

Buckwheat allergy

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ABSTRACT

Buckwheat, which has been abundantly consumed in Asian countries and has been increasingly popular in the United States, Canada, and Europe, can be a potent allergen when ingested or inhaled. A case is reported of a 36-year-old man who experienced nausea, vomiting, urticaria, a sensation of throat closing, inability to speak, dyspnea, and dizziness shortly after ingesting a large portion of buckwheat that required emergency room treatment. In the previous 2 years he had experienced asthma, contact urticaria, allergic conjunctivitis, and allergic rhinitis from sleeping with a buckwheat pillow. Six months after the first ingestion reaction, the patient again experienced anaphylaxis requiring emergency treatment when he accidentally ate crackers with a small amount of buckwheat. Skin-prick testing showed a strong positive response to buckwheat, and a radioallergosorbent assay test was highly positive to buckwheat. It is possible that inhaled buckwheat provoking asthma sensitized the patient before his two episodes of ingestion anaphylaxis. Buckwheat is a potent allergen that can induce various clinical manifestations in the same individual.

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Buckwheat is being increasingly consumed because the popularity of Asian, kosher, and health foods is rising in the United States. Buckwheat (*Fagopyrum esculentum*) belongs to the Polygonaceae plant family, and its seeds can be used as food with the chaff able to be used as stuffing in pillows. Kasha roasted groats (seeds), a Russian staple, and kasha varnishkes, a traditional eastern European dish, also have been popular with Jewish people from those regions who brought these forms of buckwheat to North America. Milling the kasha groats to fineness can be used in making various foods. Asian soba noodles are made with buckwheat, kasha in the kosher section of mainstream food stores consists of buckwheat, and Kashi brand crackers and cereals in health food stores contain buckwheat. As a food, buckwheat (unrelated to wheat) can be found in noodles, crepes, pancakes, porridge, soups, crackers, cereals, bread, biscuits, black bread, dumplings, cake batter, jelly, health foods (“whole grain products”), and vegiburgers. Buckwheat noodles, jelly, and dumplings are favorite foods in Asian countries and pillows stuffed with chaff also are popular in Asian countries¹ where the incidence of buckwheat allergy is increasing.² Buckwheat can be a highly potent allergen when eaten^{3,4} or inhaled,³ and an anaphylactic death has been reported related to ingestion.⁵ Buckwheat flour has been reported to cause occupational asthma and contact urticaria,⁶ and buckwheat pillows have been reported to cause inhalation asthma.^{7,8}

Two cases of buckwheat ingestion anaphylaxis have been reported in North America, the first a historic case in 1909⁹ and the second in 1992.¹⁰ The first and only case of buckwheat pillow-induced inhalation asthma and allergic rhinitis in North America was reported in 2003.⁸ The case in this report is notable because the same person had anaphylaxis on two occasions from ingesting buckwheat; had inhalation asthma from sleeping with a buckwheat pillow; and also had urticaria, allergic conjunctivitis, and allergic rhinitis caused by contact with a buckwheat pillow. This appears to be the first report in North America of buckwheat-induced inhalation asthma and ingestion anaphylaxis in the same individual.

CASE REPORT

A 36-year-old man, while eating at a buffet business lunch, noted that his lips tingled and swelled and his throat felt tight, “as if something were caught in it.” Within a half hour he became nauseated and soon thereafter vomited and developed a pruritic, generalized skin eruption involving the extremities, torso, groin, face, and scalp. The groin, armpits, and ears were highly pruritic, the eyelids and lips were swollen, the throat felt closed, he lost the ability to speak, and was dizzy and dyspneic. He was driven to a hospital emergency room where stridor and swelling of the uvula and pharynx were observed, and the hospital record indicates that oxygen saturation dropped to the “low 80s.” He was placed on high flow oxygen with a breathing mask, and intubation equipment was made ready. Treatment with i.v. fluids, Solu-Medrol, 125 mg i.v.; epinephrine, 0.3 mL subcutaneously times three; and Benadryl, 50 mg, successfully reversed the clinical picture, and after 5 hours he was deemed stable and was discharged.

The only food at the buffet luncheon that he had never eaten before was a generous helping of buck-

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wheat soba noodles. Two years before this episode the patient purchased a buckwheat pillow that was touted on television as being "healthy" because it conformed to the shape of a head lying on it. The patient, who worked 60 hours/week on the night shift as a manager for a large company, slept during the day and used the buckwheat pillow to cover his face to shield the light. For the 2 years that he was exposed to the pillow he had asthma that was worse in the spring and fall months and worse when in contact with the pillow. The primary care doctor made a diagnosis of "seasonal asthma" and prescribed albuterol and Singulair (Merck & Co., Whitehouse Station, NJ) the patient required albuterol for his asthma six to seven times per week. After the buckwheat anaphylactic episode and talking to the chef who cooked the buffet luncheon, the patient suspected buckwheat and got rid of his buckwheat pillow. The asthma and need for albuterol immediately stopped and has not returned in the subsequent year since then. During the 2 years he slept with a buckwheat pillow on his face he had daily pruritic urticaria on the face when in bed. He also had a conjunctivitis with severe eye itching that would awaken him and mild nasal symptoms of sneezing and postnasal discharge. The skin, eye, and nasal symptoms completely abated as soon as the buckwheat pillow was discarded.

Six months after the anaphylactic reaction to eating soba noodles, the patient ate about 12 Kashi crackers, and within an hour he became nauseated. The next morning he ate six more Kashi crackers, and within a half hour he became nauseated, had pruritic urticaria under his armpits and down the sides of his chest, his lips swelled, he had the sensation of his throat closing, and he became mildly dyspneic. He then, for the first time, checked the ingredients and discovered that one of the "seven grains" in the Kashi crackers was buckwheat. He immediately went to the hospital emergency room, was treated with i.v. fluid, subcutaneous epinephrine, and cortisone, and was discharged as stable after 2 hours.

The patient has a history of mild spring and fall hay fever and three episodes of temporary buccal itching and swelling while eating candy bars with coconut. He has a history of three nasal operations for nasal polyps and a deviated septum; the last surgery performed 1 year before the first anaphylactic episode resulted in good relief of his nasal congestion. He also has had a history of insulin-dependent diabetes, and his medications include daily insulin, metformin, Actos (Takeda Pharmaceuticals North America, Inc., Lincolnshire, IL), and Amaryl (Hoechst-Roussel, Bridgewater, NJ).

On examination 3 days after the first anaphylactic episode, the patient was an engaging man in no distress with a pulse of 76, blood pressure of 130/80, height of 6 ft 1 in., and weight of 185 lb. Fiberoptic rhinoscopy revealed a small nonobstructing nasal polyp adjacent to the middle turbinate in the left nares.

The remainder of the examination including the eyes, mouth, lungs, and skin was unremarkable. Pulmonary functioning testing on that date revealed a forced vital capacity at 84% of predicted and a forced expiratory volume in 1 second at 88% of predicted, which was reversed 11% with a bronchodilator.

METHODS

Allergy percutaneous skin testing was performed with buckwheat diluted 1/100 from the commercial testing reagent, a 1:10 (w/v) concentration from ALK Abello Laboratories (Round Rock, TX). Radioallergen sorbent assay (RAST) testing was performed by Quest Diagnostics (Teterboro, NJ) using the Pharmacia ImmunoCAP system measured in kilounits per liter with a scale of specific IgE levels using the following interpretations: <0.35 kU/L, antibody absent; 0.35–0.70 kU/L, antibody level low; 0.71–3.50 kU/L, antibody level moderate; 3.51–17.5 kU/L, antibody level high; and >17.5 kU/L, antibody level very high. In addition, Quest Diagnostics reported results with a modified RAST scale, allergen-specific modified (ASM) percentage of reference with the following interpretations: <70, no specific antibody detected; 70–109, very low positive; 110–219, low positive; 220–599, moderate positive; 600–1999, high positive; 2000–5999, very high positive; and >5999, extremely high positive.

RESULTS

Allergy percutaneous skin testing with buckwheat using a 1/100 dilution of a commercial testing reagent revealed immediate strong positivity with a 10 × 10 mm wheal and 15 × 13 mm erythematous flare. The patient's positive RAST tests 3 days after his first anaphylactic reaction were buckwheat, >100 kU/L, 5166 ASM; coconut, 5.76 kU/L, 1056 ASM; banana, 0.87 kU/L, 185 ASM; broccoli, 0.45 kU/L, 118 ASM; celery, 0.37 kU/L, 103 ASM; hazelnut, 2.18 kU/L, 305 ASM; onion, 0.43 kU/L, 113 ASM; pecan nut, 0.95 kU/L, 188 ASM; sesame seed, 0.95 kU/L, 199 ASM; and walnut, 1.43 kU/L, 242 ASM. The negative (within range) RAST tests were to apple, barley, beef, β -lactoglobulin, yeast, carrot, casein, chocolate, cheddar cheese, chicken, clam, egg white, egg yolk, lamb, lettuce, milk, mustard, oat, parsley, peanuts, potato, rye, salmon, shrimp, soybean, strawberry, tomato, wheat, and white bean. In a 1 year follow-up, positive RAST test results were buckwheat, 35.7 kU/L, 3576 ASM; coconut, 1.84 kU/L, 398 ASM; sesame seed, 0.54 kU/L, 122 ASM; macadamia nut, 0.95 kU/L, IgE class 2 (moderate level with class scale 0–6); and RAST tests were negative to almond, banana, brazil nut, celery, hazelnut, kiwi fruit, onion, peanut, pecan nut, soybean, and walnut. The total IgE was 182 kU/L with a normal reference range of $\leq$ 114 kU/L.

DISCUSSION

Food allergy is being increasingly recognized, and the growing popularity and exposure in the Western world to buckwheat, which can evoke strong allergic reactions, poses a potential problem. A case is reported that presents many manifestations of buckwheat allergy. The patient had exposure for 2 years to a buckwheat pillow that he slept with on his face, and in those 2 years had virtually daily inhalation asthma, contact urticaria, allergic conjunctivitis, and allergic rhinitis. After 2 years of the pillow exposure, he ingested a generous portion of buckwheat soba noodles and had a severe anaphylactic reaction requiring hospital emergency treatment. The percutaneous skin test and RAST test were highly positive to buckwheat, and a diagnosis of buckwheat allergy was made. Six months later, the patient accidentally ingested a small amount of buckwheat (Kashi crackers) and sustained another anaphylactic reaction requiring emergency hospital treatment.

The patient experienced, 6 months apart, two episodes of anaphylaxis after ingesting buckwheat that required emergency hospital treatment. The degree of anaphylaxis was different, possibly because in the first instance he had a large portion of buckwheat as soba noodles and the second time he had less buckwheat in eating a few Kashi crackers. However, the two anaphylactic reactions had clinically similar manifestations, which is in accordance with the findings of Sicherer *et al.*¹¹

Although prior buckwheat ingestion by the patient could have been a source of sensitization that he was not aware of, it is more likely that he was sensitized by the buckwheat pillow before having an anaphylactic reaction to eating buckwheat. It has been reported that sensitization by inhalation can precede food anaphylaxis with buckwheat,^{6,10,12} millet,¹³ and psyllium.^{14,15} However, ingestion allergy does not necessarily follow inhalation allergy; baker's asthma is quite prevalent,¹⁶ but it appears that only one ingestion reaction of asthma¹⁷ and no ingestion anaphylaxis has been reported in Medline 1950–2004 in those who developed baker's asthma.

Probably, the patient's buckwheat RAST value was higher 3 days after the anaphylactic reaction, contrasted to a year later, because just before the reaction he had eaten a large amount of buckwheat soba noodles causing the IgE level to rise. The reason that six food allergens (banana, hazelnut, onion, pecan nut, celery, and walnut) had a positive RAST 3 days after the buckwheat anaphylactic reaction and reverted to a negative RAST 1 year later needs further study. Buckwheat has been reported to be cross-reactive with potato, grass pollen,¹ latex,¹⁸ and rice.¹⁹

In summary, a case is reported of a 36-year-old mildly atopic man who had two separate anaphylactic reactions to ingesting buckwheat after 2 years of aller-

gic reactions to a buckwheat pillow including asthma, urticaria, conjunctivitis, and rhinitis. This particular case shows that buckwheat can be a potent allergen with various clinical manifestations in susceptible individuals.

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