

Allergy to the coffee plant

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Occupational respiratory allergy to green coffee beans in coffee roastery workers is well established. I now report on a 50-year-old female atopic patient sensitized to the coffee plant used for indoor decoration. The symptoms were rhinitis and conjunctivitis on exposure to the plant. Investigation showed a positive skin prick test, RAST, and rhinoconjunctival provocation test to coffee leaf allergen extract. However, the commercially available RAST disk for green coffee beans seems to be appropriate for diagnosing allergy to the potted coffee plant.

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The habit of decorating the home with potted plants has increased, and new, exotic species are continually being marketed and are easily obtainable. The hallmark of these varieties is that they are easy to cultivate and thrive in the modern dry indoor climate. This paper reports on a case of sensitization to the potted coffee plant (*Coffea arabica*), and describes the investigation.

Case report

The patient, a 50-year-old female dentist, had suffered from atopic eczema during early childhood. Later, rhinoconjunctivitis was precipitated by grass and deciduous tree pollens as well as by animal dander. Around the age of 40, she developed eczema on her hands and therefore started to use rubber gloves both at work and at home. However, after a few years, she began to suffer from increasing itching from rubber gloves as well as from the cofferdam tissue made of latex that she used in her profession. Finally, both rubber gloves and cofferdam tissue elicited contact urticaria after a few minutes. At the age of 47, a standard patch test extended with dental and rubber chemicals was negative. RAST to latex was positive; 0.9 PRU/ml. This finding explained her hand eczema, which improved when she avoided rubber products.

When she was 44 years old, she bought two young coffee plants. Under her care, the plants grew to about 2.5 m in height during the following 18 months. She found, however, that she started to sneeze when she was in the same room as the coffee plants. She developed rhinoconjunctivitis on the two occasions

when the coffee plants had flowered. These allergic manifestations became very pronounced when she harvested the red coffee beans. She suspected that she had become sensitized to the plants and therefore got rid of them. A skin prick test (SPT) with a standard panel of 13 common allergens was positive for birch (3+), timothy (3+), dog (2+), and cat (3+). The corresponding RAST scores were 5.3, 3.6, 1.2, and 4.6 PRU/ml, respectively. The total IgE concentration was 460 kU/l. SPT with allergen extract from the rubber tree (*Hevea brasiliensis*) 1:100 w/v gave the result 3+, while RAST was negative. RAST to green coffee bean was also negative.

Material and methods

Three control groups were selected. *Group 1* comprised 10 randomly chosen atopic patients who were sensitized, that is, RAST-positive, to at least one common aeroallergen. *Group 2* were five coffee roastery workers sensitized to green coffee beans. *Group 3* were five atopic patients sensitized to natural rubber latex (Table 1).

Extract from the coffee plant was made by cutting the leaves into small pieces and extracting 1 g of the cuttings overnight in 9 ml physiologic saline containing 0.3% phenol. The extract was sterilized by filtration through a 0.22-µm Millipore® filter before use in SPT and provocation tests.

My patient and the patients in control group 1 underwent SPT with the coffee leaf extract on the volar aspect of the forearm, as described by Pepys (6). The test reactions were scored with histamine

Table 1. RAST (PRU/ml) and IgE (kU/l) in atopic patients (group 1), coffee workers (group 2), and atopic patients sensitized to rubber latex (group 3)

Group 1	Group 2		Group 3	
IgE	RAST (coffee bean)	IgE	RAST (latex)	IgE
3.4	0.6	160	9.0	330
19	1.0	130	9.4	440
24	2.1	31	12	2200
30	4.2	170	47	260
47	45	330	160	1500
55				
91				
95				
110				
1500				

chloride 10 mg/ml as positive control, corresponding to a 3+ reaction.

RAST was done according to the manufacturer's instructions (Pharmacia Diagnostics AB, Uppsala, Sweden) with the commercially available ¹²⁵I-labeled anti-IgE (Phadebas RAST). The results were expressed in PRU/ml as derived from the Phadebas reference system (Pharmacia Diagnostics).

Coffee leaf disks were prepared by coupling 10 µl coffee leaf extract 1/10 w/v to each CNBr-activated paper disk, as described earlier (3, 8). The disks were negative (<0.35 PRU/ml) in RAST with nonatopic serum samples with IgE levels of 10–7000 kU/l.

The patient was challenged in the rhinoconjunctival provocation test by dropping one drop of coffee leaf extract, in tenfold stepwise increasing concentrations, beginning at 1/10000, into the conjunctival sac and 0.2 ml into the nose.

Results

RAST to coffee leaf performed on serum obtained during the period when my patient still had the coffee plants at home was positive (0.9 PRU/ml), as also was RAST to green coffee beans (2.4 PRU/ml). Two years later, when she no longer had coffee plants at home, both RASTs were negative. The reaction to SPT with coffee leaf extract 1:10 (w/v) was 1+. SPT with coffee leaf applied directly on the skin on the forearm gave a 2+ reaction. The rhinoconjunctival provocation test with coffee leaf extract was positive at the highest concentration (1/10 w/v).

In control group 1, all SPT and RAST to coffee leaf were negative except in the patient with a total IgE concentration of 1500 kU/l, who had a RAST score of 0.8 PRU/ml. This patient had a RAST score to timothy of 290 and to mugwort of 140 PRU/ml. RAST was positive to dog (1.7 PRU/ml), but SPT was negative. She had no history of exposure to coffee plant.

In control group 2, only one serum RAST-positive to green coffee beans (45 PRU/ml) also was RAST-positive to coffee leaf (2.3 PRU/ml).

In control group 3, all five sera were negative in the RAST to coffee leaf.

Discussion

To my knowledge, this is the first report of non-occupational allergic reaction to the coffee plant. It seems likely that the sensitization occurred through inhalation of airborne, allergen-enriched dust emanating from the leaves of the plants, in the same way as I have earlier described for the weeping fig *Ficus benjamina* (2). The patient was exposed on only two occasions to the pollen and the beans. The coffee plant is insect-pollinated; thus, the pollen does not easily become airborne.

Occupational allergy to green coffee beans has been found by other authors (5, 7). I have no ready explanation of why the patient had a higher RAST score to green coffee beans than coffee leaf. One possibility is that she became exposed to several different allergens from the coffee plant, that is, from leaves, debris, pollen and mature red coffee beans. The last-named allergen source may contain the most potent allergens and hence give rise to the strongest immune response, resulting in the production of IgE antibodies and consequently a high RAST score. This reasoning is partly supported by the fact that only one of the coffee workers, the one with the highest RAST score (45 PRU/ml) to green coffee beans, had a positive RAST (2.3 PRU/ml) to coffee leaf. The workers had mainly been exposed to dried green coffee beans. The finding suggests that there are differences in antigenic properties between the beans and the leaves of the coffee plant. Nevertheless, the results of this study indicate that the commercially available RAST disk to green coffee beans is probably suitable for diagnosing allergy to the ornamental coffee plant.

The atopic control patient with a positive RAST to coffee leaf had a comparatively high total IgE value, which may have led to unspecific uptake, that is, a false positive RAST test. She also exhibited a positive RAST to dog but a negative SPT, and had no history of symptoms associated with exposure to dogs. The positive RAST to dog may have been a true one, but it could also have been the result of unspecific uptake caused by "sticky" IgE antibodies, that is, idiotypic IgE antibodies with low avidity to dog allergens. The latter possibility might also apply to coffee leaf allergens.

My patient was sensitized to two uncommon allergens, those of latex and coffee plant. A few reports have indicated the possibility of an association between latex allergy and hypersensitivity to

tropical and subtropical fruits; for instance, cross-reactivity between latex and banana (4) and latex and chestnut (1). Regrettably, I was unable to obtain enough serum from the patient when she still had coffee plants at home to establish cross-reactivity between latex and coffee leaf extract on an immunochemical basis. On the other hand, none of the subjects with positive RAST to latex had positive RAST to coffee beans or to the coffee leaf extract, suggesting that cross-reactivity between the coffee plant antigens and latex may not exist. Thus, the present patient's hypersensitivity to latex may not necessarily have made her more likely to react to coffee leaves. However, the possibility of identical epitopes or cross-reactive peptides in latex and the coffee plant remains speculative and needs to be further explored.

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