

Systemic allergic reaction to pine nuts

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This case report describes a systemic reaction due to ingestion of pine nuts, confirmed by an open, oral provocation test. Skin prick testing with the aqueous allergen revealed an immediate positive prick test, and histamine release from basophil leukocytes to the aqueous allergen was demonstrated. Radioallergosorbent test demonstrated specific IgE antibodies to pine nuts. In a review of medical literature, we found no reports of either oral provocation tests confirming a systemic reaction due to ingestion of pine nuts or demonstration of specific IgE antibodies.

INTRODUCTION

Two case reports¹ of suggested IgE-related sensitivity due to ingestion of pine nuts have been found in the medical literature. This is a case report including an open, oral provocation test with pine nuts. The test revealed an immediate systemic reaction. Skin prick test and histamine release from basophil leukocytes suggested IgE-related sensitivity. Radioallergosorbent testing demonstrated IgE antibodies to pine nuts.

CASE REPORT

A 28-year-old woman was dining with friends at a restaurant. The first dish served was a vegetable salad topped with some interesting, rice-like nuts. The patient took one of these nuts. About one minute later, she felt weak, dizzy, and had a thick, itching feeling in the throat. She was sweating all over and felt a pain in her chest. Her friends told her that she looked very pale. She went to the bathroom and vomited. She was not aware of the time, and 20 minutes later a girlfriend found her in the bathroom. She was taken to the hospital emergency room. Blood pressure and pulse were normal. She was not dyspneic and had normal colors. One hour after ingesting the pine nut she developed universal itching, urticaria, and angioedema. She was given mepyramine, 25 mg IM, and responded well. She was kept under observation through the night. The next day she left hospital and the symptoms declined gradually. The patient had had no pre-

vious allergic symptoms or signs. When ingesting hazelnuts, the patient's mother had experienced itching in the mouth, but there was no other history of allergic diseases in the family.

METHODS

The phytosanitary certificate from the Spanish Ministry of Agriculture stated *Pinus Pinea* as the botanical name of the plant from which the nuts originated.

An open, oral provocation test was performed with two pine nuts delivered from the restaurant. Before the provocation, the oral cavity and skin were inspected and found to be normal. Peak expiratory flow, pulse, and blood pressure were measured and an intravenous catheter was placed on the forearm.

A crude, aqueous allergen extract was made. Two pine nuts were crushed by hand with a mortar and pestle. Ten milliliters of sterile isotonic saline was added, and the mixture was kept in a syringe and refrigerated for 24 hours. The mixture was then filtered through a filter [Millex^R—OR, 0.22 μ m (Millipore, Molsheim, France)], and 0.1 mL of this filtered extract was diluted with 0.9 mL of sterile isotonic saline. The patient was skin prick tested on the forearm with a drop of this extract using a 1-mm precision needle ("The Allergy Pricker", Dome/Hollister-Stier, Conn., USA). The positive reference used was Soluprick^R histamine reference 10 mg/mL (ALK, Hørsholm, Denmark). The same day, the same extract was used

for Lucotest-HR^R (Lundbeck, Copenhagen, Denmark).² Since no standard RAST for pine nuts was available, Pharmacia (Uppsala, Sweden) applied a paper-RAST technique.³ An extract was made from pine nuts and coupled to paper discs. Then patient's serum, normal serum, and normal serum with IgE were added (final concentration: 1000 IU/mL) and tested. We performed Phadebas-RAST^{R3} for *Pinus strobus* pollen (t16)⁴ together with Phadebas-RAST^R for pollen (gx1 and gx3, tx1, tx5 and tx9, wx3) and foods (fx1, fx2, fx3, and fx5).⁴ Skin prick test for a panel of common Danish inhalation allergens: Birch, grass, mugwort, horse, dog, cat, *Dermatophagoides pteronyssinus*, *Dermatophagoides farinae*, and molds (*Alternaria*, and *Cladosporium herbarum*) was performed using Phazet.^{R4} Blood eosinophils were counted and total IgE determined.

RESULTS

Open, Oral Provocation Test

About one minute after ingestion of two pine nuts, the patient developed urticaria on the underlip, and hypersecretion of saliva started. Soon after, substantial edema of the palatine arches was noted by inspection. The patient was given loratadine, 10 mg. Ten minutes later, the symptoms and edema of the palatine arches had increased. The patient developed nausea, and clemastin, 1 mg, was given IV. Peak expiratory flow, pulse, and blood pressure were stable. One hour after ingestion, the pulse dropped from

84 to 60, the patient vomited, and was referred to the intensive care unit. The symptoms subsided gradually and the next day she left the hospital.

Skin Prick Tests

Skin prick tests with the inhalation allergens mentioned above revealed no positive reactions. Skin prick test with the aqueous extract of pine nuts revealed a wheal equal to the positive histamine reference. Three members of the staff were tested with the same extract and found negative.

In Vitro Tests

Lucotest-HR^R with the crude pine nut allergen extract demonstrated a 33 to 42-ng histamine release from 1 mL blood when testing blood from the patient with a 0.01% to 1% (vol/vol), and no histamine release when testing a normal control who reacted with histamine release to anti-IgE. RAST testing did not detect specific IgE antibodies against any of the allergens mentioned above except for pine nuts, when 2.5 PRU/mL (RAST class 2) was found. IgE antibodies were not detected in either of the two control sera. The number of eosinophil granulocytes was $0.59 \times 10^9/L$ (elevated) and total IgE was 38 kIU/L (normal).

DISCUSSION

In vivo open, oral provocation test confirmed anamnestic information of a systemic reaction due to ingestion of pine nuts. The *in vivo* test was supplemented with *in vitro* tests revealing an immediate reaction, which suggested an IgE allergic reaction. We demonstrated IgE antibodies to pine nuts in the serum of

the patient, and histamine release from basophil leukocytes after stimulation with the crude extract elicited a positive skin prick test. The patient did not remember having eaten pine nuts before the initial, acute reaction at the restaurant. The pine nut was the first item eaten by the patient and no beverages had been ingested beforehand. Since the patient had no history of allergic reactions, which was confirmed by negative test results for standard inhalation allergens and food items known to elicit immediate reactions, the reaction was unlikely to have been elicited by some other allergen.

The European variety of pine nut is harvested from the Stone Pine (*Pinus pinea*). It is found in Southern Europe, especially Italy, Southern France, and Spain. The cones are approximately 10 cm long and each cone may produce up to 100 seeds. Pine nuts are edible, very bland-tasting, light cream in color, and approximately 5×10 mm in size. Of all the nut-bearing pines, this one provides the largest crop commercially.⁵

Fine¹ published the first two case reports in 1987. Open, oral provocation tests were not performed and other food substances were ingested together with pine nuts. The present case report is an example of a pine nut being the only food item ingested. The *in vivo* testing with objective symptoms of systemic reaction was supplemented with skin prick tests revealing immediate whealing and histamine release from basophil leukocytes, both suggestive of IgE-related allergic response.

Pine nuts are used in various ways. Generally, they are eaten whole, either from the tree or after roasting. Pine nuts are also ground into flour for cakes, pressed into candies, and used for garnishing pastries. The residual from commercial packing operations in Europe yields an oil from broken kernels that is manufactured into soap. The cones are used for fuel. Left-over shells are used in the tanning of leather and yield a dye used for coloring fishing nets.⁵ The patient did not recall having eaten pine nuts before the initial, acute reaction but may have ingested them in one form or another.

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