

Falafel burger anaphylaxis due to sesame seed allergy

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With the increasing demand for vegetarian food the consumption of vegetable burgers as an alternative to beef burgers has now become widespread. Since products of this kind are often not provided with a clear description of their components or ingredients, potential allergens generally cannot be identified by the consumer. Their ingestion, however, may lead to severe allergic reactions in sensitized individuals. Here we describe nine systemic allergic reactions to sesame seeds that were diagnosed at the Allergy Unit, Department of Dermatology, Zürich, Switzerland between 1978 and 1991. In 1991 alone, we registered three cases of anaphylactic reaction to falafel vegetable burgers in patients allergic to sesame seeds. A falafel is an oriental speciality consisting of a wheat flour bun filled with chick-pea balls. It is served together with a white sauce containing freshly ground sesame seeds. Our cases highlight the potential danger of vegetarian food and underline the importance of a proper allergologic assessment to recognize food allergy promptly so that the patient can eliminate the causative allergen and use suitable medication in the event of a dietary indiscretion.

INTRODUCTION

Sesame seeds are extremely potent allergens. In sensitized persons they may produce severe allergic reactions with urticaria, Quincke's edema, asthma, and even anaphylactic shock. In 1950 Rubinstein first described a patient with an anaphylactic reaction following ingestion of Turkish honey (halvah), which contains sesame seeds and sesame oil.¹ To our knowledge, more than 20 cases of sesame seed allergies—mostly severe anaphylactic reactions—have been reported since then in the world literature.² The reports included not only reactions following oral intake of sesame seeds but also respiratory symptoms such as asthma and rhinitis followed by urticaria after inhalational exposure to sesame seed dust.³⁻⁸

To assess the allergologic diagnosis a detailed patient's history, prick, intracutaneous, rub, and scratch tests with extracts and with native sesame seeds together with the serologic identification of specific IgE by means of the RAST are required.

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In addition the histamine release test from blood leukocytes and oral or inhalation provocation tests may provide further helpful information.

From 1978 to 1991, nine patients with systemic reactions due to sesame seed hypersensitivity were diagnosed in the Allergy Unit of the Department of Dermatology of the University Hospital of Zürich, Switzerland. In two retrospective studies from 1978 to 1987, five patients (1.2%) among 402 patients with proven food allergy had allergy to sesame seeds.^{9,10} In 1991 alone, three cases with systemic reactions to falafel vegetable burgers that contained sesame seed sauce were observed in patients with diagnosed sesame seed allergy.¹¹

A falafel is an oriental speciality that is widespread in the Near East. It is served with a white sauce containing sesame seed paste (tahin). Raw, uncooked, and unroasted sesame seeds are used for this paste. The increasing number of anaphylactic reactions to this product can probably be ascribed to the increasing popularity and consumption of vegetarian food in general. In the following article we would like to report our observations concerning allergic reactions to falafel vegetable burgers.

PATIENTS AND METHODS

All case histories of patients with the diagnosis of sesame seed allergy and/or falafel burger anaphylaxis seen in the Allergy Unit of the Department of Dermatology of the University Hospital of Zürich, Switzerland were studied. The evaluation comprises cases with suspected allergy to sesame seeds verified by positive allergologic tests (skin tests, RAST, and provocation tests). Since there is no standardized sesame seed extract commercially available in Europe sesame seeds ground into a paste with physiologic NaCl were used for prick and scratch tests. Nonallergic control atopic patients did not react to this crude sesame seed extract. The white sauce (tahin) was also tested in nonallergic atopic control patients and we did not observe an irritant effect on the skin with prick and scratch tests. Specific IgE to sesame seeds were determined by means of Phadebas RAST (Pharmacia, Uppsala, Sweden) according to the instructions of the producer. The results were expressed as RAST classes or PRU/mL (Phadebas RAST units).

Table 1 reviews the patients' characteristics and relevant findings. In the following we describe four cases

Table 1. Patients' Characteristics*

Patient	Sex	Age, yr	Atopy	Skin Test to Sesame	RAST Class to Sesame, PRU/mL	Symptoms
1	F	20	A	SCR. ++++	n.d.	Q,V,A,CO
2	F	25	NO	SCR. +	n.d.	RC,Q,A,V
3	F	44	NO	SCR. +++	4 (>17.5)	A,N
4	F	38	RCP	Prick, SCR. ++++	n.d.	Q
5	F	24	RCP	Prick negative	3 (7.02)	A,N,V,D
6	M	27	RCP	Prick +	0	OCU,N,DY,A,UR
7	F	23	NO	Prick, SCR. ++++	3 (8.5)	OCU,A,Q,UR,N,DI,C
8	M	37	RCP	SCR. ++++	3 (7.85)	F,AO,Q,DY,A,D
9	F	21	Latent	Negative	3 (14.5)	OCU,N

* A: asthma; RCP: rhinoconjunctivitis pollinosa; Latent: positive prick tests without clinical symptoms; SCR: scratch; nd: not done; Q: Quincke's edema; V: vomiting; CO: collapse; RC: rhinoconjunctivitis; N: nausea; D: dizziness; OCU: oral contact urticaria; DY: dysphagia; UR: urticaria; DI: diarrhea; C: chills; F: flush; AO: angioedema.

with allergic reactions to falafel burgers.

CASE HISTORIES

Case 1

A 23-year-old woman (patient 7) was admitted as an emergency to the hospital on May 8, 1991 after eating for the first time a falafel burger consisting of a wheat flour bun filled with chick-pea balls, white and red sauce. Immediately following the first bite she experienced a sensation of burning in her mouth followed by pharyngeal edema, severe dyspnea, Quincke's edema, generalized urticaria, nausea, diarrhea, and chills. The patient was treated with intravenous steroids and antihistamines and discharged after observation for several hours. She had no personal history of allergic diseases.

Routine prick and intracutaneous skin tests were negative for a representative panel of common inhalant and food allergens; however, a scratch test to the white sauce gave a strongly positive result (negative in nonallergic atopic control patients). According to the producer, the white sauce contained mainly sesame seed paste (tahin). Prick and scratch tests carried out with sesame seeds ground into a paste were strongly positive. Serologically specific IgE class 3 (8.5 PRU/mL) to sesame were identified.

The anaphylactic reaction after

ingestion of a falafel burger can be explained by sensitization to sesame seeds. Further investigation disclosed that this sensitization had probably been caused by a commercially available spice mixture containing sesame seeds. The patient had previously developed rhinitis and itching eyes when using this spice mixture in cooking. A prick test to this spice mixture gave a strongly positive wheal and flare reaction.

Case 2

This 37-year-old patient (patient 8 Table 1) ate a falafel burger for the first time on June 19, 1991. Approximately five minutes later he experienced flushing, swelling of the face, Quincke's edema, dysphagia, dyspnea, and drowsiness. He was treated in the outpatient unit of the Department of Dermatology of the University Hospital of Zürich, Switzerland as an emergency with 250 mg prednisolone and 2 mg clemastine, intravenously. Since his youth the patient had suffered from mild allergic rhinoconjunctivitis with immediate type sensitization to house dust mites and pollen of early and late flowering plants.

A scratch test to the white sauce containing sesame seeds (tahin) was strongly positive. Serologically specific IgE RAST class 3 (7.85 PRU/mL) to sesame could be identified.

The anaphylactic reaction after ingestion of a falafel burger can be

explained by the sensitization to sesame seeds. Further investigation revealed that the sensitization had probably been caused by a sesame seed-containing flour used for salad dressings.

Case 3

This 21-year-old woman (patient 9 in Table 1) ate a falafel burger for the first time at the beginning of October 1991. Immediately following the first bite she developed itching in the mouth and nausea. In September 1991 the patient had once before reacted with oral itching, generalized urticaria, Quincke's edema, and dyspnea after eating pastry containing peanut butter.

The skin tests gave positive reactions to peas and peanuts. Serologically specific IgE of RAST class 3 (14.5 PRU/mL) to sesame and RAST class 6 (>100 units/mL) to peanuts were demonstrated.

The allergic reaction to the falafel burger was most likely caused by sensitization not only to sesame seeds but also to legumes (eg, chick pea mass in the falafel burger).

Case 4

This 34-year-old woman (patient 1 in Table 1) suffered from an anaphylactic reaction to sesame seeds (Quincke's edema, vomiting, collapse) for the first time at the age of 15 years (1978). Since then anaphylactic reactions after ingestion of sesame-containing foods, pitta bread, and falafel burgers were repeatedly observed in Israel.

Scratch tests to white, sesame seed-containing sauce (pitta filling, tahin) and to ground sesame seeds were strongly positive.

The anaphylactic reaction after ingestion of a falafel burger can be explained by sensitization to sesame seeds.

DISCUSSION

The cases of systemic reaction to sesame seeds described above demonstrate the potential hazards of a vegetarian diet in allergic persons and point out the importance of a detailed allergologic examination.

Table 2. Food and Substances that May Contain Sesame Seed Allergens

Oriental Specialities	Ready Made Foods	Sesame Oil	Other
Halvah (Turkish honey)	Salad dressings, stuffings, diet foods, substitutes for nuts and almonds, bread crumbs, hamburger, vegetarian burger	Margarine	Sesame-containing breads, biscuits, crackers, diet breads, potato chips, puff pastries
Tahin (sesame paste)		Cosmetics	
Humus (chick-pea sauce, tahin and garlic)		Local and parenteral therapeutics	

Sesame as a genus (Pedalaceae) includes 18 species, most of which are indigenous to Africa and Asia. Economically *Sesam indicum* is the most important; a perennial, herbaceous plant up to 1 meter in height having bluish-white or pink flowers. The cultivation of sesame is traceable as far back as 2350 BC in Babylon. According to Herodotus the Babylonians preferred sesame oil to all other oils. From there, sesame reached Japan via China very early. Since the end of the 17th century sesame has been cultivated in the US and Venezuela. In recent years the annual worldwide production of sesame has amounted to around 2 million tons. The seeds contain about 50% to 60% oil, which is used in the pharmaceutical industry as a carrier substance for medications for intramuscular injection since it is stable, neutral, inert, nonirritant, not too viscous and heat-resistant. Sesame oil is also used in cosmetics and in rare cases it can cause allergic contact eczema.¹²

Since only a few anaphylactic reactions to heat-extracted sesame oil have so far been described,⁸ it has been suggested that the relevant allergenic components in sesame seeds are sensitive to heat. In 1981 Malish et al described nine allergens in sesame seeds with a molecular weight between 8000 and 62000

Daltons by means of crossed immunoelectrophoresis.¹³

In patients allergic to sesame seeds an early diagnosis with a proper allergologic assessment is of utmost importance, since the allergen can easily be avoided in food (Table 2). In addition the patient should be supplied with the necessary emergency medications (adrenalin metered aerosol or epinephrine for subcutaneous administration), 100 mg prednisone, and 20 mg cetirizine, a quick acting antihistamine.¹⁴

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