

First case report of anaphylaxis to quinoa, a novel food in France

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Quinoa seeds belonging to the plants of Chenopodiaceae family, such as spinach, beets and Swiss chard, represent a staple food in high altitude Andean regions because of their high protein content levels (about 15% wet weight) and their balanced essential amino acid profile, thereby offering a wider spectrum of nutrition than that of cereals and legumes (1). Quinoa seeds are a novel food in France, available in health food stores. They are consumed as a substitute to cereals by patients allergic to wheat or intolerant to gluten. We present the first case of allergy to quinoa reported to the Allergy Vigilance Network. A 52-year-old man developed a serious systemic reaction with dysphagia, dysphonia, generalized urticaria and angio-oedema after the ingestion of quinoa with fish and bread. The symptoms were resolved with intravenous corticosteroids and anti-H1. Clinical history of this patient included a previous reaction to quinoa in 2006 and a seasonal rhinitis to grass pollens. The prick-test to crushed quinoa seeds was positive with a wheal diameter of 15 mm while that for the codeine control was 5 mm. Prick tests were negative to fish and wheat. Specific IgEs were documented by ImmunoCAP® (Phadia AB, Uppsala,

Sweden): 7 kU/L. Immunocap to spinach was negative.

Crude and heated quinoa extracts were obtained after centrifugation of a homogenate of seeds, heated or not at 95°C for 10 min in 20 mM Tris buffer, pH 7.2. Gel electrophoresis under reducing conditions of these extracts (12% polyacrylamide precast gels, NuPAGE® Novex Bis-Tris; Invitrogen, Carlsbad, CA, USA) were stained with Coomassie brilliant blue (Fig. 1A) or electrophoretically transferred to polyvinylidene fluoride (PVDF) membranes. Quinoa extract proteins (crude and heated) were electrophoretically transferred to PVDF membranes. Gels were loaded with 20 µg of quinoa extracts for Coomassie staining and 1 µg for immunoblotting. Immunoblotting was carried out using 1/100 serum from the patient showing allergic reaction to quinoa and five control sera. Bound IgEs were detected by peroxidase-conjugated goat anti-human IgEs (KPL, Inc., Gaithersburg, MD, USA), using ECL Plus Western blotting kit (Amersham Biosciences, Little Chalfont, UK). Immunoblotting analysis showed IgE reactivity in the patient's serum to one band with an apparent molecular mass of

35 kDa, in both crude and heated quinoa extracts (Fig. 1B). No specific IgE binding was observed for the control sera (Fig. 1C).

Exceptional food allergies to spinach or beets and cross allergy to latex have been reported (2–4). No case is recorded in the CICBAA data bank including 1400 food allergic patients.

The major quinoa seed storage proteins included: 11S-type globulins named chenopodin and a high-cysteine 2S fraction. Two heterogeneous sets of polypeptides in the size ranges 30–40 kDa (acidic subunits) and 20–25 kDa (basic subunits) joined by disulphide bonds in the native protein characterize the 11S-type of seed proteins (5). The band near 35 kDa evidenced by immunoblot therefore may belong to the class of chenopodin A acidic subunits.

Highly soluble proteins of quinoa seeds can be used for developing functional foods and as potential ingredients that could be substituted for soy or lupin flour, with additional advantage of avoiding mandatory labelling (6). For this reason, this first case of anaphylaxis documenting a thermostable allergen is of particular interest.

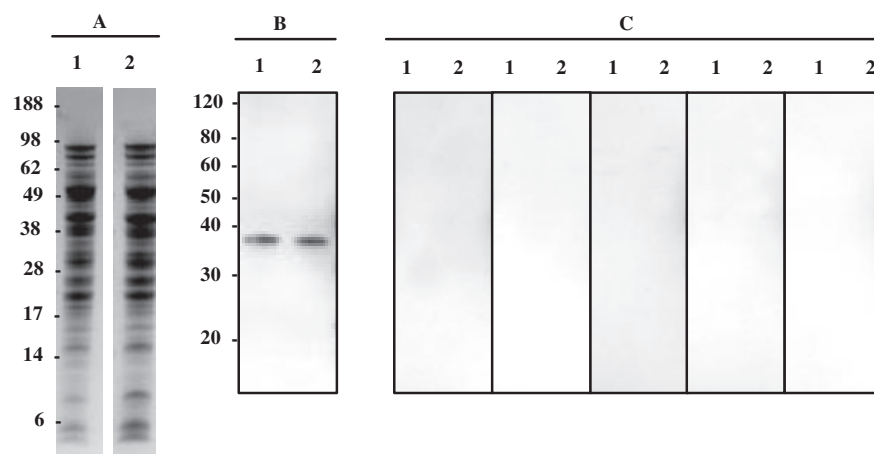


Figure 1. Gel electrophoresis and IgE immunoblotting. (A) SDS-PAGE; (B) immunoblotting with serum from a patient allergic to quinoa; (C) from five nonatopic subjects. Lane 1: crude quinoa extract; lane 2: heated quinoa extract.

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