

Letter to the Editor

Anaphylactic reaction to (mixed) fruit juice containing dragon fruit

To the Editor:

Dragon fruit, or pitaya (or *pitahaya*), is the fruit of the cactus species *Hylocereus undatus* (Haw [red pitaya]). This exotic fruit is native to Mexico and Central and South America and is also cultivated in Southeast Asian countries. The flesh is mildly sweet. Because of its exotic and impressive appearance, this fruit enjoys growing popularity in Europe and the United States and is sold in many supermarkets. The fruit is also converted into juice or used to flavor other beverages.

A 19-year-old woman reported 2 incidences of allergic reactions 5 to 15 minutes after ingestion of (mixed) fruit juice containing dragon fruit. Symptoms were vomiting, swelling of the tongue, general dermal erythema, and urticaria. Because she had been in a horse stable on the first occasion, she also considered horse allergy a possible cause. After a second "challenge test" at home, the patient experienced similar symptoms after 10 minutes, which clearly implicated the juice as being the allergen. Other juices of different flavors without dragon fruit were well tolerated. Everything was suggestive of pitaya. She also had an atopic history, with eczema of the hands and face and rhinitis after contact with birch pollen and mite allergen.

A skin prick test (SPT) with the (mixed) fruit juice containing dragon fruit resulted in a wheal of 6 mm and an erythema of 9 mm, whereas use of histamine as positive control resulted in a 5-mm wheal and an 8-mm erythema; the negative control with saline elicited a 0-mm reaction. When the 6 ingredients of the juice of dragon fruit, banana, strawberry, white grape, apple sugar, and flavors provided by the manufacturer were used in SPTs, only the solution containing dragon fruit elicited a positive result at a dilution of 1:10,000 (wheal, 4 mm; erythema, 7 mm; for all the other ingredients, the results were 0 mm). Five healthy control subjects showed no reactions. A prick-by-prick test result was positive and confirmed earlier findings with positive results to birch, alder and hazel pollen, and mite.

Because of the positive pitaya juice SPT response, the IgE reactivity of the patient's serum to pitaya juice extract was tested by means of Western blotting. An IgE-reactive band of less than 10 kd was detected (Fig 1). This is in accordance with the findings of Damiani et al,¹ who analyzed the IgE reactivity of serum of a patient with pitaya allergy to pitaya extract. The marked band (Fig 1) was excised from the same extract blotted onto polyvinylidene difluoride membrane for N-terminal sequencing to identify the IgE-reactive antigen (Table I). Thirteen amino acids were identified and screened by using FASTA 3 (a DNA and protein sequence alignment software package; European Bioinformatics Institute [EMBL-EBI], Hinxton, UK) in the protein database. A 53% identity and 63% similarity was found to the N-terminus of the corn nonspecific lipid transfer protein (nsLTP) Zea m 14. An extract of pitaya fruit was analyzed by means of Western blotting and 2-dimensional electrophoresis/immunoblotting to confirm the authenticity of the pitaya juice and to check the N-terminal sequence. An IgE-reactive antigen with an alkaline isoelectric point (pI) of 9.5, which is characteristic for nsLTPs, was identified in the immunoblot (Fig 2). This was subjected to N-terminal sequencing, which identified 14 amino acids (Table I)

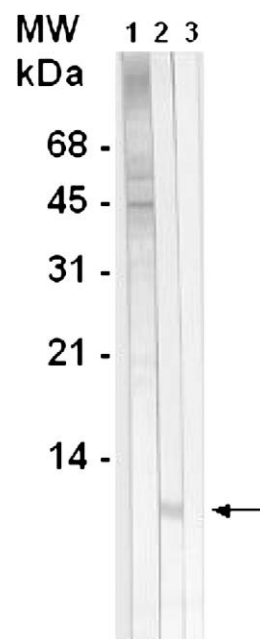


FIG 1. Western blot of pitaya juice [(mixed) fruit juice containing dragon fruit] under nonreducing conditions, 15% SDS-PAGE: 1, protein staining (India Ink); 2, IgE reactivity of the patient's serum; 3, buffer control. The arrow indicates the position of the protein band excised for protein sequencing.

TABLE I. N-termini of IgE-reactive 10-kd and 9.5-pI bands of pitaya juice and red pitaya fruit extract compared with the N-terminus of the corn allergen nsLTP Zea m 14

Source	Estimated N-terminus
IgE-reactive 10-kd band (Western blot) of pitaya juice, an ingredient of (mixed) fruit juice containing dragon fruit	SIT_GAVALXIAP
IgE-reactive 9.5-pI spot (2-dimensional electrophoresis/immunoblot) of red pitaya extract	AIT_GAVAKGIAP
N-terminus of Zea m 14 (accession no. A31779)	AISCGQVASAIAPC

Gaps () are typical for C (cysteine residue).

and confirmed the N-terminus found for lipid transfer protein (LTP) derived from pitaya juice. Because the peach LTP (Pru p 3) and wheat LTP (Tri a 14) were available for us in pure and recombinant forms and showed some primary structure similarity,² we tested them for cross-reactivity with the pitaya LTP in a Western blot inhibition test (Fig 3). The results showed no IgE reactivity to nPru p 3 (Fig 3, A) in serum from the patient with pitaya allergy and a negative inhibition test result with recombinant allergen wheat LTP (rTri a 14; Fig 3, B), which is cross-reactive with Pru p 3. This is in accordance with the clinical data showing that there is no cross-reactivity between the peach allergen LTP (Pru p 3) and pitaya LTP because the patient tolerates peaches. Additionally, the patient had no history of allergic or anaphylactic reactions to corn. Because the patient claimed to have never eaten dragon fruit, the sensitization might have happened through pollen-related LTP, as in a case report on rambutan.³

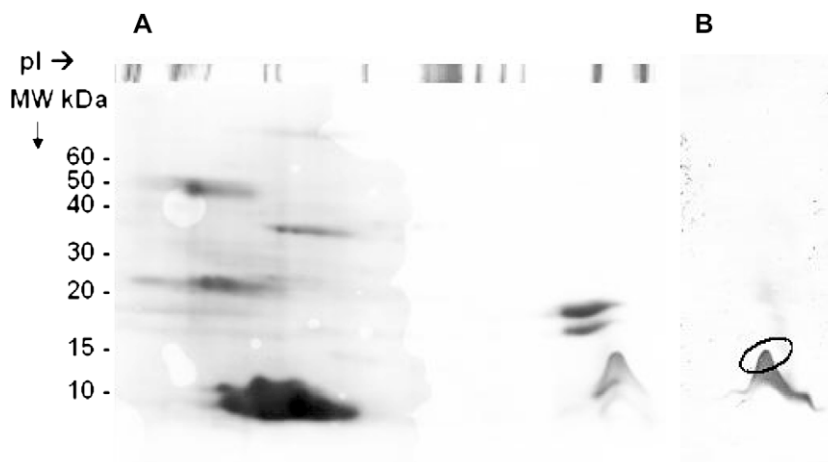


FIG 2. Two-dimensional electrophoresis/immunoblotting of pitaya fruit extract: first dimension, pH 3 to 10; second dimension, 15% SDS-PAGE. **A**, Protein staining (Coomassie blue) of the 2-dimensional electrophoresis. **B**, Immunoblot depicting the IgE reactivity of the patient's serum. The marked spot was excised and N-terminally sequenced.

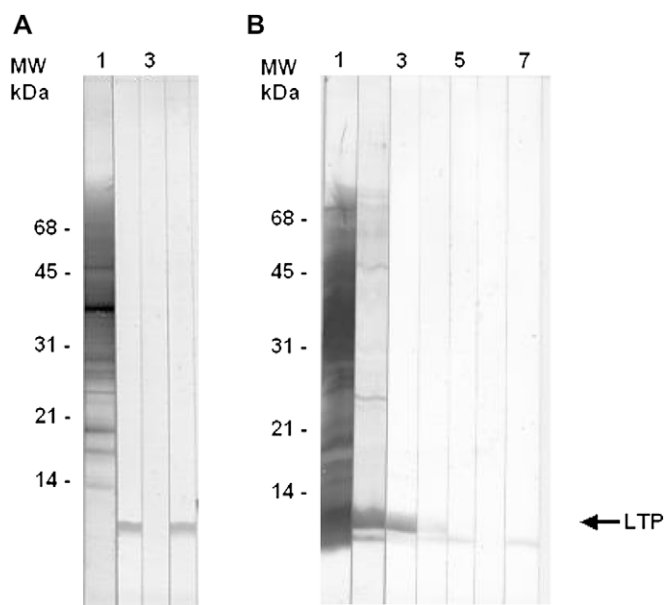


FIG 3. Western blot inhibition test. **A**, Western blot of pitaya fruit extract under nonreducing conditions, 15% SDS-PAGE: inhibition experiment. 1, protein staining (India Ink); 2–4, IgE reactivity of the patient's serum without inhibitor (2), with pitaya fruit extract as inhibitor (3), and with rTri a 14 (wheat LTP) as inhibitor (4). **B**, Western blot of peach extract containing Pru p 3 (LTP) under nonreducing conditions, 15% SDS-PAGE: 1, protein staining (India Ink); 2, rabbit anti-Cor a 8-reactive serum (cross-reacting with Pru p 3); 3 and 4, Pru p 3-positive sera; 5, serum of the pitaya-reactive patient; 6, anti-Cor a 8 control; 7, anti-IgE control.

This is the second case describing pitaya as an allergenic source eliciting strong allergic reactions. To our knowledge, this is the first time that pitaya nsLTP has been described as an IgE-reactive

antigen with the power to elicit anaphylactic responses. The LTPs are a large group of allergens found in many pollen species and fruits.⁴ Because this is the second report on an anaphylactic reaction to pitaya in a short time period, this might indicate a higher incidence of sensitization to pitaya and the potential emergence of a wave of new cases of dragon fruit allergy.

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