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Food Allergy in the Students of Tirana City

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Food Allergy in the Students of Tirana City

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Abstract

A food allergy is an adverse immune response to certain kinds of food. The protein in the food is the most common allergic component. Allergic responses include dermatitis, gastrointestinal and respiratory distress, together with such life-threatening anaphylactic responses as biphasic anaphylaxis and vasodilatation which require immediate emergency intervention. Individuals with protein allergies commonly avoid contact with the problematic protein.

We targeted the study of food allergies and the determination of allergens by immunological methods in order to diagnose, and prevent or cure allergies. It has been observed that the presence of food allergens in our country is very high, especially in Tirana, as a result of the large population, and malnutrition from fast foods and canned foods. This has resulted in the increase of the number of people with food allergies. ELISA was used to calculate the total and specific Immunoglobulin E (IgE) levels in food allergens. This test is very sensitive and determines the presence of allergens that have a very high degree of sensitivity and specificity.

Albanian students ranging from 6 to 10 years of age were considered as a representative sample of the Tirana students' population. During the period of February 2014 - February 2015, the students had filled out forms prepared and distributed by us about the food consumed by them and about irritation caused as a result. Individuals who resulted to be allergic to specific foods were subjected to further analysis in order to determine the level of eosinophiles in the blood.

The percentage of positive cases coincides with previous studies, where the result of these food allergy cases has been about 8%. In most cases students of this age are allergic to eggs (52% of positive cases). In some cases allergies are caused mainly by the protein in the egg yolk. Other foods that cause allergies are sea products such as fish (15% of positive cases) or shellfish (13% of positive cases), followed by peanuts (12% of positive cases) and tree nuts (5% of positive cases). Lastly, there are fewer cases where children were allergic to soya (3% of positive cases). Almost in all the cases of children who are allergic to various foods, we notice an increase of eosinophiles as polymorph nuclear leukocytes, which release the contents of granules that help in the emergence of allergic signs.

It is particularly interesting to notice that the majority of the population has no information about allergies. Through this analysis we observe the connection of allergies related to age, gender etc.

The purpose of this study is the use of tests in order to have a diagnosis for the allergic immune system that is accurate in determining the allergens.

Keywords: Antigen, Food allergy, Immune response, Immunoglobulin

Introduction

A food allergy is an adverse immune response to a food protein. Food allergy is distinct from other adverse responses to food, such as food intolerance, pharmacologic reactions, and toxin-mediated reactions.

The food protein triggering the allergic response is called a food allergen. It is estimated that up to 12 million Americans have food allergies, and the prevalence is rising [1, 2, 4]. Food allergies cause roughly 30,000 emergency room visits and 100 to 200 deaths per year in the United States [3, 5]. The most common food allergies in adults are the result of eating shellfish, peanuts, tree nuts, fish, and eggs. The most common food allergies in children are cow milk, eggs, peanuts, and tree nuts.

An allergy is a disease related to immunological reactions that take place in the body and as a result display clinical signs of inflammation such as redness, swelling, itching etc. It depends on several factors including age, gender, lifestyle and genetic predisposition. An allergy is a common disease that arises as a result of abnormal functioning of the immune system. This is due to exposure to a specific antigen (allergen) against a person who has already developed antibodies against this allergen [6, 7]. These allergens come into contact with our body through the skin, respiratory system and food. Food allergies are caused by the food's proteins, or allergens, which are recognized as a foreign subject by the immune system.

An allergen is usually a soluble antigen that reacts with IgE antibodies present in the body. Allergens pass the skin layers and once they are inside the organism, they are grabbed by the antigen presenting cells (APC) [8, 9, 10]. APC processes the antigen in proteins with 10-12 amino acids and it extracts it to the surface where it gets united with MHC. APC interacts with T_h cells that enable the activation of B cells which produce IgE antibodies that bind to mast cells. Following a second contact with the allergen, the mast cells which are respectively connected with IgE, [6, 7] release granules with histamine. The immediate response is caused by the direct effects of the histamine release from mast cells in blood vessels [11, 12, 13]. A later stage caused by an influx of other immune cells such as eosinophiles, basophiles and mediator release from mast cells caused by the first immunologic response. Most forms of diseases like Asthma, Anaphylaxis, skin swelling, itching, come as a result of reactions of type I immune hypersensitivity.

The best way to reduce the symptoms is to understand the cause of the allergies. There are certain types of medicinal products that prevent or treat allergies, such as drugs that are recommended, depending on the type and frequency of symptoms, age or health conditions [14, 15]. One way to prevent allergies is the hypo sensibility method whereby small doses of allergens, to which the patients' body interacts, are injected into the body. This is an attempt to teach the body not be so sensitive to these allergens. For this reason they produce vaccines to prevent allergies [16].

Materials and Methods

In a one year period, in 2014, 1840 students were sampled. They were firstly asked to fill in a questionnaire with questions about the allergies and allergy symptoms. We took biological samples (blood) according to the respective procedures and preserved them in suitable conditions from the students who were thought to be allergic or who thought they were allergic to different kinds of food [12].

Figure 1. *Preparing of Blood*

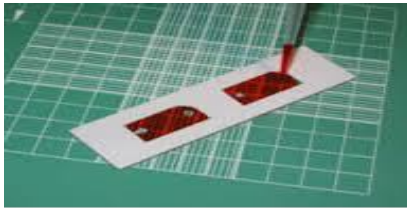


Figure 2. *The Microscope for Observing of Eosinophiles*



First we took the periphery blood in a special tube and then we put some of the blood in a glass slide. A dyer was added to the sample, which made the eosinophiles look like circles filled with red granules. Then, the technician counted how many eosinophils were present in a 100 cells (Figures 1 and 2). The percentage of eosinophils was multiplied by the number of the white cells in order to give the absolute [12].

We used a Patch test or skin test for some food allergens (Figure 3). Skin tests used extracts -- a concentrated liquid form -- of common allergens like different foods. Once the allergen gets in your skin, it could trigger a rash. The skin will get irritated and may itch, like a mosquito bite.

Figure 3. *Skin Patch Test for Food Allergen*



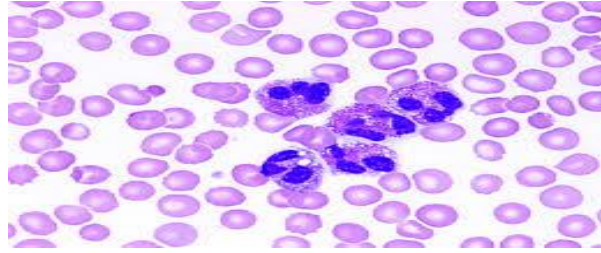
Results and Discussion

Initially, we distributed a questionnaire to 1840 students, with questions about signs, symptoms, or problems that the students of this age group have with any kind of food, during or after consuming it.

We observed the skin patch test in the students who suffered from food allergy or who were in doubt about it. Skin testing is a safe and fairly easy way to try to figure out or confirm what's causing food allergy symptoms. It is through the reaction that we could tell if they were allergic to a substance.

We examined the increasing eosinophiles in the student's blood that were allergic to different foods (Figure 4).

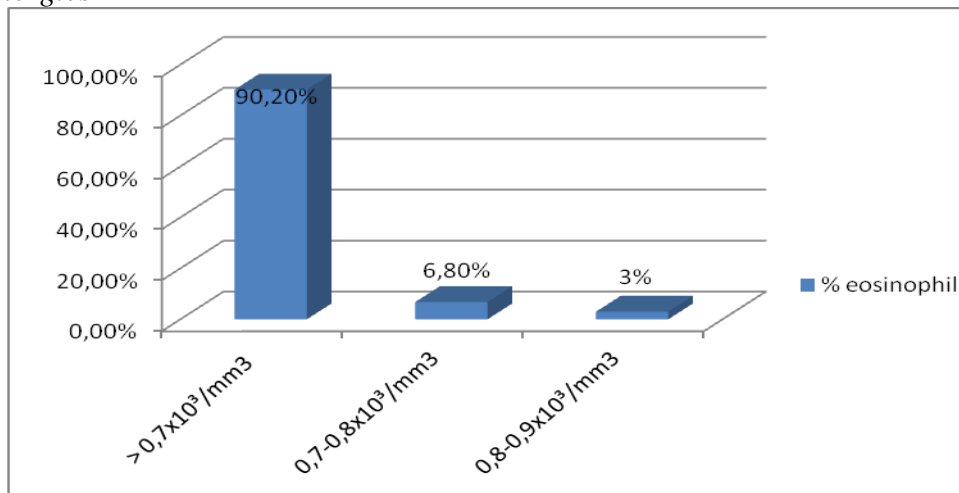
Figure 4. *Eosinophils in the Blood of Allergic Pupils*



In positive cases of allergies to food, we also observed the level of eosinophiles. The eosinophiles level has shown that in all the allergy cases they increase, indicating that high eosinophilia is one of the main parameters of allergies caused by food.

We saw how the increased values of the eosinophilia cells vary in the blood or in the serum of the persons diagnosed. We also noticed that in 6.8% of the studied cases, the increased values of the eosinophilia in the serum of the blood vary from $0.7-0.8 \times 10^3/\text{mm}^3$ cells. Only in 3% of the cases the number of the eosinophilia was $0.8 - 0.9 \times 10^3/\text{mm}^3$ (Figure 5). This increase in the number of the eosinophilia in these individuals with more than $0.7 \times 10^3/\text{mm}^3$, leads to the hypothesis that the eosinophilia assessed as an increase of the number of the eosinophilia cells in the peripheral blood has an association to the immune system response in the reaction caused by food.

Figure 5. *Distribution of Eosinophiles Level in Positive Cases of Food Allergies*



After processing the questionnaires, the skin patch test showed that 321 students (from 1840 in total) (Figure 6) had signs of allergies caused by various foods, mainly by eggs, nuts, peanuts etc. (Figure 7).

Figure 6. *Distribution of Total Cases and Food Allergy Cases*

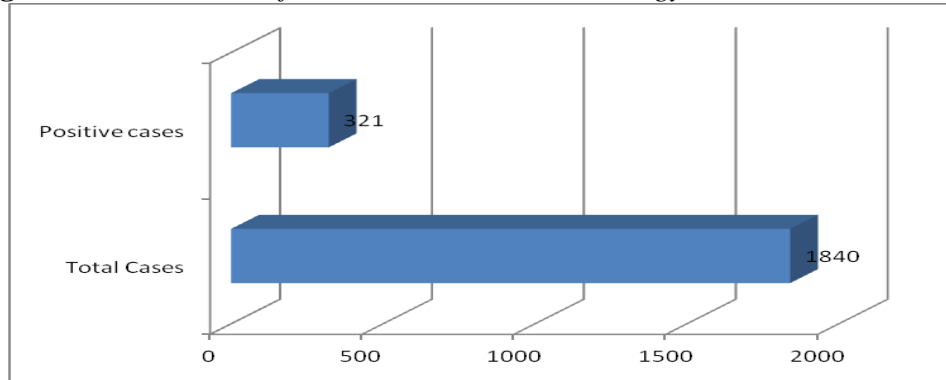
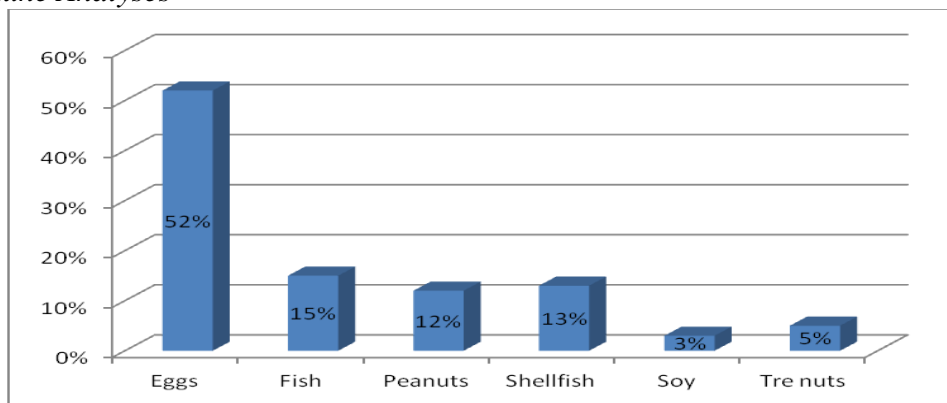


Figure 7. *The Percentage of the Allergy Cases Related to Various Food by Immune Analyses*



In Figure 7 we can see that 52% of the cases with food allergies in this age group are caused by the consumption of the egg yolk, accompanied by 28% of the entire total that is due to the consumption of fish and shellfish, 15% by peanuts and tree nuts and only 3% by soya.

From the positive cases by skin patch tests, one of the first signs was edema in lips and difficulty in swallowing. We also observed some other symptoms, for almost all the positive cases, which included abdominal pain and vomiting and diarrhea. Also in the respiratory organs we noticed asthma or hoarseness of voice. Hence, allergic reactions to foods include almost all the major organs such as the digestive, respiratory, etc.

Conclusions

Our sample included 1840 students, age group 6-10 years old, to determine food allergies. 321 showed positive results towards food allergies, and all of them were confirmed through immunological tests (skin patch tests and count of eosinophiles). In the cases positive for allergies to food, we studied the levels of eosinophiles. The eosinophiles level has shown that in all cases allergies have increased, indicating that higher eosinophiles are one of the main parameters of allergies caused by food.

Almost in all the cases of children who were allergic to various foods, we also noticed an increase of the eosinophiles level, as polymorphonuclear leukocytes, which produced the contents of granules that help in the emergence of allergic signs.

One of the strongest food allergens is the egg yolk, and the weakest is soy and soy based products.

Recommendations

- Avoidance of cross-contact (for example via shared utensils or fryers) of allergens with otherwise safe food during meal preparation [8].
- Elimination of only those foods which are confirmed that provoke allergic reactions; both obvious and hidden sources of food allergens (medications and cosmetics) should be considered [6, 10].
- Consideration of potential exposure by routes other than ingestion (for example by skin contact or inhalation) [1].
- Anticipation of potential candidates for food allergen cross-reactivity (for example eggs with chicken or cow milk with beef) [4, 7].
- Avoidance of high-risk situations where accidental or inadvertent ingestion of food allergens can occur (buffets or picnics) [8].

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