

Case report

Oral allergy syndrome (OAS) in pollinosis patients after eating pistachio nuts

Two cases with two different patterns of onset

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We describe two uncommon cases of oral allergy syndrome (OAS) after eating pistachio nuts (p.n.) in subjects (a 54-year-old man and a 3-year-old girl) with exclusive skin prick test (SPT) positivity to *Parietaria* (*P.*) and pistachio nut (p.n.) allergens. Serologic *P.*- and p.n.-specific IgE determinations were also carried out. A double-blind, placebo-controlled food challenge (DBPCFC) was performed, for ethical reasons, only in the adult patient, but we observed a positive intraoral reaction only after slight scratching of the oral mucosa. Since this patient had put three whole p.n. with their shells into his mouth, breaking them with his teeth, before the onset of symptoms, we suggest that slight injury of the oral mucosa may enhance the local response. Preliminary results with SDS–PAGE and immunoblotting demonstrate the occurrence of a slight degree of cross-reactivity between these allergens, but further studies are necessary to obtain a definite conclusion.

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The oral allergy syndrome (OAS) is a common form of IgE-mediated food allergy in which the offending food induces clinical symptoms (itching and swelling) localized especially in the oral mucosa and pharynx (1–3). OAS usually derives from the ingestion of fresh fruits or nuts and vegetables such as apple, peach, hazelnut, pear, and tomato, in subjects with pollinosis, since in most cases there are cross-reacting allergens (e.g., profilin) (4–8). Rarely, OAS is induced by other foods and in patients without pollen-related respiratory symptoms (9). Pistachio nuts (*Pistacia vera* – Anacardiaceae family) (p.n.) are widely used in the production of cakes, ice cream, and sausages such as mortadella, and are also dried and eaten as a snack. Reactions to p.n. were considered very uncommon, despite the fact that type I hypersensitivity to dried fruits is well recognized (10). In this report, we describe two unusual cases of p.n.-related OAS with different patterns of inducing symptoms in subjects with pollinosis from *Parietaria* (*P.*) pollen allergens, and a preliminary

attempt to demonstrate the possibility of cross-reactivity between p.n. and *P.* allergens.

Case reports

Patient 1

A 54-year-old man with a history of seasonal rhinoconjunctivitis and monosensitization to *P.* pollen allergens was examined because of the appearance of severe OAS without symptoms of systemic involvement immediately after eating p.n. outside the *P.* pollen season. The patient frequently ate these nuts, but on this occasion he had put three nuts in the shell into his mouth, breaking them with his teeth. He had never had reactions before after eating fresh or dried fruits and vegetables.

Patient 2

A 3-year-old girl suffering from seasonal rhinoconjunctivitis and mild bronchial asthma, with

monosensitization to *P.* pollen allergens, was admitted to the emergency care unit for treatment of marked immediate oral and lip itching and swelling after eating p.n. during the *P.* pollen season. OAS was followed by mild systemic symptoms: urticaria and bronchial obstruction. The child had never previously eaten dry p.n. but had sometimes consumed them as an ingredient of ice cream, cakes, etc.

Material and methods

Examination of the patients included cutaneous, serologic, and, when possible, provocative diagnostic tests with commercially available allergenic extracts and reagents. Informed consent was obtained from the patient 1 and from the parents of patient 2. Skin prick tests (SPT) were carried out by the method of Aas & Belin (11) with a standardized allergenic extract for common inhalant allergens and the most important foods (Lofarma Laboratories, Milan, Italy); wheal areas were also calculated. Prick-prick tests were also done, according to Dreborg & Foucard (12), with fresh food (the same commercially available p.n. eaten by the patients). The same lancet was used for pricking first p.n. and then the skin of the patient's forearm. Serum samples were obtained for total and *P.*- and p.n.-specific IgE determinations (Pharmacia Cap System FEIA; Pharmacia Diagnostics, Uppsala, Sweden).

For ethical reasons, double-blind, placebo-controlled food challenge (DBPCFC) was done as set out in the EAACI position paper (13) only on patient 1, on separate days, with commercially available gelatin capsules containing different amounts of p.n. powder (0.1–50 mg protein/capsule) or inert vehicle. The capsule contents were applied directly to the oral mucosa to ensure direct contact with the target organ.

DBPCFC was also done after slight scratching of the oral mucosa, with the same standardized lancet, without causing bleeding.

In an attempt to demonstrate the occurrence of cross-reactivity between p.n. and *P.* allergens, SDS-PAGE and immunoblotting were carried out with the sera of our patients.

Electrophoresis was carried out, according to Laemmli (14), with a 10–20% gradient polyacrylamide gel in a Mini-gel SW 250 Hoefer apparatus (Prodotti Gianni, Milan, Italy). The sample (MW markers, *Parietaria judaica* extract, and pistachio extract) were diluted in running buffer (Tris-HCl 0.125 M, pH 6.8, 5% β -mercaptoethanol, and 2% SDS) and then boiled for 3 min. After 60 min of electrophoresis at 40 mA, the resolved protein components were stained with Coomassie brilliant

blue R-250 or blotted onto nylon cellulose paper (Fluorotrans 0.45 μ m, Pall, Milan, Italy) with a semidry electroblotter at 0.8 mA/cm² for 90 min. After a 2-h incubation in saturating buffer (5% fat-free milk in 20 mM Tris, 0.9% NaCl, pH 7.6), the membrane was incubated with a RAST-positive serum. Bound IgE antibodies were detected by adding goat antihuman IgE antibodies peroxidase-conjugate (1 : 1000 dilution in saturation buffer) and then revealed, ECL Western blotting kit (Amersham, Milan, Italy) being used as substrate.

Results

The results of cutaneous and serologic tests are shown in Table 1. Both patients were sensitized only to *P.* and p.n. allergens. DBPCFC according to the usual procedure did not cause symptoms even with the capsule of 50 mg of protein; however, DBPCFC with the capsule of 0.1 mg of allergen after scratching the oral mucosa induced after a few minutes intraoral itching and angioedema of the lips, which required the precautionary administration of an antihistamine (terfenadine: one tablet of 120 mg by mouth). No reactions were recorded after using the placebo capsule on the scratched mucosa.

SDS-PAGE and immunoblotting results (Fig. 1) demonstrate that serum samples recognize a band present on both the extracts of about 14 kDa which corresponds to *Par j* I (the allergen of *P. judaica*).

Discussion

To our knowledge, there are no documented reports of OAS after the ingestion of p.n. in subjects with *P.* pollinosis. Patient 1 showed an unusual pattern of inducing symptoms because he probably caused an SPT-like infiltration of food allergen into the oral mucosa, enhancing the local response. The low p.n. serum specific IgE level seems to confirm the local prevalence of these antibodies and, consequently, the appearance of exclusively oral symptoms. Patient 2, in whom we found a high level of p.n. serum specific IgE, also showed mild systemic manifestations. The association in both cases of p.n.-related OAS (even in a 3-year-old subject in whom pollinosis is usually infrequent) with SPT positivity to *P.* allergenic extract suggests the possibility of cross-reactivity between the allergens of *P.* pollen and p.n.

Our preliminary results demonstrate the occurrence of a slight degree of cross-reactivity between these allergens but the scarcity of patient sera did not permit us to perform inhibition immunoblotting studies in order to obtain a definite conclusion.

We emphasize the necessity of these studies by using some other sera of patients with *P.* and p.n.

Table 1. Results of skin tests and IgE determinations

		Skin prick test with allergenic extract		Prick-prick with fresh food		Serologic IgE assay		
		Class	Wheal area (mm ²)	Class	Wheal area (mm ²)	Class	kU/l	
Patient 1	<i>Parietaria</i>	++++	88	n.a.	n.a.	5	77.0	Specific IgE
	Pistachio nut	++++	64	++++	72	2	1.7	Specific IgE
	Histamine	+++	48	n.a.	n.a.		169	Total IgE
Patient 2	<i>Parietaria</i>	++++	54	n.a.	n.a.	4	47.9	Specific IgE
	Pistachio nut	++++	96	++++	58	4	40.5	Specific IgE
	Histamine	+++	30	n.a.	n.a.		215	Total IgE

n.a. = not applicable.

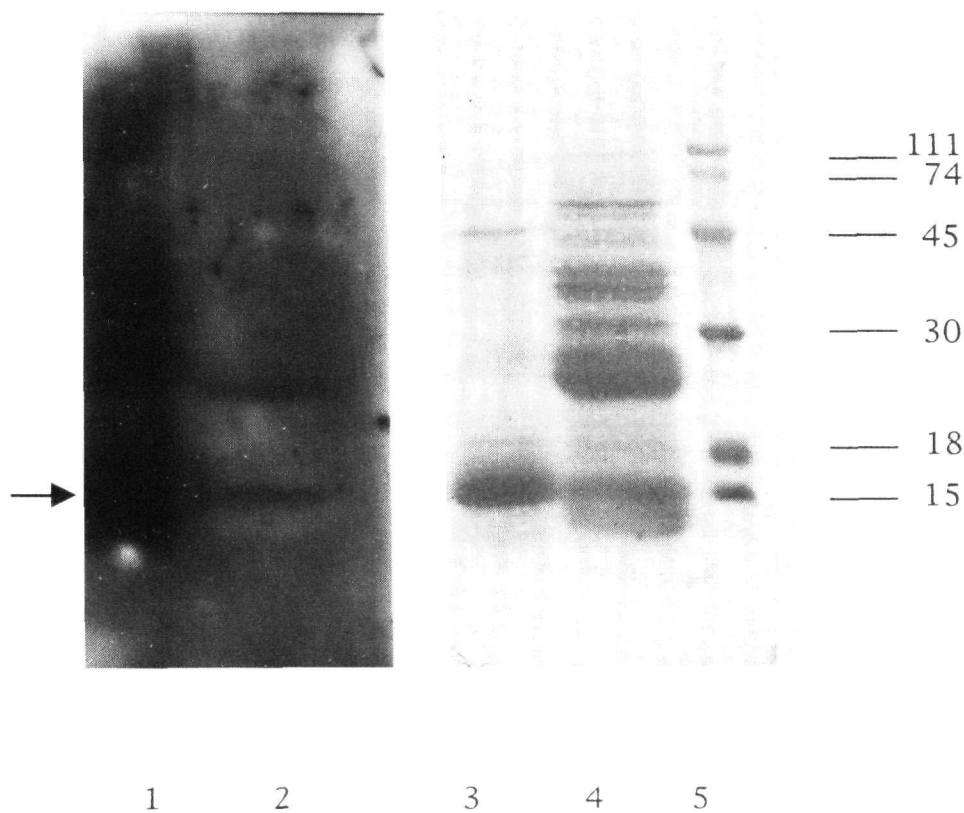


Fig. 1. 1) Immunodetection of *Parietaria judaica* extract probed with RAST *Parietaria*-positive serum; 2) immunodetection of pistachio extract probed with same serum; 3) *P. judaica* extract (3 mg/ml) after blotting onto nylon cellulose membrane; 4) pistachio extract (3 mg/ml) after blotting onto nylon cellulose membrane; 5) molecular weight markers.

sensitization. For this reason, we are examining in our center all *P.*-monosensitive subjects in order to evaluate the frequency of SPT positivity for p.n. allergens and, consequently, to obtain serum samples.

In conclusion, we suggest that SPT for p.n. allergens be done in subjects with *P.* pollinosis on account of the high frequency of sensitization to this pollen in the Mediterranean area (15, 16), and the increasing consumption of p.n.

The possible role in some cases of slight injury of the oral mucosa in the pathogenesis of OAS may also be suggested.

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