

Asymptomatic IgE Mediated Food Hypersensitivity in Patients with Nasal Polyps

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Nasal polyps are the most common tumors that arise in the nasal cavities. They are easy to detect, readily accessible and have been studied extensively.¹ Although nasal polyposis has been recognized for more than 3,000 years, the etiology and pathogenesis of nasal polyps are still unknown. Conditions that are known to predispose for nasal polyposis include chronic sinus infections, allergy, ASA intolerance, and cystic fibrosis.^{2,3} None of these causes has been proved to be the main cause with certainty. During the 1930s, allergy was believed to be prevalent in patients with nasal polyps and was considered to be a likely cause of nasal polyps.¹ Later on, some authors found no increased prevalence of atopy or allergic disorders in patients with nasal polyps compared to the general population.^{4,5} But more recently, King⁶ observed a more frequent relationship between polyps and delayed food allergies than between polyps and typical IgE-mediated inhalant allergies. Pang *et al.*⁷ reported that 81% of patients with nasal polyps have some food allergy which had been

SUMMARY The aim of this prospective study is to compare the prevalence of atopy in patients afflicted by nasal polyps with the atopy prevalence in healthy volunteers without nasal polyps, since systemic allergy and allergy in the nasal mucosa are still being debated as underlying causes for nasal polyps. Thirty-four cases with nasal polyposis without asthma and history of allergy or atopic disease were enrolled in the study and compared with 20 healthy volunteer controls in respect to asymptomatic food hypersensitivity. Hypersensitivity for 48 kinds of commonly consumed food in Turkey was investigated by an epicutaneous prick test, Multi-Test^R II (Lincoln Diagnostic, Inc, USA), using a special applicator. The food allergy test was positive in 25 out of the 34 cases with nasal polyps and in 6 out of the 20 controls. The difference between the two groups was statistically significant ($\chi^2 = 0.000$, $p < 0.001$). The number of skin tests with positive results in patients with nasal polyps ranged from 1 to 37 (mean \pm S.D. = 10.0 ± 7.9), whereas in the control subjects the range was 1 to 10 (mean \pm S.D. = 4.0 ± 3.3). The difference in the number of food reactions was also statistically significant. Asymptomatic food hypersensitivity, being immunologically mediated, may be a triggering factor for the pathogenesis of nasal polyps. Therefore, treatment of asymptomatic food allergy in patients with nasal polyps may alleviate symptoms, slow the progress of nasal polyps and prolong the disease-free interval after polypectomy.

demonstrated by intradermal food allergy skin testing. The goal of this study was to compare the prevalence of asymptomatic IgE-mediated food hypersensitivity in nasal polyp patients with the prevalence of such food hypersensitivity in healthy volunteers without nasal polyps.

MATERIALS AND METHODS

Forty-seven consecutive patients with nasal polyposis were included in this study at the Süley-

man Demirel University, Faculty of Medicine, Department of Otorhinolaryngology. On the basis of a skin multitest for inhalant allergen(s), 13 cases with nasal polyps who had an allergy and a history of food allergy were excluded from the study. None of the remaining 34 patients had asthma, ASA hypersensitivity,

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cystic fibrosis or dermographism and there was no history of allergy or atopic disease. The study was approved by the ethical committee, and informed consent was obtained from each patient. The main symptoms of the patients were nasal blockage and rhinorrhea. The polyposis diagnosis was made by a rigid endoscope (Storz Hopkins, Germany).

Twenty healthy volunteers were also selected as controls. None of them had nasal polyposis by a rigid endoscopic examination, nor a history of any allergy or asthma. Both inhalant allergy and food allergy were investigated by an epicutaneous prick test, Multi-Test^R II (Lincoln Diagnostic, Inc, USA), using a special applicator.

The list of foods searched for food allergy (commonly consumed foods) is given in Table 1. The test allergens (Lincoln Diagnostic) were supplied in 1:10 w/v strength with 50% glycerine as solvent. The negative control used was 50% glycerine. A special applicator soaked into the dipwell tray of allergens was administered on the flexor surface of the forearm. The test was assessed after 20 minutes. The exact size of the wheal was measured and recorded. A growth of 3 mm in diameter in excess of the negative control was considered a positive result. A steroid cream was then applied to the test area to stop further reactions after the assessment of the test. Necessary medications for anaphylactic reactions was always available, and a physician was always present to intervene on any problems.

Statistical analyses were done by Chi square and Mann-Whitney U test.

RESULTS

Twenty-one out of 34 patients with nasal polyposis were male and 13 were female. Eleven out of 20 control subjects were male, 9 were female. The ages of the patients range between 4-57 years (mean \pm S.D. = 37.3 \pm 16.3). The ages of the subjects in the control group range between 5-64 (mean \pm S.D. = 34.8 \pm 16.4).

The food allergy test was positive in 25 out of 34 (73.5%) cases with nasal polyps who had no food allergy in their medical history and no inhalant allergy as determined by a prick test. However, the food allergy test was positive in 6 out of 20 (15%) cases in the control group. The difference between two groups was statistically significant ($\chi^2 = 0.000$, $p < 0.001$). The number of skin tests with positive results in nasal patients ranged from 1 to 37 (mean \pm S.D. = 10.0 \pm 7.9), whereas in the control group the range was 1 to 10 (mean \pm S.D. = 4.0 \pm 3.3). This difference was also statistically significant ($p < 0.05$ Mann-Whitney U test). The most common reactions were to onion, oat grain, grapefruit, plum, buckwheat and apple (Table 1).

DISCUSSION

Nasal polyps were first described more than 3,000 years ago and are the most common group of mass lesions encountered in the nasal cavities. They are thought to affect between 1% and 4% of the global population and have a high rate of recurrence.⁹ Despite this long history and frequent occurrence, the pathogenesis of nasal polyps is still an enigma. Although various causes have been suspected, the clinical and

histologic features of this disorder are rather similar.¹⁰ This disease is frequently associated with sinusitis, asthma, aspirin intolerance, and cystic fibrosis. Systemic allergy and allergy in the nasal mucosa are still being debated as an underlying cause for nasal polyps.¹¹

Heading the list of possible mechanisms is allergy. The major features pointing to allergy as a cause for nasal polyps are rhinorrhea, sneezing and itching, elevated histamine and IgE concentration in extracellular polyp fluid, degranulated mast cells in polyps, marked tissue eosinophilia, and association with late-onset asthma.⁴

Caplin *et al.*¹² evaluated 3,000 atopic patients and found that only 0.5% had nasal polyps. Settupane and Chafee⁹ analysed more than 6,000 patients with asthma or allergic rhinitis and found nasal polyps were the most common entity in non-allergic asthmatic patients older than 40 years of age. Drake-Lee *et al.*¹³ found no evidence of an increased incidence of allergic disorders in 200 patients admitted for polypectomy. Delaney¹⁴ studied 100 patients admitted for polypectomy and reported the incidence of allergy in that group to be the same as in the general population. Although these authors had proposed no association between allergy and nasal polyposis, the allergy incidence was reported to be 17-66% by other authors.

Holopainen *et al.*¹⁵ reported that 17% of 109 patients with nasal polyps had a positive history for allergy as well as positive skin tests. Busuttill *et al.*¹⁶ studied 54 patients who were treated for nasal polyposis to determine the incidence of hypersensitivity and found that 24 (44%)

Table 1 Foods searched for food allergy and their frequencies of allergic reactions

Soybean (5)	Grapefruit (10)	Lettuce (4)	Plum (9)
Cinnamon (2)	Spinach (2)	Tuna (4)	Cow meat (6)
Almond (5)	Cocoa bean (2)	White egg (3)	Vanilla (2)
Onion (10)	Apple (8)	Backwheat (8)	Whole egg (7)
Orange (7)	Banana (2)	Carrot (6)	Walnut (5)
Honey dew (3)	Peach (3)	Sweet potato (1)	Celery (3)
Strawberry (3)	Lamb (4)	Goat meat (4)	Rice (1)
Coffee (4)	Thea sinesis (6)	Water melon (2)	Mushroom (7)
Sweet corn (4)	Tomato (6)	Salmon (0)	Wild oat (6)
Beef (2)	Egg yolk (1)	Garlic (2)	Grape (0)
Peanut (2)	Black pepper (1)	Cherry (1)	Chicken meat (1)
Lemon (2)	Pear (1)	Mustard (5)	Oat grain (10)

had positive skin tests. Moloney¹⁷ analyzed the records of 445 patients with nasal polyps and discovered that 64% had a positive response to skin tests. In a series of 249 patients who had nasal polypectomy in the Hamilton area, 66% had at least one positive allergy skin test result.¹⁸

In the aforementioned papers, the allergic incidence in patients with nasal polyposis is too discrete. The incidence of allergy in patients with nasal polyps may be influenced by the size of the patient population, the age of the patients, the methods of detecting allergy, and the presence of either systemic diseases or local nasal abnormalities.¹ Inhalant allergy was investigated in all of those studies, but food allergy was not. For those reasons, before the true absence of atopic skin reactivity can be confirmed in patients with nasal polyposis, food allergy must be investigated and negative prick test results must be followed by intradermal tests. Because, although prick testing is generally adequate to diagnose significant degrees of sensitivity to inhalant antigens, intradermal tests are much more sen-

sitive than prick tests.¹⁹

Food may act on the body through any of the four immunologic mechanisms defined by Gell and Coombs.⁸ Food hypersensitivity can not be elicited by a single test as it occurs by various mechanisms. The best test for food allergy is the blinded oral challenge test, which is laudable in principle but virtually impossible in practice. Thus, most otolaryngologic allergists depend either on the intradermal provocative food test or on unblended elimination and challenge refeeding tests. Multitest^R is not sufficient to detect all patients with food allergy, but it is one of the most reliable and easily applicable in practice for the detection of IgE-mediated food hypersensitivity.

Although the exact mechanism in the formation of nasal polyps is not fully understood, local eosinophilic inflammation is known to play a key role in the pathophysiology of nasal polyps. the pathophysiology of nasal polyps. It may be that nasal polyps are the uniform local manifestation of a systemic

disorder, perhaps such as food allergy, that has yet to be fully defined.

The mucosal surface of the nose and paranasal sinuses is continuously exposed to foreign bodies and, hence, is an important site of immunologic activity. Therefore, the pathogenesis and generation of nasal polyps may be closely related to the mucosal immune responses of each individual.²⁰ Immune responses against foreign bodies are initiated by the presentation of the antigen to T lymphocytes by antigen-presenting cells. Many recent studies have described a host of mediators in nasal polyp tissues. Food hypersensitivity being immunologically mediated may be the trigger for the migration and release of mediators in polyp tissues.^{7,20}

King⁶ observed a more frequent relationship between polyps and delayed food allergies than between polyps and typical IgE-mediated inhalant allergies. Pang *et al.*⁷ reported that 81% of nasal polyp patients have some food allergy and they determined that the most common allergic reactions

were against wheat, potato, tomato, corn and chicken. In the present study, we detected a positive skin test results in 73.5% of the patients with nasal polyps which was a significant association of asymptomatic IgE-mediated food hypersensitivity and nasal polyposis. The percentage of positive skin test results in our study was lower than those previously reported by Pang *et al.*⁷ The reason for this difference may be the use of the epicutaneous multitest by which the asymptomatic IgE-mediated hypersensitivity was determined. In our study, the most commonly found allergic food reactions (onion, oat grain, grapefruit, plum, backwheat and apple) were different than those of Pang *et al.*⁷ We suggest that this discrepancy originates from the different nutritional habits or racial properties of the investigated populations.

Our results showed a strong association between asymptomatic IgE-mediated food hypersensitivity and nasal polyposis. Following the ingestion of allergy inducing food, the release of mediators might increase in the nasal mucosa. Hence, it can be hypothesized that asymptomatic food hypersensitivity, being immunologically mediated, may be a triggering for the pathogenesis of nasal polyps. Therefore, treatment of food allergy in patients with nasal polyp may alleviate the symptoms,

slow the progress of nasal polyps and/or prolong the disease-free interval after polypectomy. However, further studies are needed to test this hypothesis.

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