarca G, Schiavino D, Poecora V. Food allergy and food intolerance: diagnosis and treatment. *Intern Emerg Med* 2009; 4: 11-24.

10. Haraman G, Hart G. Dietary advice based on food-specific IgG results. *Nutr Food Sci* 2007; 37: 16-23.
11. Liu J. Clinical research on specific IgG detection on food allergen of allergic skin diseases. Harbin Med Univ 2008.

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