

Anaphylaxis to beans

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The leguminoaceae family includes many genera: *Arachis* (peanuts), *Glycine max* (soybeans), *Pisum* (peas), *Cicer* (garbanzo beans or chick peas), and *Phaseolus* (kidney, garden, lima, butter, snap, sugar, string, navy, pinto, and white beans). Although reactions to peanuts and soybeans are common, reactions to beans have rarely been reported.^{1,2} We report a case of anaphylaxis resulting from the ingestion of beans (*Phaseolus*) in homemade chili.

CASE REPORT

A 33-year-old woman was evaluated for tongue swelling and burning and mouth itching occurring minutes after eating baked beans. She had no history of food reactions. Her oropharyngeal symptoms resolved without treatment. Subsequently she ingested split pea soup and experienced mouth tingling and pharyngeal pruritus within 15 minutes. These symptoms occurred at a later date after ingestion of pea soup. Weeks later she ate a bean burrito and developed mouth and lip tingling and throat pruritus within 15 minutes. She ate another burrito days later with recurrence of symptoms. Each time her symptoms remitted spontaneously.

Weeks later, 20 minutes after eating homemade chili made with kidney and hot chili beans (pinto beans), she experienced pharyngeal pruritus, lip burning, chest tightness, wheezing, generalized erythema followed by urticaria, light-headedness, abdominal cramping, and a feeling of impending doom. Treatment with epinephrine, albuterol, and intravenous diphenhydramine resolved her symptoms.

She had a past history of urticaria from penicillin and mild asthma. Her mother had throat tightness and palatal itching after eating fresh fruit, and her brother had hives, dyspnea, and oral pruritus after eating pizza.

Given the risk of anaphylaxis, we did not perform a bean challenge test.

METHODS

Skin prick tests were performed with commercial extracts and liquids aspirated from canned kidney beans, chili beans, and split pea soup diluted 1:10 with glycerinated saline. Positive and negative controls were performed. Specific IgE was measured by commercial RAST and in-house ELISA with standard protocols.³

Fresh and canned beans were extracted with phosphate-buffered saline and centrifuged, and the supernatant protein was profile evaluated by means of sodium dodecylsulfate-polyacrylamide gel electrophoresis. Proteins from the gels were transferred to nitrocellulose membranes, and the reactivity of the patient's sera and control sera from atopic and nonatopic individuals were evaluated for specific IgE.³ A competitive inhibition ELISA with glucose and mannose was performed to determine if the immunoblot reactivity detected was the result of lectins binding to IgE rather than IgE binding to bean proteins.

RESULTS

Skin test responses to commercial extracts were positive to red kidney and white beans. Responses to peas, string beans, and lima beans were negative. Crude food extract skin test responses were positive to pea soup and kidney beans. Total IgE was 199 IU/ml (range, 50 to 150 IU/ml). RAST results were positive for red kidney, white, and pinto beans and chick, garden, and black-eyed peas. ELISA results were strongly positive for extracts of canned kidney beans, chili beans, and pea soup and fresh chick peas, black-eyed peas, and kidney beans.

Sodium dodecylsulfate-polyacrylamide gel electrophoresis showed multiple bands in the various bean extracts (Fig. 1, A). Proteins from several bean extracts reacted with patient IgE in Western Blots with bands ranging from 18 to 68 kd and similarities among extracts particularly at 60 to 68 kd (Fig. 1, B). Control sera failed to show reactivity. None of the bands reacting with patient IgE showed Concanavalin A binding. ELISA inhibition indicated similar reactivity with partial or complete dose-dependent inhibition with the extracts. Preincubation with lectins did not inhibit binding.

DISCUSSION

Beans are the staple food in many countries, yet adverse reactions are rare. Only three cases of anaphylaxis to pinto, garbanzo, and white beans have been reported.^{1,2} Reactions to chili and burritos have been described,⁴ but the responsible allergen has not been identified. This report demonstrates IgE sensitivity to *Phaseolus* beans in a patient with food-induced anaphylaxis and oropharyngeal symptoms to a related legume, the pea.

Bean allergens have not been well characterized. The albumin fraction of green pea and dried bean extracts may be a major antigenic determinant.¹ Despite biologic and antigenic similarities, clinically important cross-reactivity is unusual.⁵ Oral allergic symptoms from peas probably represent cross-reactivity.

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J Allergy Clin Immunol 1998;101:556-7.

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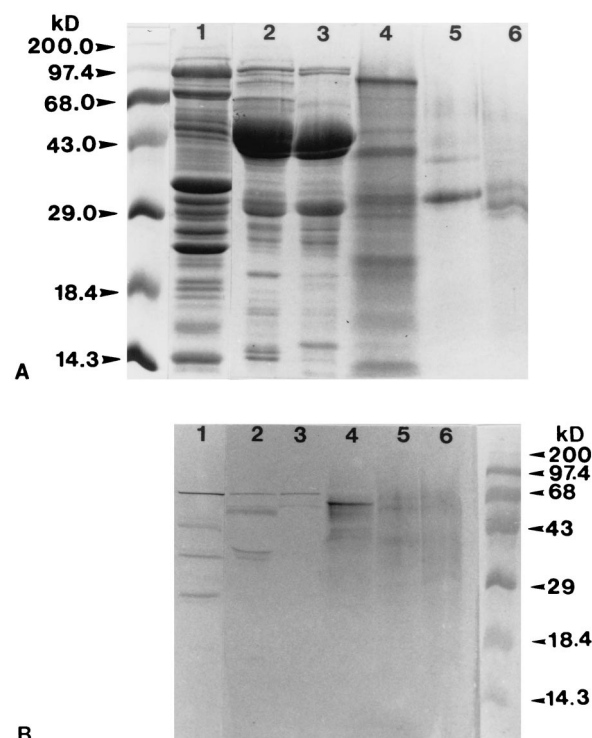


FIG. 1. A, Sodium dodecylsulfate-polyacrylamide gel electrophoresis with Coomassie blue staining demonstrating protein profile of various bean extracts. *Lane 1*, Chick pea; *lane 2*, black-eyed peas; *lane 3*, red kidney bean; *lane 4*, pea; *lane 5*, canned kidney bean; *lane 6*, canned chili bean. Note similarities of protein migration among the various extracts. **B,** Immunoblot demonstrating serum-specific IgE against bean proteins. Lanes are identified as in **A**. Note IgE reactivities with multiple proteins ranging from 18 to 68 kd.

The disparity between skin and RAST test results may be related to the specific antigen available during preparation. Immature pods marketed as fresh or frozen may lack significant storage protein (albumin) compared with ripe, mature, dried seeds (navy or white beans). Thus time and method of processing may explain the differing results between string beans (immature) and mature beans. Electrophoresis revealed multiple protein bands with similarities among the bean varieties. It is significant that even after processing, specific allergen was present.

Physicians should be aware of beans as a cause of food anaphylaxis.

We thank Mary Lasley, MD, for her helpful suggestions and Nancy Elms for skilled technical assistance.

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