

Case report

Occupational asthma due to different spices

Sastre J, Olmo M, Novalvos A, Ibañez D, Lahoz C. Occupational asthma due to different spices.

Allergy 1996; 51: 117–120. © Munksgaard 1996.

We describe a 27-year-old subject who developed rhinitis and asthma symptoms 1 year after starting to prepare a certain kind of sausage. He was previously diagnosed as having allergy to coconut, banana, and kiwi and allergic rhinitis to horse, cat, dog, and cow. A positive immediate skin prick test (SPT) for paprika (dry powder of *Capsicum annuum* [Solanaceae]), coriander (*Coriandrum sativum* [umbelliferous]), and mace (shell of nutmeg, *Myristica fragrans* [Myristicaceae]) at a concentration of 10% (w/v) was obtained. SPT with other sausage ingredients, mites, pollens, and molds were negative. By ELISA, specific IgE antibodies to paprika, coriander, and mace were demonstrated. By ELISA-inhibition assays, a partial cross-reactivity was found among IgE-binding components from paprika and mace. The immunoblot analysis showed two IgE-reactive protein bands able to bind to IgE from mace of 20 and 40 kDa and two other bands from coriander extract of 50 and 56 kDa. No bands were detected from paprika extract. Specific bronchial inhalation challenges showed an immediate asthmatic reaction to extracts from paprika, coriander, and mace with a maximum fall in FEV₁ of 26%, 40%, and 31%, respectively, with no late asthmatic reactions. In summary, we demonstrate that inhalation of dust from paprika, coriander, and mace can result in an IgE-mediated reaction to these spices. In this patient, occupational asthma was due to spices from botanically unrelated species.

J. Sastre, M. Olmo, A. Novalvos, D. Ibañez¹, C. Lahoz

Servicios de Alergia e Inmunología, Fundación Jiménez Díaz, Madrid; ¹Allergy Section, Hospital Niño Jesús, Madrid, Spain

Key words: coriander; mace; occupational asthma; paprika; spices.

Joaquín Sastre
Servicio de Alergia
Fundación Jiménez Díaz
Av. Reyes Católicos 2
28040 Madrid
Spain

Accepted for publication 13 October 1995

Organic dust such as that of wheat flour, castor bean, green coffee bean, acacia gum, or garlic is a well-known elicitor of occupational asthma (1); however, few cases due to spices have been described (2, 3–5).

We report the clinical, immunologic, immunochemical, and bronchial challenge analysis of an atopic patient who had an immediate-type asthmatic reaction after inhaling material from three different botanically unrelated spices, paprika (dry powder of *Capsicum annuum* [Solanaceae]), coriander (*Coriandrum sativum* [umbelliferous]), and mace (shell of nutmeg, *Myristica fragrans* [Myristicaceae]).

Case report

The patient was a 27-year-old male butcher who 1 year before had developed rhinitis and asthma symptoms, which were aggravated on days when he prepared a certain type of sausage. The subject was previously diagnosed as having allergy to coconut,

banana, and kiwi because he had experienced several episodes of generalized urticaria after eating these fruits. He was also diagnosed as having allergic rhinitis to horse, cat, dog, and cow. He presented rhinitis when he came into contact with these animals, but never cough or asthma symptoms. He worked in his own butcher's shop dispensing several kinds of raw meat and making sausages. To make sausages, he mixed together pork, salt, sweet paprika, green pepper, coriander, mace, dried garlic, potassium sorbate, cornstarch, sugar, sodium citrate, sodium ascorbate, sodium sulfate, red erithrosine, red cochineal, and orange-yellow colorant. He could eat fried sausages, raw paprika, and other foods, except banana, kiwi, and coconut, without any clinical symptom.

Material and methods and Results

Skin prick tests

All sausage ingredients, except pork, were obtained from the company which supplied materials to the

Table 1. Skin tests and specific IgE results

Allergen	Wheal (mm)	Specific IgE (kU/ml)*IgE
Danders		
Dog	12	0.9
Cat	12	12.1
Goat	8	<0.35
Cow	7	ND
Horse	21	7.3
Foods		
Horse meat	8	ND
† Kiwi	10	18
† Coconut	15	3.23
† Banana	10	5.38
Solanaceae		
Paprika	28	1.36
† Tomato	—	3.25
† Potato	—	47.2
† Bell pepper	—	ND
† Eggplant	—	0.54
Umbelliferous		
Coriander	15	see Table 2
Cumin	18	ND
Fennel	10	ND
Parsley	—	ND
Aniseed	—	ND
† Celery	—	ND
† Carrot	—	ND
Myristicaceae		
Mace	20	see Table 2
Histamine HCL (10 mg/ml)	7	
Glycerosaline	—	

ND = not done.

(—) = negative.

* = Pharmacia CAP system, positive > 0.35 kU/l.

† = prick by prick with fresh food.

patient. Extracts from all sausage ingredients were prepared in phosphate-buffered saline (PBS) at 10% w/v. In the case of foods, a prick by prick test with fresh food was done if a negative result was obtained with the commercial extract.

Table 1 shows prick test results. Prick tests with mites, molds, and tree, grass, and weed pollens, including mugwort, were negative. No response was obtained from any sausage ingredient extract when 10 atopic control patients were skin tested.

Protein content

Extracts from paprika, coriander, and mace contained 1.65, 0.26, and 0.22 mg/ml of protein, respectively (protein content was measured by the BIO-RAD method (Munich, Germany)).

Total and specific IgE

Total IgE was 243 kU/l (Pharmacia CAP-FEIA System). Specific IgE (Pharmacia CAP system or Phadezym Pharmacia, Uppsala, Sweden) results are presented in Tables 1 and 2.

Table 2. Specific IgE by ELISA

	Patient	Controls**
Paprika	0.702	0.091 ± 0.0056
Coriander	2.062	0.080 ± 0.0047
Mace	2.250	0.098 ± 0.0072
Garlic	0.058	0.033 ± 0.0061

(*) expressed as optical density (OD).

(**) mean ± SD of OD of five control sera.

ELISA inhibition analysis

For the liquid phase of ELISA inhibition, 2–150 µg of each antigen was used (6).

ELISA inhibition analyses are illustrated in Fig. 1. These graphs show partial cross-reactivity between paprika and mace extracts.

SDS-PAGE electrophoresis and immunoblot analysis

SDS-PAGE was performed and different protein bands were detected from paprika, coriander, and mace extracts (4) (Fig. 2). The immunoblot analysis showed two IgE-reactive protein bands able to bind to IgE from mace of 20 and 40 kDa, and another two of 50 and 56 kDa from coriander extract. No bands were detected from paprika extract (Fig. 3).

Inhalation challenges

Methacholine and specific bronchial challenge tests were done by a method modified from that of Cockcroft et al. (7). The patient had a methacholine PC₂₀ of 1.2 mg/ml. Specific bronchial inhalation challenges showed an immediate asthmatic reaction to extracts from paprika, coriander, and mace, with maximum falls in FEV₁ of 26%, 40%, and 31%, respectively, with no late asthmatic reactions. These reactions were elicited at a 1:50 concentration of paprika and coriander extracts and at 1:1 for mace extract (Fig. 4).

Discussion

Spices are minor components of food and may be easily overlooked in histories of food allergy or occupational asthma. In previous reports of allergic reaction to spices, patients had IgE against other food allergens (3–5), as did our patient. Although he had specific IgE against different foods, he currently presented allergic symptoms only to banana, coconut, and kiwi (8). As in other cases of food-induced asthma, he presented oral tolerance to these foods (9). This suggests that the IgE

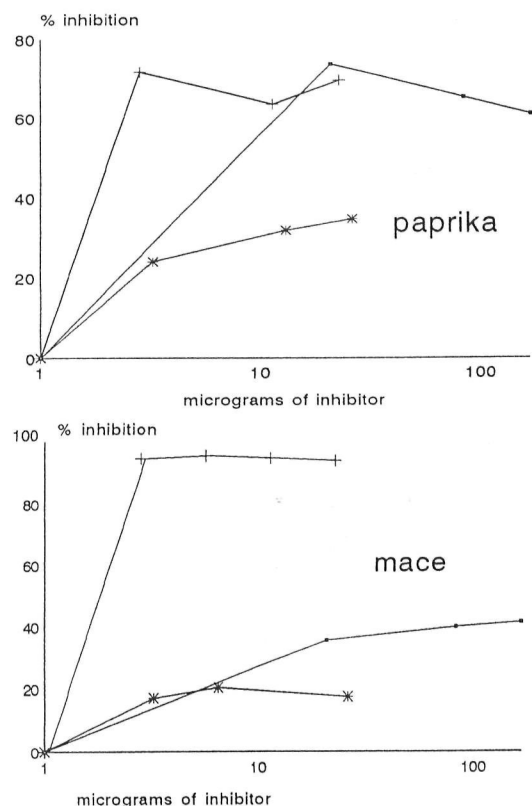
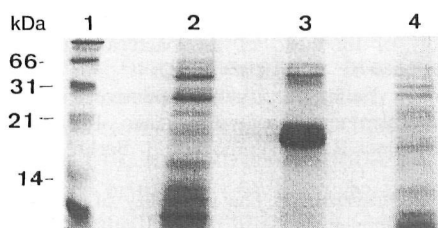


Fig. 1. ELISA inhibition.



SDS - PAGE

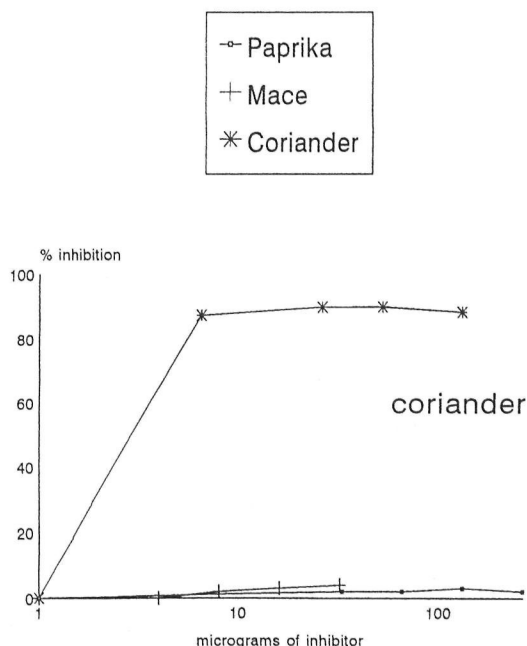
Fig. 2. SDS-PAGE profile. Gel was stained with Coomassie brilliant blue. 1) Molecular markers: BSA (66 kDa), egg albumin (44 kDa), trypsinogen (21 kDa), and lysozyme (14 kDa); 2) coriander; 3) mace; 4) paprika.

response to inhaled food allergens might differ from the IgE response to allergens of ingested food.

A previous report described cross-reactivity between mugwort pollen and coriander (6); however, our patient was not sensitized to this pollen. Partial cross-reactivity between paprika and mace was found, although they belong to different botanical families, Solanaceae and Myristicaceae, respectively.

ELISA results confirm the presence of an IgE-mediated hypersensitivity to these spices. Immunoblot assays provide evidence that the patient's serum recognized different IgE-binding

ELISA IgE-INHIBITION



IgE - Immunoblot

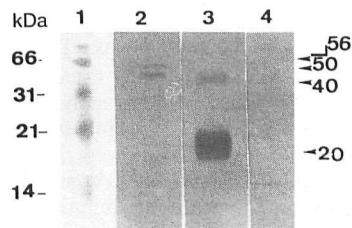


Fig. 3. Immunoblot analysis of antigens. 1) Molecular markers: BSA (66 kDa), egg albumin (44 kDa), trypsinogen (21 kDa), and lysozyme (14 kDa); 2) coriander; 3) mace; 4) paprika. Two IgE-binding bands of 50 and 56 kDa from coriander extract and two bands of 45 and 20 kDa from mace extract were detected.

proteins from coriander (10) and mace. Therefore, the allergenicity of these spices originates, at least in part, from the protein-containing components. We did not detect any IgE-binding band from paprika extract, perhaps because of the low level of specific IgE in the patient's serum, as demonstrated by ELISA.

In summary, we describe a case of occupational asthma to paprika, mace, and coriander, three spices from botanically unrelated species, with evidence of an IgE-mediated mechanism.

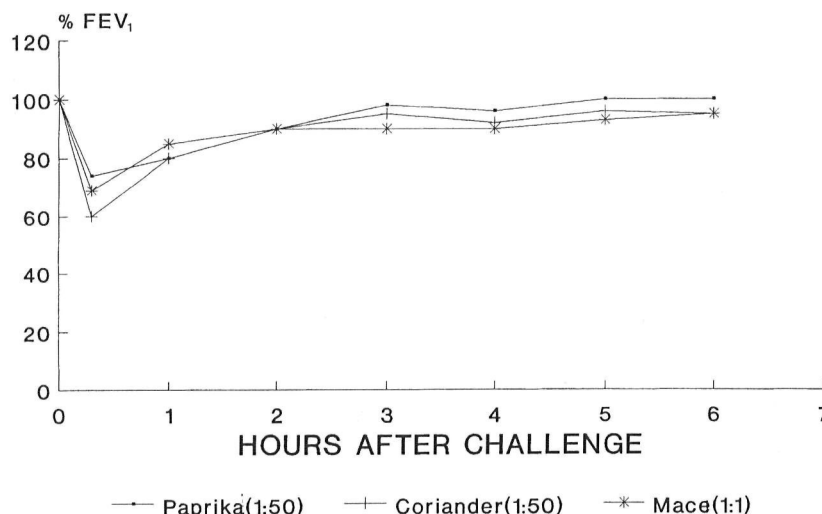


Fig. 4. Bronchial challenge test with extracts of paprika at 1:50, coriander at 1:50, and mace at 1:1.

References

1. Chang-Yeung M, Malo JL. Table of the major inducers of occupational asthma. In: Bernstein IL, Chan-Yeung M, Malo JL, Bernstein D, editors. *Asthma in the workplace*. New York: Marcel Dekker, 1993:559-624.
2. Suhonen R, Keskinen H, Björkstén F, Vaheri E, Zitting A. Allergy to coriander. A case report. *Allergy* 1979;34:327-30.
3. Toorenenbergen AW, Dieges PH. Immunoglobulin E against coriander and other spices. *J Allergy Clin Immunol* 1985;76:477-81.
4. Toorenenbergen AW, Dieges PH. Demonstration of spice-specific IgE in patients with suspected food allergies. *J Allergy Clin Immunol* 1987;79:108-13.
5. Toorenenbergen AW, Dieges PH. Occupational allergy in horticulture: demonstration of immediate-type allergic reactivity to freesia and paprika plants. *Int Arch Allergy Appl Immunol* 1984;75:44-7.
6. Sastre J, Ibañez MD, Lopez M, Lehrer S. Respiratory and immunological reactions among Shiitake (*Lentinus edodes*) mushroom workers. *Clin Exp Allergy* 1990;20:13-19.
7. Cockcroft DW, Killian DN, Mellon JA, Hargrave FE. Bronchial reactivity to inhaled histamine: a method and clinical survey. *Clin Allergy* 1977;7:235-43.
8. Ortolani C, Ispano M, Pastorello E, Ansaloni R, Magri GC. Comparison of results of skin prick tests with fresh food and commercial extracts and RAST in 100 patients with oral allergic syndrome. *J Allergy Clin Immunol* 1989;83:683-90.
9. De Blay F, Pauli G, Bessot JC. Cross reactions among respiratory and food allergens. *Allergy Proc* 1991;12:313-17.
10. Toorenenbergen AW, Huijskes-Heins MIE, Leijnse B, Dieges PH. Immunoblot analysis of IgE-binding antigens in spices. *Int Arch Allergy Appl Immunol* 1988;86:117-20.
11. Laemmli UK. Cleavage of structural proteins during the assembly of the head of the bacteriophage T4. *Nature* 1970;227:680-5.
12. Thiel CL, Fuchs E. Über korrelative Beziehungen bei Kräuterpollen und Gewürzallergenen. In: Steigleder GK, editor. *Kölner RAST symposium 3*. Berlin: Grosse Verlag, 1981:161-5.
13. Weber K, Osborn M. The reliability of molecular weight determinations by sodium dodecyl sulfate-polyacrylamide gel electrophoresis. *J Biol Chem* 1969;244:4406-12.

This document is a scanned copy of a printed document. No warranty is given about the accuracy of the copy. Users should refer to the original published version of the material.