



Letter

Identification of cross-reactivity between buckwheat and coconut

Buckwheat is a member of the Polygonaceae family that is used as food (eg, in bread, pancakes, and noodles), as filling in pillows, or as medicine, predominantly in China. Reported cases of buckwheat allergy involved asthma or allergic rhinitis due to buckwheat pillow exposure, occupational buckwheat asthma, atopic dermatitis, urticaria, or anaphylaxis due to its ingestion.^{1–3}

Buckwheat allergy was considered a rare food allergy in Europe and North America but was recently reported to be more frequent than in the past, at least in Europe.^{4,5} In contrast to wheat, buckwheat is a gluten-free crop and is commonly used as a supplement for patients with celiac disease. A case of chronic urticaria due to buckwheat allergy in a celiac patient has recently been described.⁶ Different allergens have been identified in buckwheat: a 24-kDa globulin is considered the major allergens; other allergens (45–50, 19, 16, and 9 kDa) may be of clinical importance.⁷ Clinically relevant cross-reactivity has been found for latex, rice, and poppy seeds.⁵

Coconut allergy seems to be more rare than buckwheat allergy but potentially very severe.⁸ In fact, only a few cases of coconut allergy have been described so far, and all of them were cases of anaphylaxis.⁸ Few proteins have been identified as coconut allergens: a 29-kDa 7S vicilin (Coc n 2), a 56-kDa 11S globulin (Coc n 4), and a 14-kDa profilin (Coc n 5). Cross-reactivity with coconut has been demonstrated for walnut, hazelnut, and lentil.⁸

We describe the case of a 17-year-old boy who developed swelling of his mouth, generalized urticaria, vomiting, and dyspnea 10 minutes after eating a buckwheat cake. The episode required treatment at the emergency department. Before this incident, the boy had developed prickling in his mouth after coconut ingestion. Seasonal allergic rhinitis was confirmed by sensitizations to grass and birch pollens. A prick-to-prick test with buckwheat³ and coconut yielded a positive reaction. No other food allergen sensitization was found. Specific serum IgE antibodies (ImmunoCAP System; Thermo Fisher Scientific, Waltham, Massachusetts) were found to coconut (4.59 kU/L) and buckwheat (40.7 kU/L). The total serum IgE level was 276 IU/mL. Because of the clear anamnesis and the severity of the initial reaction, we decided not to perform the double-blind, placebo-controlled food challenge.

To confirm the sensitization and to investigate the possibility of a cross-reaction between the 2 allergenic sources, direct enzyme-linked immunosorbent assay (ELISA), sodium dodecyl sulfate–polyacrylamide gel electrophoresis (SDS-PAGE), and an immunoblotting inhibition with buckwheat flour and coconut extracts were performed. The preparation of buckwheat and coconut extracts was performed as previously described.¹ The protein content

of buckwheat flour and coconut extracts, measured by the method of Bradford,⁹ was 1.6 and 7 mg/mL, respectively. In immunoblotting inhibition studies, IgE reactivity against buckwheat flour extract was evaluated by preabsorption of the serum with 25 μ g of coconut extract, 25 μ g of house dust mite extract (as unrelated extract), or 25 μ g of buckwheat flour extract (as a control). IgE reactivity against coconut extract was evaluated by preabsorption of the serum with 25 μ g of buckwheat flour extract, 25 μ g of house dust mite extract (as unrelated extract), or 25 μ g of coconut extract (as a control).

A direct ELISA experiment confirmed the sensitization to both coconut and buckwheat extracts. The protein profile (SDS-PAGE) revealed the presence of several components for both coconut and buckwheat (Fig 1).

The immunoblotting experiments put in evidence an IgE-binding band of approximately 29 kDa for the coconut extract (Fig 1) and several bands for buckwheat extract (Fig 1). In immunoblotting inhibition experiments, the 29-kDa coconut band disappeared when inhibited with the buckwheat extract (Fig 1), and a 19-kDa buckwheat band was inhibited by the coconut extract (Fig 1). The inhibition with an unrelated allergenic source (house dust mite, Fig 1) did not change the immunoblotting profiles of both buckwheat and coconut extracts, and the results of a direct ELISA experiment against bromelain were negative.

This is, in our knowledge, the first report of a clinically relevant allergic cross-reaction between buckwheat and coconut. We

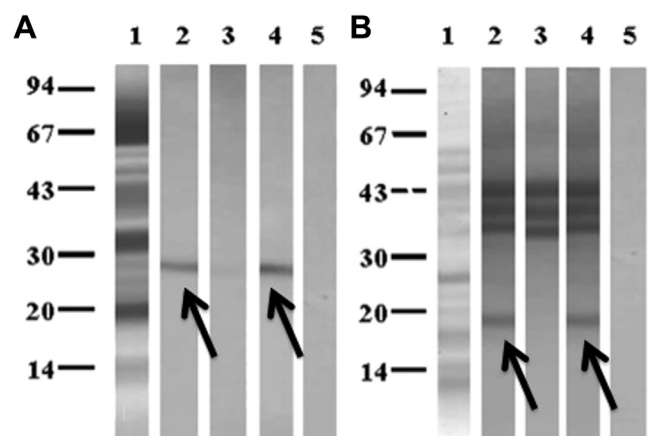


Figure 1. Immunoblotting analysis with coconut (A) and buckwheat (B) extracts. Lane 1: sodium dodecyl sulfate–polyacrylamide gel electrophoresis profile. Lane 2: immunoblotting without inhibition. Lane 3: immunoblotting inhibition after preabsorption with buckwheat (A) and coconut (B) extracts. Lane 4: immunoblotting inhibition after preabsorption with house dust mites extract (nonrelevant allergen, control). Lane 5: immunoblotting of serum from a healthy nonatopic control participant. Arrow indicates the identified cross-reactive allergen between coconut and buckwheat.

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suppose that the identified 29-kDa coconut and 19-kDa buckwheat IgE-binding bands may correspond to the already known 7S vicilin allergens Coc n 2 and Fag e 3, respectively, suggesting a strong cross-reaction between these two 7S vicilins. The 2 proteins have different molecular weight, but despite that, they mutually immunoblot inhibited themselves; this is not surprising because highly conserved IgE-binding epitopes are present in vicilins of different molecular weight.¹⁰

Considering the high prevalence of buckwheat allergy in Asia and the evidence of an increase in buckwheat sensitization in Europe,⁵ where this allergenic source seems to be particularly relevant as a hidden allergen,^{2–5} this newly recognized cross-reaction with a more commonly eaten food as coconut should reinforce the recommendation, already mentioned in previous report,^{4,5} to health authorities to consider including buckwheat in the list of required allergens to be declared on food products. Further studies, including more studies of buckwheat allergic patients, are necessary to elucidate the possible cross-reactivity between buckwheat and other 7S vicilin-containing foods.

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