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ORIGINAL ARTICLE

Allergy to hazelnut in adults: A two-step study

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KEYWORDS
DBPCFC;
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Abstract
Background: Although hazelnut consumption is very high in Turkey, the prevalence of hazelnut allergy is still unknown. This study's objective was to investigate the prevalence of hazelnut sensitisation and to verify its clinical importance using double-blind, placebo-controlled challenge (DBPCFC) in an adult population.
Methods: Prick-to-prick skin tests were performed with fresh hazelnut in 904 patients admitted to the allergy department. Among the 904 subjects, 20 patients with a history of allergic reactions to hazelnut and/or positive skin tests were recalled for further evaluation. Specific IgE was measured in these subjects. Eleven (11/20) patients accepted to undergo DBPCFC with hazelnut.
Results: Among the 904 individuals, the history of reactions to hazelnut was positive in 16 subjects (1.8%); prick-to-prick skin tests were positive in 13 (1.4%); prick tests with the commercial product were positive in nine (0.9%); and history plus skin tests were positive in 16 (1.8%). Specific IgE to hazelnut was positive in only three patients. DBPCFC was conducted in 11 subjects with a positivity rate of 63.6% (7/11). We observed six mild and one moderate systemic reactions during the DBPCFC. Among seven subjects with a positive DBPCFC, six (85.7%) had a history of hazelnut allergy, and five (71.4%) had both history and skin test positivity.
Conclusion: Skin test sensitisation to hazelnut was found to be 1.76% (16/904) which is similar to the sensitisation rate in previous reports. However, DBPCFC was positive in 63% of cases with a history of hazelnut allergy and/or positive skin tests in this study. These results indicate that the presence of history with a positive skin test can be suggestive of hazelnut allergy; however an oral food challenge is needed to confirm the diagnosis.

Introduction

Allergic reactions induced by food are characterised by clinical manifestations such as anaphylaxis, urticarial angioedema, rhinitis and asthma, flare-up of atopic eczema, gastrointestinal symptoms, and oral allergy syndrome (OAS).[1] Food allergy is an important health problem and there is increasing evidence that the prevalence of food

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allergies is increasing in parallel to the other forms of atopic disease.[2–8] A ''2008 Centers for Disease Control and Prevention Report'' indicated an 18% increase in childhood food allergy from 1997 to 2007, with an estimated 3.9% of children currently affected.[9]

The food stuffs which are responsible for most allergic reactions in adults are peanuts, tree nuts, fish, and shellfish.[10] There are also many others that are known to cause allergy, depending on the geographical region (e.g. celery, kiwi fruit and rice, etc.).[11,12] The actual prevalence of food allergy is not well known. Most of the investigations assessing the prevalence of food allergy have focused on paediatric populations.[13–18] However, similar data are scarce for adults and the rate of perceived adult food allergy shows great variability between countries (e.g. Spain 4.6%, Australia 19.1%).[19] While Woods et al. have found that 1.3% of adults in Australia were consistently sensitised to food and perceived adverse reactions to the same allergen; perceived hypersensitivity reaction to peanut and tree nut was reported to be observed in 1.1% of the population in USA.[20,21]Hazelnut is also a common food which is frequently implicated in severe anaphylactic reactions. In Denmark, hazelnut allergy was recently reported at 6.6% in population of young adults.[22] Although hazelnut production and consumption is very high in our country, the prevalence of hazelnut allergy is still unknown in the adult population. Most studies of food allergy in adults were case reports which describe anaphylactic reactions after ingestion of a specific food, or retrospective reports based on clinical history supported by positive allergy skin testing, and in vitro studies. Although double-blind, placebo-controlled food challenge (DBPCFC) is the gold standard for the diagnosis of food allergy, few reports exist in which DBPCFC was used.[1,23–30]

Therefore, the objective of this study was to investigate the prevalence of hazelnut sensitisation based on DBPCFC in adult patients who attended an outpatient allergy clinic.

Methods

Patient selection and study design

A total of 904 patients who attended the outpatient allergy clinic with a complaint such as cough, sneezing, itching, nasal obstruction, shortness of breath, and fatigue were randomly selected to be included in the study at Ankara University, Medical School, Department of Allergy, between 2001 and 2003. The mean age of the patients was 35.2 ± 14.9 years (range: 13–72 years), 631 females and 273 males.

In the first phase of the study a detailed history of allergy and physical examination were followed by skin prick tests (SPTs) with commercial extracts of hazelnut and prick-to-prick skin tests with fresh hazelnut. Among this patient population subjects with a history of allergic reactions to hazelnut and/or positive skin tests with hazelnut were called back for further evaluation. In the second phase patients with either skin test positivity to hazelnut or clinical history of hazelnut allergy or both underwent DBPCFC with hazelnut to confirm the diagnosis of food hypersensitivity. Specific IgE was also measured in these selected subjects.

Skin tests

Skin prick test were performed using either a commercial extract (Stallergèns, France) or fresh hazelnut. The prick-to-prick technique was used for the fresh fruit according to the Dreborg and Foucard method.[31] All patients were also tested with a standardised panel (Stallergèns, France) of airborne allergens including *Dermatophagoides pteronysinus* and *Dermatophagoides farinae*; grass, tree pollens (alder, birch, hazel), and weed pollens; moulds, and cat and dog allergens. Histamine dihydrochloride (10 mg/ml) and glycerol diluent were used as positive and negative controls, respectively. A wheal size larger than 3 mm or greater than that produced by the control solution was considered a positive reaction.

In vitro tests

Twenty patients who had a positive history and/or skin test positivity to hazelnut were tested for specific IgE antibodies for hazelnut. Allergen-specific IgE antibodies to hazelnut were measured by the UniCAP system according to the manufacturer's instructions (Pharmacia; Sweden). Results equal to or greater than class II (IgE level of $\geq$0.7 kU/ml) were considered positive according to the instructions of the manufacturer.

Challenge testing

DBPCFC

Hazelnut sensitivity was evaluated by DBPCFC in 11 patients who declined the informed consent. Nine patients refused the challenge test because they did not have time. DBPCFCs were carried out at the hospital between November 2002 and March 2003 in Ankara, as previously described. The challenge meals were prepared in the form of pudding. The test pudding included 20 g of hazelnut, 100 ml of water, 15 g of sugar, 50 ml of peppermint syrup, 10 g of rice flour and one tablespoon of rice grains according to the Ortolani et al. method.[1] The placebo meals consisted of the same ingredients except hazelnut. Apart from the hazelnut, all ingredients were known to be tolerated by each patient.

DBPCFC procedure

On the first test day, patients were given the placebo pudding, the second day they ate pudding containing 20 g of hidden hazelnut. The test meal was given in gradually increasing doses, beginning with an initial dose of 2 g. The dose was doubled every 15 min up to a final dose of 20 g, and the test was finalised at the end of 3 h. The patients were under constant observation during the test. Before administering each dose, the oral cavity and skin were carefully inspected for allergic reactions. The challenge was stopped at the appearance of cutaneous, respiratory, digestive, or cardiovascular symptoms. The severity rating of the reactions observed to challenge was adapted from Bock et al.; scores of 0 (none), 1 (mild), 2 (moderate) and 3 (severe) were coded as none to severe.[32]