

IgG-Mediated Food Intolerance in a Patient with Allergic Symptoms, Acne and Obesity - Effect of Elimination Diet

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Abstract

Edited by: Igor Spiroski
Citation: Andjelković M, Vojvodić A, Dikić N. IgG-Mediated Food Intolerance in a Patient with Allergic Symptoms, Acne and Obesity - Effect of Elimination Diet. Open Access Maced J Med Sci. 2024 Dec 15; 12(4):520-523. <https://doi.org/10.3889/oamjms.2024.12010>
Keywords: food allergy; IgG; food intolerance
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Received: 25-Jul-2024
Revised: 09-Sep-2024
Accepted: 10-Nov-2024
Ahead of print: 10-Dec-2024
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Funding: This research did not receive any financial support
Competing Interests: The authors have declared that no competing interests exist

BACKGROUND: Although the association of food-specific IgG with the development and progression of specific diseases has been shown by many studies, strong correlations are still under question. Are these antibodies a normal immune response to foods, or is the pathogenetic mechanism triggered in another way? Why do elimination diets improve, in many studies, different diseases at different ages?

CASE PRESENTATION: We will present the case of a patient who experienced significant improvement in allergic symptoms and reduced body weight by implementing an elimination diet. Type III hypersensitivity reactions are associated with IgG antibodies. They are considered to be normal reactions to food antigens. They are absorbed into the bloodstream in small amounts. However, immediately after a meal, antibodies and food antigen complexes bound to specific IgG circulate in the serum, rapidly cleared by a healthy immune system, specifically the reticuloendothelial system. If large amounts of antibodies are produced and immune complexes are deposited in the blood vessels of various organs and organ systems, various manifestations may occur.

CONCLUSION: This is a new field of medicine. Further research, better-standardized tests, and much more extensive studies are needed to prove how to utilize the IgG antibody-based elimination diet properly.

Introduction

According to the latest nomenclature, and as the European Academy of Allergy and Clinical Immunology states in its statement, a significant step forward has been made in understanding the influence and importance of the barrier and barrier function of the skin and mucous membranes of the respiratory and digestive systems on the onset and development of many diseases, such as the previously known atopic dermatitis, allergic rhinitis and rhinoconjunctivitis, allergic asthma, eosinophilic esophagitis, food protein-induced enterocolitis syndrome, and celiac disease. It is believed that the underlying problem is precisely this inadequate barrier function and not immune dysregulation as in other types of hypersensitivity, where, in this case, immune dysregulation occurs secondarily and consequently leads to chronic inflammation [1], [2], [3], [4].

The barrier function of the mucosa depends on the presence of a "tight junction" between enterocytes, the transport of ions, protons, water, and other

substances, the expression of antimicrobial products, protective proteases, and many other mechanisms. A significant contribution to developing allergic manifestations is also made by activating sensory nerves, which is associated with the loss of barrier function. The direct influence of various factors from the external environment, such as pollution and toxic chemical substances, affects the microbiome and the immune system. A direct example of chemical cytotoxicity of the permeable intestinal barrier is epithelitis, which occurs upon contact with toxic substances (allergens, viruses, enzymes), which then attracts inflammatory cells, producing alarmins, TSLP, IL25, IL33, and other pro-inflammatory cytokines that most "pull" the immune response towards type IVb and T2 response. It has also been shown how necessary a healthy intestinal microbiome is for the normal functioning of the entire organism, and even though it is young as a field of interest, this area provides impressive results. It shows the importance of these bacteria, viruses, and parasites that influence and build our immune system. Dysbiosis is associated with many allergic and autoimmune diseases, such as type 1

diabetes mellitus, but also diseases of other organ systems, which influence the entire body [5], [6].

Respiratory diseases, especially allergic ones, are very often associated with various, but primarily early allergic reactions to foods mediated by IgE antibodies. In a study conducted in New Zealand, it was found that 64% of parents modify the diet of their children if they have a diagnosed asthma to prevent attacks. However, it has been shown that these diets are often rigorous, very restrictive, and lead to significant nutritional deficiencies and, in extreme cases, can be fatal and cause a lot of harm [7], [8], [9].

There are not many studies on the relationship between IgG food intolerance and allergic respiratory diseases, but it was shown in a large number of patients in studies in the UK, China, and India those excluding foods to which there was an IgG intolerance resulted in significant improvement in symptoms after 4-6 weeks, as well as a better response to therapy. The UK study also showed predictive value - it was concluded that high levels of IgG1 in eggs are a risk factor for the development of future asthma and also that IgG1 levels > 14,500 units in one year can predict future development of asthma with 64% sensitivity and 74% specificity [10], [11], [12].

A very interesting study examined the impact of low-grade systemic inflammation on the development of diabetes mellitus, insulin resistance, obesity, and atherosclerotic vascular disease. They started with the fact that food intolerance and the formation of IgG class antibodies can create conditions for smoldering inflammation and atherogenesis. Thirty obese children and 30 children of average weight were examined- these food IgG antibodies are significantly associated with low-grade systemic inflammation and with the thickness of the wall of the common carotid arteries, and that, therefore, these antibodies are significantly involved in the development of obesity and atherosclerosis [13].

Several studies on many patients, adults, and children suffering from chronic spontaneous urticaria and its association with IgG food intolerance have been conducted worldwide. However, further research is needed. In many cases, when all IgE tests are harmful, no analysis shows a significant deviation, and the IgG test shows intolerance, an elimination diet can significantly improve some patients [14], [15], [16].

Case report

A 13-year-old boy comes for an examination due to problems with allergies and acne. Allergies most often occur in hives for the last several months on the lower and upper legs; regardless of the time of day or the period of the year, he cannot connect them with diet or anything else. Chronic hives last from a few minutes to an hour and pass spontaneously. Occasionally, there is also severe itching on the entire body, without any changes in the skin. Occasionally, he had an

increased runny nose and sneezing. A persistent and dry cough has been going on for a year. It did not stop even after using antibiotics; improvement occurred after inhaling corticosteroids, but only briefly. The patient is obese.

In childhood, he was treated for asthma, and his last attack was at the age of seven.

X-ray of the lungs and heart was normal, and ultrasound of the heart and cardiological, pulmonary, and ENT findings were routine. On the skin of the face-papulopustular acne, two cysts are present in the area of the angle of the mandible. The skin of the face is extremely oily, and the body's skin is very dry.

In laboratory tests, insulin intolerance was proven (with consultation with an endocrinologist), and in the complete blood count, eosinophils were elevated since childhood in the range of 4.3% to 9%.

An ELISA IgG food intolerance test was performed on 108 foods, and the following results were obtained: he had high levels of IgG antibodies to gluten, cow's milk and dairy products, eggs, poppy seeds, and pistachios.

Also, IgE analyses were performed for inhalant and nutritional allergens, and the following results were obtained: Timothy (Phleum pratense)- class IV; Cultivated Rye, Birch, Buffalo grass—Anthoxanthum odoratum- class III; Common ragweed, Adler; House dust- class II; and Hazel- class I. He had no reactions to food allergens.

Also, a PRICK test was performed for inhalant and nutritional allergens, which did not show sensitivity to any applied dietary allergens. In contrast, hypersensitivity to inhalant allergens was proven to be to weed pollen, grass pollen, ragweed, and cat fur.



Figure 1: PRICK test - inhalant allergens

Body weight and height were measured, and BMI was estimated using a body mass and composition scale.

At the measurement on January 1, 2024, the boy was 180 cm tall and weighed 95.4 kg. His BMI was 29.4, hip-to-waist ratio was 0.91, visceral fat level was 14, body fat was 33.1 kg, and skeletal muscle mass was 34.8 kg. His water, mineral, and protein levels were within the reference range.

The boy was prescribed an allergen-free elimination diet - without gluten, eggs, cow's milk and dairy products, and nuts, to which he has high antibodies.

He followed the elimination diet all the time.

The prescribed therapy was to take one antihistamine tablet in case of hives.

Local therapy for acne treatment, local combined antibiotic creams and retinoids, and appropriate skin hydration and facial cleansing products were given.

He practiced aerobic and strength training (how many times per week) (how long in minutes) at an intensity of (how many % of Maximal heart rate).

At the follow-up in August:

After the first month of the diet, allergy symptoms subsided - the cough stopped, and hives did not appear. He states that he feels significantly better and has more strength and energy. The diet is now significantly healthier; he consumes more fresh fruit, vegetables, fish, and meat. He does not eat sweets, fast food, or "nothing from the baker". He consumes gluten-free cereals, whole grains. Goat cheese and milk and plant-based milk substitutes. He consumes about 2-3 liters of water per day. A few weeks ago, he started exercising regularly.

In the laboratory tests provided, no previously present eosinophilia was observed. All findings in biochemistry are within the limits of reference values.

At the measurement on 15.08.2024. The boy was 182 cm, 80.0 kg, with a BMI of 24.7, hip-to-waist ratio of 0.83, visceral fat level of 7, body fat of 18.7 kg, skeletal muscle mass of 34.0 kg, water, mineral, and protein levels were within the reference range. The most significant was the loss of fat from 33.1 kg to 18.7 kg visceral fat – in January, the level was 14, and in August 7. Significantly, there was no loss of protein, minerals, or water in the body, even if there was a significant loss of adipose tissue and body mass.

Given the patient's age, ongoing growth, and development, there is an increase in adipose tissue in the abdominal region, which is minimal.

He used local therapy for acne, along with diet, with a significant therapeutic response.

Now, only comedones are present, open primarily in the T-zone.

There was no need to use antihistamines; he had no allergic reactions or complaints.

There was a significant improvement in both acne and all the patient's complaints, with a significant reduction in body weight when this elimination diet was implemented.

Further monitoring is needed; the boy was advised to continue following the nutritionist's advice, exercise regularly, use the given therapy, and immediately report for examination in case of any complaints.

Table 1: Bioimpedance measurement of body composition

Date	Height (cm)	Weight (kg)	BMI	Skeletal muscle mass (kg)	Body fat (kg)	Visceral fat (level)	Waist hip ratio
30.01.2024	180	95.4	29.4	34.8	33.1	14	091
15.08.2024	182	80.0	24.7	34	18.7	7	083

BMI = Body mass index.

Discussion

Type III hypersensitivity reactions are associated with IgG antibodies. They are considered to be normal reactions to food antigens. They are absorbed into the bloodstream in small amounts. However, immediately after a meal, antibodies and food antigen complexes bound to specific IgG circulate in the serum, which is quickly removed by a healthy immune system, more precisely, the reticuloendothelial system. If antibodies are formed and immune complexes are deposited in the blood vessels of various organs and organ systems, the manifestations listed above may occur. What also often confuses scientists, doctors, and patients is that, unlike early-type hypersensitivity, where a cause-and-effect relationship between food intake and the appearance of symptoms such as hives or angioedema, gastrointestinal symptoms, anaphylaxis, lip swelling, itching, and the like, this is absent in this case. Problems such as migraine, autism, exacerbation of chronic diseases such as inflammatory bowel disease, exacerbation of asthma, impact on the overall performance of the body, etc. - are complex to associate with the type of food consumed. Also, unlike the first type of hypersensitivity, where even a small amount of food can cause severe reactions, the amount of food consumed is also important here, so in some cases, it may be advised not to exclude food from use completely, but to reduce its use depending on the level of antibodies.

Also, there is no uniformity in testing. There are tests on the market that test food intolerance without testing the level of antibodies, which is unacceptable.

Also, commercial tests have already been prepared for different foods to measure IgG antibodies. The results of these tests are difficult to interpret for both doctors and patients because they show the presence of specific IgG antibodies against foods that

the patient often eats, making it difficult for them to accept elimination diets, especially since they do not see for themselves that these foods harm them when they consume them. This is further complicated by other doctors who believe that testing and elimination diets have no scientific basis, and even if they are in specialties outside of nutrition and immunology, they advise patients not to use the diet. Proteins ingested through food, under normal conditions, including food allergens, are broken down in the digestive tract by intestinal proteolytic enzymes to small oligopeptide fragments and then broken down into di- and tripeptides and amino acids, which are absorbed by enterocytes. Further proteolysis occurs in the enterocytes to amino acids and dipeptides, which enter the portal circulation and are then transported to the liver. However, research has shown that not everything is so perfect and that as much as 15% of proteins ingested through food remain incompletely digested, including a portion of food allergens, antigens that penetrate the epithelium of the digestive tract and reach the internal environment of the body [1], [8].

Conclusion

In our patient, an elimination diet of foods to which IgG intolerance was proven to significantly improve all his complaints, including urticaria and chronic cough. There was a reduction and the transition of severe acne to a mild form. The patient felt significantly better and had more strength, and there was a significant loss of body weight and body fat, significantly impacting the waist-hip ratio. In 7 months, body weight decreased from 95.4 kg to 80.0 kg, BMI from 29.4 to 24.7.

This is a new field of medicine; further research, better-standardized tests, and much more extensive studies are needed to prove how to properly utilize the IgG antibody-based elimination diet.

References

- Abbas, A. K., Lichtman, A. H., & Pillai, S. Cellular and molecular immunology (10th ed.). Philadelphia: Saunders Elsevier. 2022.
- Rich R, Fleisher T, Schroeder Jr. H, Weyand C, Corry D, Puck J. Clinical Immunology (6th ed.). Philadelphia: Saunders Elsevier. 2023.
- Bonači-Nikolić B, Poremečaji imunskog odgovora, u poglavlju VII Alergologija i klinička imunologija, Interna medicina, Data Medika 2021.
- Jutel M, et al. Nomenclature of allergic diseases and hypersensitivity reactions: Adapted to modern needs: An EAACI position paper. *Allergy*. 2023;78(11):2851-2874. <https://doi.org/10.1111/all.15889> PMID:37814905
- Arzola-Martínez L, Ptaschinski C, Lukacs NW. Trained in innate immunity, epigenetics, and food allergy. *Front Allergy*. 2023;4:1105588. <https://doi.org/10.3389/falgy.2023.1105588> PMID:37304168 PMCID:PMC10251748
- Citi S, Fromm M, Furuse M, González-Mariscal L, Nusrat A, Tsukita S, Turner JR. A short guide to the tight junction. *J Cell Sci*. 2024;137(9):jcs261776. <https://doi.org/10.1242/jcs.261776> PMID:38712627 PMCID:PMC11128289
- Kanagaratham C, El Ansari YS, Lewis OL, Oettgen HC. IgE and IgG Antibodies as Regulators of Mast Cell and Basophil Functions in Food Allergy. *Front Immunol*. 2020;11:603050. <https://doi.org/10.3389/fimmu.2020.603050> PMID:33362785 PMCID:PMC7759531
- Burton OT, Tamayo JM, Stranks AJ, Koleoglou KJ, Oettgen HC. Allergen-specific IgG antibody signaling through FcγRIIb promotes food tolerance. *J Allergy Clin Immunol*. 2018;141(1):189-201. <https://doi.org/10.1016/j.jaci.2017.03.045> PMID:28479335 PMCID:PMC5671359
- Dawson KP, Ford RP, Mogridge N. Childhood asthma: What do parents add or avoid in their children's diets? *N Z Med J*. 1990;103:239-40.
- Kumar R; Singh M; Gupta N; Kumar M; Bisht I; Gaur SN. Prevalence of food intolerance in bronchial asthma in India. *Indian Journal of Allergy, Asthma and Immunology*. 2013;27(2):121-128. <https://doi.org/10.4103/0972-6691.124394>
- Vance GHS, et al. Ovalbumin-specific immunoglobulin G and subclass responses through the first 5 years of life in relation to duration of egg sensitization and the development of asthma. *Clin Exp Allergy*. 2004;34:1542-1549. <https://doi.org/10.1111/j.1365-2222.2004.02058.x> PMID:15479268
- Virdee K, et al. Food-specific IgG Antibody-guided elimination diets followed by resolution of asthma symptoms and reduction in pharmacological interventions in two patients: A case report. *Glob Adv Health Med*. 2005; 4:62-66. <https://doi.org/10.7453/gahmj.2014.068> PMID:25694853 PMCID:PMC4311561
- Wilders-Truschnig M, Mangge H, Lieners C, Gruber H, Mayer C, März W. IgG antibodies against food antigens are correlated with inflammation and intima media thickness in obese juveniles. *Exp Clin Endocrinol Diabetes*. 2008;116(4):241-5. <https://doi.org/10.1055/s-2007-993165> PMID:18072008
- Koshak EA, Atwah AF, Ahmad HMY. IgG food hypersensitivity: A potential hidden precipitant for chronic spontaneous urticaria A case report. *Allergol Immunopathol (Madr)*. 2023;51(4):148-150. <https://doi.org/10.15586/aei.v51i4.889> PMID:37422791
- Shakoor Z, Al Faifi A, Al Amro B, Al Tawil LN, Al Ohaly RY. Prevalence of IgG-mediated food intolerance among patients with allergic symptoms. *Ann Saudi Med*. 2016;36(6):386-390. <https://doi.org/10.5144/0256-4947.2016.386> PMID:27920409 PMCID:PMC6074204
- Antico A, Pagani M, Vescovi P, Bonadonna P, Senna G. Foodspecific IgG4 lack diagnostic value in adult patients with chronic urticaria and other suspected allergy skin symptoms. *Int Arch Allergy Immunol*. 2011;155(1):52-56. <https://doi.org/10.1159/000318736> PMID:21109748