

Allergy to Coriander

A Case Report

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After 3 years of occupational exposure to powdered coriander – a spice – a woman developed respiratory symptoms of immediate hypersensitivity. Skin tests, nasal and bronchial challenge tests and the RAST were positive to coriander. Column chromatography, enzymatic digestion of the fractions and skin testing suggested that the allergen is a protein.

Key words: coriander; allergens; rhinitis; asthma; occupational diseases.

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Coriander is an annual herb grown in Italy, Morocco, Eastern Europe, India and elsewhere. Two species are of importance, *Coriander sativum* L., var. *vulgare* Alef. (fruit diameter 3–5 mm) and *Coriander vulgare* L. var. *microcarpum* DC. (fruit diameter 1.5–3.5 mm). The family is *Umbelliferae*. Various preparations obtained from the dried ripe fruit of this herb are used in the food industry, perfumery and pharmacy. In particular, powdered fruit is used to make various spice mixtures (curry) and to flavour sausages.

In the present report we describe a patient with occupational hypersensitivity to coriander. To our knowledge coriander allergy has not previously been reported. However, skin testing with various spices and spice extracts is occasionally attempted, and many positive reactions have been observed (8). We have investigated the usefulness of different testing procedures with respect to the coriander allergen, as well as the nature of the allergen.

PATIENT AND METHODS

The patient was a woman, aged 51, employed in a factory packing spices. She had been preparing spice mixtures for 3 years before complaining of rhinitis and irritation of the throat. Previously she had not noticed symptoms of immediate hypersensitivity or experienced any specific allergic reaction. The symptoms were aggravated during the first hour at work in the morning and were relieved during weekends and holidays. Treatment with cromoglycate was only partially successful. Later she began to notice symptoms after eating some sausages.

Skin tests were performed by means of the prick technique with extracts and the scratch technique with powdered coriander. A skin reaction was regarded as positive when the diameter of the weal caused by the allergen was larger than that caused by water and at least half as large as that caused by histamine acid phosphate 10 g/l. The allergen prep-

arations used for testing included:

1. Commercial extracts of common allergens in 50% glycerol (Dome Laboratories).
2. Powdered coriander from the factory where the patient worked.
3. Powdered coriander obtained from the University Pharmacy.
4. An aqueous (1: 10 w/v) extract of preparation 2 in Coca's solution and additional dilutions of this extract.
5. Preparation 4 heated for 15 min at 100°C.
6. Preparation 4 after removal of non-macromolecules with a dextran column (Sephadex G 25).
7. Preparation 4 after proteolytic digestion with Pronase E (E.C. 3.4.24.4., E. Merck, Darmstadt). Dry spice (2.0 g) was suspended in 20 ml of distilled water and homogenized for 5 min with an ultrasonic disintegrator. The suspension was centrifuged (15 min, 15 000 g) and the supernatant passed through a Millipore® filter (pore size 0.45 µm). 1.8 ml of the filtrate was buffered with 0.2 ml of 1 M phosphate buffer (pH 7.4). 700 U of pronase was added, and the digestion was carried out for 2 h at 40°C.

Five control subjects were tested with preparation 2 and the scratch technique.

Nasal challenge was performed with the following technique: A small piece of cotton wool (1–2 mm diameter) was impregnated with test material (together with physiologic saline when dry test material was used). The cotton wool was placed at the opening of the inferior nasal meatus for 1 h. The simultaneous use of cotton wool with physiologic saline in the other nostril served as a control.

The nose was inspected during the procedure at 15 min intervals and the patient was asked about subjective symptoms.

Any signs of itching, mucosal swelling, watery discharge and sneezing were recorded. The test was interpreted as positive if at least two of the three last-mentioned criteria were positive, and probably positive

if there was itching plus one of the objective criteria.

Preparation 2, preparation 4 diluted to 10⁻² and two different fractions from preparation 6 (prick-positive and prick-negative) were used for the nasal challenge.

Histamine challenge for the detection of bronchial hyperreactivity was performed (7). Bronchial challenge tests were performed with lactose powder as described by Pepys et al. (9) and with an aerosol prepared with a de Vilbiss nebulizer of preparation 4 at various dilutions, and the control solution of Dome Laboratories (sodium chloride 0.9% with phenol 0.4%). Hypersensitivity to acetylsalicylic acid was tested as described by Stenius & Lemola (10). Measurements of peak expiratory flow (PEF) were performed with a Wright peak flow meter reading according to the method described by Keskinen et al. (6).

Serum total immunoglobulin E (IgE) was determined with the Phadebas IgE (Pharmacia Diagnostics). Serum IgE specific to coriander was determined with the radioallergosorbent test (RAST). A sample of powdered coriander brought by the patient was extracted with Coca's solution (1:10 w/v), and the proteins in the aqueous extract were coupled to cyanogen bromide activated Munktell OOH filter paper discs (4). The other reagents were obtained from Phadebas RAST kits (Pharmacia Diagnostics). A semi-quantitative RAST score (0 to 4) based on the commercial reference system was used for the interpretation of the results. Coriander-specific IgE was sought also in sera from control patients with at least one positive RAST result (score 1 or above) for an allergen other than coriander.

RESULTS

The patient's blood eosinophils, ($0.10 \times 10^9/l$) were within the reference range. The serum total IgE (250 U/ml) was slightly elevated. Eosinophils were not detected in her nasal mucus.

Prick tests with 20 common allergens and 11 moulds gave negative results. The coriander extract treated with pronase also gave negative results. Positive results were obtained with the two powdered coriander preparations, with coriander extract down to dilution of 10^{-5} , with the heated coriander extract, and with the Sephadex fraction from which small molecules had been removed. Test on five control patients were negative.

When fungi were sought in cultures of a powdered coriander sample from the factory involved, *Mucor sp.* was identified. Prick tests with a *Mucor* extract on the patient's skin were negative.

Nasal challenge with powdered coriander gave a strong positive result. A threshold reaction was obtained with the 10^{-1} extract. The bronchial histamine challenge gave a fall of 44% in PEF after 16 breaths. The patient's vital capacity and forced expiratory volume in 1 s were normal. Diurnal variations in the PEF values were within normal limits when the patient was not exposed to coriander. The placebo challenge with lactose and the control solution (Dome) were negative. There was no salicylic acid induced asthma. The 10^{-1} coriander extract caused a 15% fall in the PEF values, indicating mild bronchial obstruction.

Determination of coriander-specific IgE in the patient's serum gave a RAST score of 1, which we interpret as probably positive. Nine of the 10 control patients had a score of 0. The tenth control patient was an atopic 11-year-old girl whose serum gave a coriander-RAST score of 2. When she was skin tested with powdered coriander, positive results were also obtained. Specific IgE to birch (3), alder (4), timothy (4), and mugwort (3) was also found. The total IgE was 1550 U/ml. Skin tests were positive to cat, a number of pollens and several vegetables including potato, carrot, celery and parsley.

DISCUSSION

History, skin testing, nasal challenge, bronchial challenge and determination of

specific IgE all indicated that the patient suffered from immediate hypersensitivity to coriander. She had been subjected to coriander dust at work for 3 years, and this exposure obviously led to the development of an occupational allergy, including both nasal and mild bronchial symptoms which also began to occur after she ate sausages spiced with coriander.

The allergen could be extracted with water, and it behaved like a macromolecule upon fractionation in a dextran column (Sephadex G 25). The allergen was sensitive to proteolytic enzymes, and it could be coupled to cyanogen bromide-activated paper discs with a procedure suitable for proteins (4). Therefore it appears probable that the allergen, like most allergens causing immediate hypersensitivity, was a protein.

Skin and challenge testing of five control persons with coriander preparations did not yield positive results. On the other hand, determination of coriander-specific IgE in the sera of 10 atopic controls yielded one positive result. Subsequent scratch testing also indicated sensitivity to coriander in the control in question, an 11-year-old girl. The girl could have been sensitized to another allergen from the Umbelliferae family, which cross-reacted with the coriander allergen. The family includes a number of commonly used spice and vegetable plants, i.e. parsley (*Petroselinum hortense*), caraway (*Carum carvi*), dill (*Anethum graveolens*), parsnip (*Pastinaca sativa*), carrot (*Daucus carota*), and celery (*Apium graveolens*), and skin tests with parsley and celery were positive. Cross reactions between allergens from plants belonging to the same family are common (1, 2, 3, 5). Another possibility would be sensitivity to a contaminant in the coriander raw material, e.g. *Mucor*. This, however, does not seem probable since skin tests to the patients with *Mucor* extract were negative.

The case of coriander allergy described in this report illustrates the occupational risks caused by protein dust in industrial facilities. A number of other dusts, most commonly flour dusts (3), are known to cause similar

symptoms of immediate hypersensitivity. It is possible that also non-occupational coriander allergy can occur.

REFERENCES

1. Anderson, K. E. & Löwenstein, H.: An investigation of the possible immunological relationship between allergen extracts from birch pollen, hazelnut, potato and apple. *Contact Dermatitis* 4, 73-79, 1978.
2. Bernstein, I. L., Perera, M., Callagher, J., Michael, J. G. & Johansson, S. G. O.: *In vitro* cross-allergenicity of major aeroallergenic pollens by the radioallergosorbent technique. *J. Allergy Clin. Immunol.* 57, 141-152, 1976.
3. Björkstén, F., Backman, A., Järvinen, K. A. J., Lehti, H., Savilahti, E., Syvänen, P. & Kärkkäinen, T.: Immunoglobulin E specific to wheat and rye flour proteins. *Clin. Allergy* 7, 473-483, 1977.
4. Ceska, M. & Lundqvist, U.: A new simple radioimmunoassay method for the determination of IgE. *Immunochimistry* 9, 1021-1030, 1972.
5. Hannuksela, M. & Lahti, A.: Immediate reactions to fruits and vegetables. *Contact Dermatitis* 3, 79-84, 1977.
6. Keskinen, H., Alanko, K. & Saarinen, L.: Occupational asthma in Finland. *Clin. Allergy*, in press.
7. Laitinen, L.: Histamine and metacholine challenge in the testing of bronchial reactivity. *Scand. J. Resp. Dis.* 55, 19, 1974.
8. Niinimäki, A.: Personal communication, 1978.
9. Pepys, J., Pickering, C. A. A. & Loudon, H. W. G.: Asthma due to inhaled chemical agents - piperazine dihydrochloride. *Clin. Allergy* 2, 189-196, 1972.
10. Stenius, B. S. M. & Lemola, M.: Hypersensitivity to acetylsalicylic acid (ASA) and tartrazine in patients with asthma. *Clin. Allergy* 6, 119-129, 1976.

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