

Anaphylactic reaction to young garlic

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Background: Garlic is well known to cause contact dermatitis and asthma. However, it is a very rare cause of food allergy. We present the case of a 23-year-old woman with previous history of allergy to pollen and dried fruit, and food-dependent, exercise-induced anaphylaxis for which no specific food could be identified as responsible, who experienced an anaphylactic reaction after eating young garlic.

Methods: Skin prick tests and specific IgE immunoassay with several pollens and foods were performed, as well as the prick-prick test with young garlic and SDS-PAGE followed by immunoblotting IgE to young garlic and other Liliaceae species, mustard, sesame, parsley, celery, hazelnut, almond, and pollen of birch and mugwort.

Results: Skin prick tests and specific IgE were mainly positive for grass, plane tree, and mugwort pollen; peanut; hazelnut; walnut; almond; and mustard. Prick-prick tests with young garlic and garlic were positive. Total IgE was 113 U/ml. SDS-PAGE immunoblotting showed IgE-binding bands at 12 kDa to young garlic, garlic, onion, and leek extracts. Similar bands could also be detected with mugwort pollen and hazelnut extract.

Conclusions: We describe IgE-mediated reaction to young garlic in a patient sensitized to pollen and dried fruit.

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Young garlic is the unripe garlic plant whose bulb is not completely developed. Garlic belongs to the Liliaceae family, like onion, leek, and asparagus. Hypersensitivity to garlic has been described as a cause of contact dermatitis (1, 2), rhinoconjunctivitis and asthma (3–5), and urticaria (6). We report a case of anaphylaxis after ingestion of young garlic.

Case report

The patient was a 23-year-old woman with a personal history of allergic rhinoconjunctivitis due to grass and weed pollen. From childhood, she had presented several episodes of urticaria and angioedema after ingestion of seeds and nuts (sunflower seed, peanut, walnut, hazelnut, and almond), and at 19–20 years old, she suffered three episodes of food-dependent, exercise-induced anaphylaxis in which no specific food could be identified. A few minutes after eating young garlic with eggs and shrimp, without previous exercise, she presented generalized urticaria and facial angioedema, followed by a feeling of sickness, hypotension, and loss of consciousness. She was taken to the emergency clinic and treated with intravenous fluids, epinephrine, diphenhydramine, and hydrocortisone. Her symptoms resolved over 24 h.

Subsequently, she tolerated eggs, shrimp, garlic cloves, onion, asparagus, and leek several times. She did not eat young garlic again.

Material and methods

Skin prick tests were done with a battery of commercially available allergens (pollen from grasses, weeds, and trees; dried fruits; mustard; shrimp; *Anisakis*; and latex). Raw and cooked young garlic and garlic clove were prick-prick tested in our patient and also in six atopic and six nonatopic patients. Histamine dihydrochloride 10 mg/ml and physiological saline were used as positive and negative controls, respectively. A positive response was defined as a mean wheal diameter at least 3 mm bigger than that seen with saline after 15 min.

Serum levels of IgE and specific IgE for several pollens, dried fruits, mustard, shellfish, *Anisakis*, and latex were determined according to the instructions of the manufacturer (Pharmacia CAP System FEIA, Pharmacia, Uppsala, Sweden). We did not measure egg-specific IgE because it was well tolerated several times after the anaphylaxis.

We also performed sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE 16%) of different minced parts of young garlic: root, bulb, and stem (fresh and stored 48 h at room temperature) extracted 1:20 (w/v) in phosphate-buffered saline and filtered through Millipore 0.22 µm.

Specific IgE immunoblots with the patient's serum and a control serum (from a nonatopic, healthy young female patient without any reactions to foods) were performed with the following extracts: young garlic, garlic, onion, leek,

mustard, sesame, parsley, celery, hazelnut, almond, and pollen of *Betula* (birch) and *Artemisia* (mugwort). The food extracts were prepared in the same way as that of young garlic, and the pollen extracts were obtained from commercial preparations. After separation by SDS-PAGE in 16% polyacrylamide gel and transfer to nitrocellulose membrane by diffusion, sera from both the patient and the control were added and incubated for 24 h. Subsequently, monoclonal anti-IgE labeled with biotin was added, and finally streptavidin alkaline phosphatase was introduced, followed by the substrate.

For ethical reasons, we did not perform the oral challenge test with young garlic.

Results

We obtained positive results on skin prick tests (Table 1) with pollen of grass, trees (*Platanus*, *Ulmus*), and weeds (*Artemisia*, *Taraxacum*, *Parietaria*, and *Chenopodium*). Results were also positive to almond, hazelnut, peanut, walnut, sunflower seed, mustard, and *Anisakis*. In the prick-prick test, raw young garlic produced a wheal of 23×14 mm. Heated young garlic and garlic clove gave wheals of 8×4 and 10×6 mm, respectively. In the controls, only one atopic patient reacted to raw young garlic.

Total IgE was 113 U/ml. Specific IgE was detected by CAP for pollen from grass, trees, and weeds, and also for dried fruits and mustard.

SDS-PAGE of young garlic extracts showed a number of bands between 60 and 12 kDa in fresh stem, which disappeared in stored stem and were absent from root (Fig. 1).

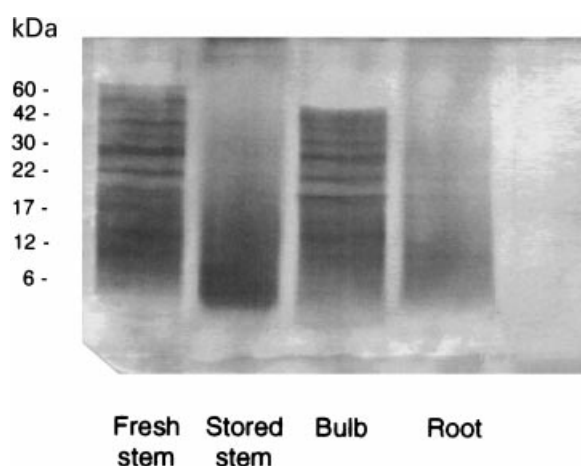


Figure 1. SDS-PAGE 16% of various parts of young garlic plant.

Table 1. Results of skin prick test (expressed in wheal diameter) and specific IgE tested in CAP (expressed in classes)

	Skin prick test (mm)	Specific IgE (CAP)		Skin prick test (mm)	Specific IgE (CAP)
<i>Phleum</i>	18×11	3	Almond	5×4	2
<i>Lolium</i>	25×20	3	Hazelnut	13×8	2
<i>Secale</i>	9×9	3	Peanut	19×15 ps	3
<i>Cynodon</i>	9×7	3	Walnut	6×6	3
<i>Olea</i>	Neg.	2	Sunflower seed	15×12	N.D.
<i>Betula</i>	Neg.	2	Mustard	20×10 ps	2
<i>Platanus</i>	18×8 ps	3	Shrimp	Neg.	<0.35
<i>Ulmus</i>	8×6	3	<i>Anisakis</i>	4×4	<0.35
<i>Artemisia</i>	13×11	4	Latex	Neg.	<0.35
<i>Taraxacum</i>	9×5	4	Raw young garlic*	23×14	N.D.
<i>Parietaria</i>	5×4	3	Cooked young garlic*	8×4	N.D.
<i>Plantago</i>	Neg.	2	Clove of garlic*	10×6	N.D.
<i>Chenopodium</i>	5×5	3	Histamine	9×8	
<i>Rumex</i>	Neg.	2	Saline	Neg.	

Neg: negative (<3 mm). N.D.: not done; *: prick-prick; PS: pseudopodium (shape).

Immunoblotting of the patient's serum with raw young garlic (stem and bulb), garlic, onion, and leek gave bands in all lanes at the same level, which corresponded to a molecular mass of approximately 12 kDa (Fig. 2). Other 12-kDa bands could also be observed with extracts of mugwort pollen and

hazelnut. Furthermore, the serum recognized an intense IgE-binding band of about 22 kDa in mugwort pollen. The control serum recognized bands of high molecular mass in leek, garlic, and hazelnut, but it did not recognize any protein on the same level as those detected by our patient's serum.

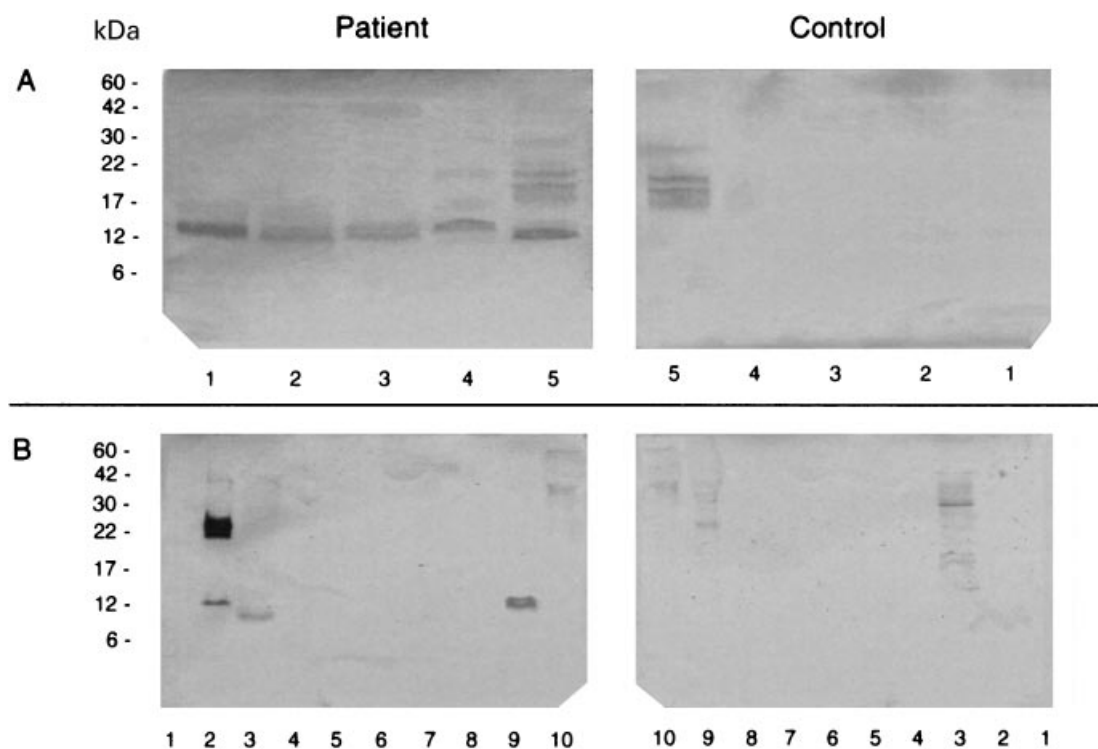


Figure 2. Specific IgE immunoblotting study. (A) Lane 1) young garlic (stem); 2) young garlic (bulb); 3) garlic clove; 4) onion; 5) leek. (B) 1) birch pollen; 2) mugwort pollen; 3) young garlic; 4) PBS; 5) mustard; 6) sesame; 7) parsley; 8) celery; 9) hazelnut; 10) almond.

Discussion

Garlic is one of the commonest causes of contact dermatitis to foods (1, 2). IgE-mediated reactions have also been described, after skin contact (urticaria) and inhalation or ingestion of garlic dust and other Liliaceae species (rhinoconjunctivitis and asthma) (3–8). It was of interest that our patient tolerated garlic clove and other Liliaceae. She also

suffered multiple sensitization to pollen and foods from distantly related plants.

In the immunoblotting study, we found a band of about 12 kDa in young garlic, hazelnut, and mugwort pollen, which perhaps belongs to the same allergenic protein. Unfortunately, we could not perform inhibition studies because of lack of serum.

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