

Contact Urticaria to Raw Potato and Lentil Anaphylaxis: A Case Report

H. Haluk Akar, MD,¹ Fulya Tahan, MD,¹ and Duygu Ekinci, MD²

Potatoes and lentils are highly consumed throughout the world. Adverse reactions to potatoes among children are considered uncommon and usually result from ingestion. Allergy to raw potato has mainly been described in adults, usually in the form of oral-contact dermatitis or contact urticaria, but also may manifest as asthma, rhinoconjunctivitis, wheezing, or even anaphylaxis. Lentils, chickpeas, beans, and peas are the most commonly consumed legumes in Turkey and the Mediterranean region. In the literature, type I hypersensitivity to lentils and legumes is rare. We report a case of a 16-month-old boy with both urticaria induced by raw potato and lentil-induced anaphylaxis.

Introduction

WHITE POTATO (*Solanum tuberosum*) is highly consumed in Turkey as it is in Europe, and in its cooked form is usually added to a child's diet around the age of 5–6 months.¹ Raw potato allergy has rarely been described, and is generally in relation to Oral Allergy Syndrome (OAS). Adults with seasonal allergic rhinitis have been reported to suffer from ocular symptoms, wheezing, and contact urticaria after peeling raw potatoes.² Delgado et al. described a 4-year-old boy who displayed contact urticaria from raw potato, but was able to eat cooked potato. Beausoleil et al. described a 4-year old with raw potato-induced anaphylaxis.^{2,3} Legume allergy, mainly to lentils and chickpeas, is the fifth most common cause of food allergy in Spanish children. Allergy to lentils is the most frequently diagnosed legume allergy.^{4,5} In those who have presented with lentil allergy, the most frequent symptoms were oropharyngeal symptoms and acute urticaria, followed by anaphylaxis.⁶ This case describes a 16-month-old boy with both raw-potato-induced contact urticaria and lentil-induced anaphylaxis. To our knowledge, this is the first report in the literature where raw potato-contact urticaria and lentil-induced anaphylaxis are associated.

Case Report

A 16-month-old boy had previously suffered from contact urticaria and 2 episodes of anaphylaxis related to lentils. There were no symptoms during the first 6 months of his life. Complementary foods had been started after 6 months of age, and it was the first time that he threw up the egg he had eaten. Because of this vomiting, his parents discontinued

eggs. Then, he experienced 3–4 urticarial symptoms before the age of one, but the parents did not know the etiology. The patient presented to our department because of contact urticaria on his right eyelid. From the history, we learned that the mother had been peeling potatoes for dinner, and the patient had taken a piece of raw potato. After that, the patient had touched his right eye with the same hand, resulting in contact urticaria that cleared up 45–60 min after ceasing contact. The lesion was limited to the areas that had been in contact with the piece of potato. There were no late contacts or systemic reactions to the raw potatoes. From the history, it was learned that cooked and fried potato (ingestion and contact) produced no reaction. The same patient reported suffering from facial erythema followed by generalized urticaria, edema of the eyelids, lips, and tongue, wheezing, and dyspnea within 30 to 60 min after ingestion of lentil soup 2 times around 13 months of age. The patient was treated in an hospital with antihistamines and methylprednisolone and short-acting β -2 agonist. A prick-test using commercial antigens was strongly positive for nuts, peanuts, egg white, and yolk. Skin testing to tree pollens was negative (Table 1). A blood test showed his eosinophil count (% 9.1, 1,070/mm³) and IgE; 532 (0–90 IU/mL) levels to be high. Finally, a prick-by-prick test with raw potato (Fig. 1) and boiled lentil (Fig. 2) showed positive results after 15 min, supporting the diagnosis. Also, a piece of raw potato was rubbed to the patient lips, and he showed contact urticaria within 5 min (Fig. 3).

Discussion

Food exposure through ingestion, inhalation, and mucous membrane or skin contact can cause adverse reactions. Skin-

Departments of ¹Pediatric Allergy and ²Pediatrics, Erciyes University School of Medicine, Kayseri, Turkey.

TABLE 1. SKIN-PRICK TEST RESULTS

Histamine	++++
Saline	—
Raw Potato	++++
Boiled Lentil	++++
Egg white	++++
Yolk	++++
Nut	++++
Peanut	++++
Tree pollens	—

++++, strong positive.

contact reactions most commonly manifest as irritant contact dermatitis, allergic contact dermatitis, or contact urticaria.⁷ The term contact urticaria was described by A.A. Fisher in 1973 and represents pruritus, whealing, and erythema occurring within minutes after mucosal or cutaneous contact with the causative agent and resolving completely within a maximum of 24 h. Contact urticaria is frequently restricted to the contact areas. It may be present in distant locations or as generalized urticaria. Sometimes, internal organs can be involved, and the reaction can even result in an anaphylactic shock.⁸ Allergy to raw potato has mainly been described in adults, most frequently as a cause of OAS or contact urticaria.^{1,9} Castells et al. reported an infant 5 months old who had developed anaphylactic symptoms after ingestion of cooked potato.¹⁰ Our contact urticaria case is the youngest patient to react to raw potato in the literature.

Different potato allergens have been identified. Patatin (Sol-t-1) is the most important of these¹¹ and shows a significant homology with a latex allergen, leading to the possibility of cross-reaction.¹² Four IgE-binding potato proteins were (cathepsin D-, cysteine-, and aspartic protease inhibitors) identified and designated Sol t 2, Sol t 3.0101, Sol t 3.0102, and Sol t 4, belonging to the family of soybean trypsin inhibitors (Kunitz type) by Seppälä et al.¹¹ Although patatin is considered to be a heat-labile allergen, it has been shown that the heat lability of its IgE interaction is strongly influenced by other potato proteins.¹³ With increasing temperature above 60°C, the structural properties of the Kunitz-type soybean trypsin invert.¹⁴ The existence of heat-labile potato proteins (unstable in the presence of digestive enzymes and gastric acid) that lose their allergenic properties when cooked

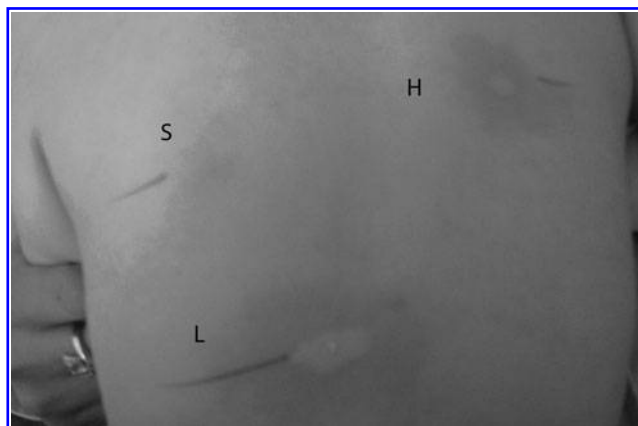


FIG. 2. Positive prick-by-prick boiled lentils. S, saline; H, histamine; L, boiled lentil.

or eaten explains why some subjects show symptoms only after contact with raw potatoes and not with processed potatoes or after oral intake.¹

Lentils, chickpeas, beans, and peas are the most common consumed legumes in the Mediterranean area. There is little information about legume allergy. Allergy to lentils is the most frequently diagnosed legume allergy. Most lentil allergy symptoms begin under 4 years of age.^{5,6} Lentil allergy was found to be 7.0% by Yavuz et al. Lentil allergy is the sixth most common cause of food allergy in Turkish children.¹⁵ The case of bronchial asthma induced by inhaling steam from cooking lentils has rarely been described.¹⁶ Lentil-induced anaphylaxis and lentil-dependent exercise-induced anaphylaxis have rarely been reported in the literature.^{17,18} Our case is the youngest patient with anaphylaxis induced by lentils in the literature.

Peanuts (*Arachis hypogaea*) belong to the botanical family of legumes (Leguminosae). Serological cross-reactivity between peanuts and other legumes has been reported in several studies.¹⁹

There are some immuno-cross-reactivities between legume seed proteins that are based on similarities of their sequence and molecular structure.²⁰

Legumes produce a diversity of allergen proteins, including protease inhibitors, α -amylase inhibitors, arcelins,

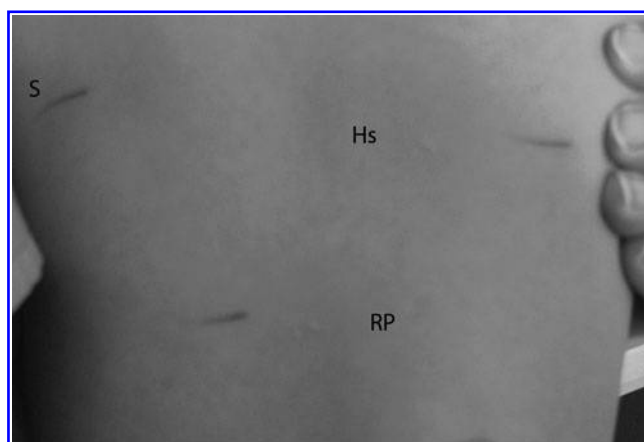


FIG. 1. Positive prick-by-prick to raw potato. S, saline; Hs, histamine; RP, raw potato.



FIG. 3. Positive raw potato challenge (labial contact urticaria).

lectins, and antifungal proteins. Kuntz-type soybean trypsin inhibitors can be isolated from legumes.²¹

In our case, both contact urticaria with raw potatoes and lentil-induced anaphylaxis may be explained by Kunitz-type soybean trypsin inhibitors. Potatoes and legumes (lentil) contain this cross-reactive allergen protein.²²

To our knowledge, our patient is the first and youngest instance of a child with both contact urticaria from raw potatoes and anaphylaxis induced by lentils to be reported in the literature. We documented prick-by-prick test with raw potatoes (and raw potato challenge) and boiled lentils. The patient will be followed for the development of seasonal allergic rhinitis.

Author Disclosure Statement

No competing financial interests exist.

References

- De Swert LF, Cadot P, Ceuppens JL. Diagnosis and natural course of allergy to cooked potatoes in children. *Allergy* 2007; 62:750–757.
- Beausoleil JL, Spergel JM, Pawlowski NA. Anaphylaxis to raw potato. *Ann Allergy Asthma Immunol* 2001; 86:68–70.
- Delgado J, Castillo R, Quirarte J, Blanco C, Carrillo T. Contact urticaria in a child from raw potato. *Contact Dermatitis* 1996; 35:179–180.
- Martínez San Ireneo M, Ibáñez MD, Fernández-Caldas E, Carnés J. In vitro and in vivo cross-reactivity studies of legume allergy in a Mediterranean population. *Int Arch Allergy Immunol* 2008; 147:222–230.
- Martínez San Ireneo M, Ibáñez MD, Sánchez JJ, Carnés J, Fernández-Caldas E. Clinical features of legume allergy in children from a Mediterranean area. *Ann Allergy Asthma Immunol* 2008; 101:179–184.
- Pascual CY, Fernandez-Crespo J, Sanchez-Pastor S, Padial MA, Diaz-Pena JM, Martin-Muñoz F, Martin-Esteban M. Allergy to lentils in Mediterranean pediatric patients. *J Allergy Clin Immunol* 1999; 103(1 Pt 1):154–158.
- Bahna SL. Adverse food reactions by skin contact. *Allergy* 2004; 59 Suppl 78:66–70.
- Wakelin SH. Contact urticaria. *Clin Exp Dermatol*. 2001; 26:132–136.
- De Lagrán ZM, de Frutos FJ, de Arribas MG, Vanaclocha-Sebastián F. Contact urticaria to raw potato. *Dermatol Online J* 2009; 15:14.
- Castells MC, Pascual C, Esteban MM, Ojeda JA. Allergy to white potato. *J Allergy Clin Immunol* 1986; 78:1110–1114.
- Seppälä U, Majamaa H, Turjanmaa K, Helin J, Reunala T, Kalkkinen N, Palosuo T. Identification of four novel potato (*Solanum tuberosum*) allergens belonging to the family of soybean trypsin inhibitors. *Allergy* 2001; 56:619–626.
- Schmidt MH, Raulf-Heimsoth M, Posch A. Evaluation of patatin as a major cross-reactive allergen in latex-induced potato allergy. *Ann Allergy Asthma Immunol* 2002; 89: 613–618.
- Koppelman SJ, van Koningsveld GA, Knulst AC, Gruppen H, Pigman IG, de Jongh HH. Effect of heat-induced aggregation on the IgE binding of patatin (Sol t 1) is dominated by other potato proteins. *J Agric Food Chem* 2002; 50:1562–1568.
- Pouvreau L, Kroef T, Gruppen H, van Koningsveld G, van den Broek LA, Voragen AG. Structure and stability of the potato cysteine protease inhibitor group (cv. Elkana). *J Agric Food Chem* 2005; 53:5739–5746.
- Yavuz ST, Sahiner UM, Buyuktiryaki B, Soyer OU, Tuncer A, Sekerel BE, Kalayci O, Sackesen C. Phenotypes of IgE-mediated food allergy in Turkish children. *Allergy Asthma Proc* 2011; 32:47–55.
- Martin JA, Compaired JA, de la Hoz B, Quirce S, Alonso MD, Igea JM, Losada E. Bronchial asthma induced by chick pea and lentil. *Allergy* 1992; 47 (2 Pt 2):185–187.
- Kalogeromitos D, Armenaka M, Galatas I, Capellou O, Katsarou A. Anaphylaxis induced by lentils. *Ann Allergy Asthma Immunol* 1996; 77:480–482.
- Orhan F, Karakas T. Food-dependent exercise-induced anaphylaxis to lentil and anaphylaxis to chickpea in a 17-year-old boy. *J Investig Allergol Clin Immunol* 2008; 18:465–468.
- Jensen LB, Pedersen MH, Skov PS, Poulsen LK, Bindslev-Jensen C, Andersen SB, Torp AM. Peanut cross-reacting allergens in seeds and sprouts of a range of legumes. *Clin Exp Allergy* 2008; 38:1969–1977.
- Ballabio C, Magni C, Restani P, Mottini M, Fiocchi A, Tedeschi G, Duranti M. IgE-mediated cross-reactivity among leguminous seed proteins in peanut allergic children. *Plant Foods Hum Nutr* 2010; 65:396–402.
- Zhu MJ, Zhang GQ, Wang HX, Ng TB. Isolation and characterization of a Kunitz-type trypsin inhibitor with anti-proliferative activity from *Gymnocladus chinensis* (Yunnan bean) seeds. *Protein J* 2011; 30:240–246.
- Breiteneder H, Radauer C. A classification of plant food allergens. *J Allergy Clin Immunol* 2004; 113:821–830.

Address correspondence to:

Fulya Tahan, MD

Department of Pediatric Allergy

Erciyes University School of Medicine

Kayseri 38039

Turkey

E-mail: tahanfulya@yahoo.com

Received for publication May 23, 2012; accepted after revision December 12, 2012.