

Case report

Occupational asthma caused by aromatic herbs

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We describe a subject with occupational asthma caused by several aromatic herbs: thyme, rosemary, bay leaf, and garlic. The diagnosis was confirmed by specific inhalation challenges in the laboratory. Although immediate skin reactivity was demonstrated to the herbs the subject reacted to by inhalation, RAST showed that garlic was the most potent allergen by weight, the other herbs showing less reactivity. These aromatic herbs, bay leaf, thyme, and rosemary, should be included among agents causing occupational asthma in the food industry.

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Occupational asthma (OA) to spices such as garlic, coriander, or cinnamon has been previously described (1, 2). We report here for the first time, to our knowledge, OA to several aromatic herbs (thyme, rosemary, and bay leaf) in the same subject.

Case report

A 32-year-old butcher started work in a pork butchery in 1992. He had no previous history of asthma. He had never smoked. He worked in a department where other employees prepared pâtés and sausages, using various spices including aromatic herbs. Three months after beginning this work, he started complaining of cough, sneezing, dyspnea, and wheezing. These symptoms used to occur a few minutes after other workers had handled spices. The subject reported waking up at night because of respiratory symptoms. His symptoms improved during weekends and he became asymptomatic during holidays. One year later, he was treated by beclomethasone 1000 µg/day and albuterol on demand. This treatment improved his condition, though his asthmatic symptoms persisted.

He did not report skin, respiratory, or systemic reactions on eating products containing spices and aromatic herbs.

Skin tests performed by the prick method with 15 common inhalants showed immediate wheal reactions to tree and ragweed pollens and to house dust (maximum diameters=3 mm each). Soluble extracts of spices and aromatic herbs encountered at work were prepared by suspending each spice and herb in saline solution (0.9%) at concentrations of 1 and 5 mg/ml. These tests showed immediate wheal reactions of 5 mm maximum diameters to cayenne, paprika, and garlic and of 3 mm to thyme, mace, rosemary, bay leaf, and savory at both concentrations. Skin tests were negative with cinnamon, pepper, coriander, and clove extracts. Skin tests to garlic, bay leaf, rosemary, and thyme performed in 10 asthmatic subjects (seven atopic and three nonatopic subjects) were entirely negative.

In March 1995, serial monitoring of peak expiratory flows (PEF) for a period at work and away from work was highly suggestive of work-related asthma. PEF values indeed varied from 400 to 675 l/min at work, whereas values were stable and higher while away from work (values of 650–700 l/min).

Moreover, the subject needed albuterol twice a day while at work but did not require it while away from work.

Specific inhalation challenges

Specific inhalation challenges were performed in May 1995 by a previously described method with a closed-circuit apparatus for dry aerosol (3). FEV₁ was 3.05 l (71% predicted [4]) and forced vital capacity (FVC), 3.6 l (72% predicted [4]). On the control day, the subject was exposed to a control powder (lactose) for a total of 30 min. No significant change in FEV₁ occurred in the following 8 h (Fig. 1). Nonspecific bronchial responsiveness to methacholine was assessed at the end of the day with a Wright nebulizer (output = 0.14 l/min) at tidal volume breathing for 2 min (5). PC₂₀ was 3 mg/ml, reflecting mild bronchial hyperresponsiveness (6). On subsequent days, specific inhalation challenges were performed using each agent in dry particle form: exposure to garlic, rosemary, thyme, and bay leaf on separate days induced isolated immediate asthmatic reactions (Fig. 1). PC₂₀ was significantly reduced after the exposure to thyme (0.38 mg/ml). The main features of these specific inhalation challenges are shown in Table 1. We exposed the subject to mixed spices including coriander, cinnamon, clove, pepper, and nutmeg for a 2-h period. No asthmatic reaction occurred. To confirm that the reactions experienced by our subject were not due to a nonspecific irritant effect of the aromatic herbs, we exposed a control asthmatic subject with a PC₂₀ of 2 mg/ml to rosemary for a 2-h period in the same manner. No asthmatic reaction occurred. There was no increase in nonspecific bronchial responsiveness after the challenge (PC₂₀ = 4 mg/ml).

Immunologic assessment

IgE antibody reactivity was assessed to garlic, oregano, bay, and thyme extracts by RAST (7). Extracts were prepared by homogenizing each spice separately in phosphate-buffered saline overnight at 4°C, with centrifugation at 22 000 g, followed by concentration (Amicon YM1). The amount of protein per ml in each extract was determined by Coomassie brilliant blue plus protein assay (Pierce, Rockford, IL, USA). Decreasing concentrations (100 to 0.001 µg) of spice proteins were coupled to disks in order to assess their potency as allergens in this patient. Human serum albumin at 1 µg/disk was used as a control. The results, summarized in Table 2, indicate that this subject had significant IgE antibodies to garlic, oregano, and bay leaf. Reactivity to garlic was substantial in that as little as 1 ng garlic per disk

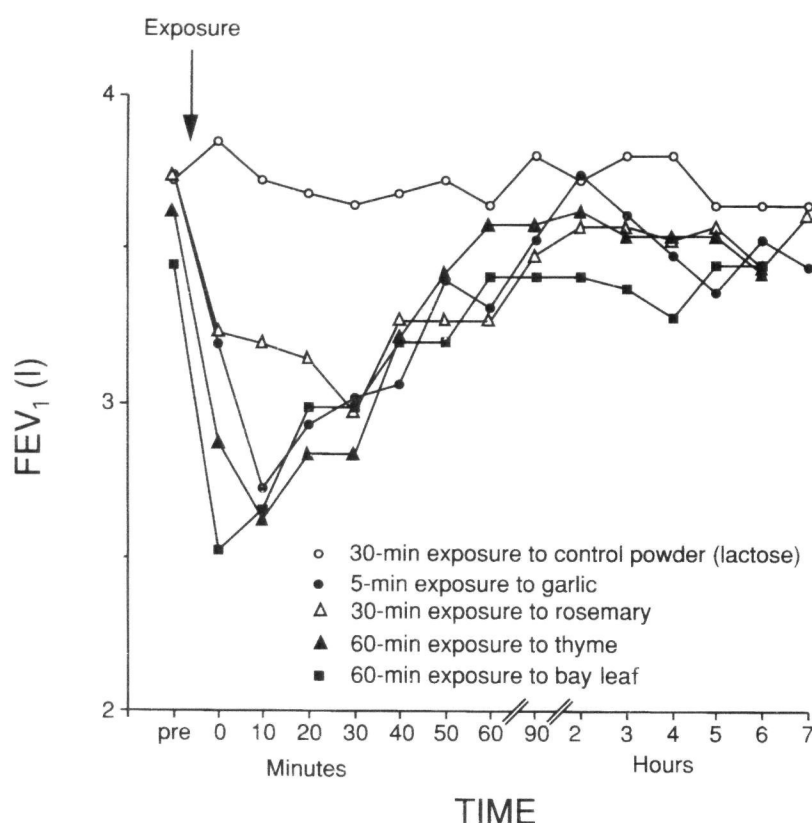


Fig. 1. Specific inhalation challenges to aromatic herbs, showing in all instances isolated immediate asthmatic reactions.

still yielded substantial reactivity with the patient's serum. IgE antibody reactivity to oregano and bay leaf was essentially marginally positive or negative at 10 µg/disk. RAST reactivity to garlic, oregano, bay leaf, and thyme (at a concentration of 100 µg/disk) in three nonallergic subjects was negative (0.6–1.2% label bound).

Discussion

We report a case of OA induced in the same patient by several aromatic herbs: garlic, thyme, rosemary, and bay leaf and proved by specific inhalation challenges. There was evidence of type 1 immunologic reactivity as demonstrated by skin testing and by RAST for garlic, oregano, and bay leaf.

Although this subject demonstrated positive skin test and OA to garlic, bay leaf, and thyme, significant IgE antibody responses were observed only to garlic, oregano, and bay leaf. Garlic was significantly the most potent allergen in the study. Thus, there appeared to be significant differences in IgE antibody reactivity to the different spices to which this worker was exposed, garlic being the most potent, and thyme being the least potent. This may possibly reflect differences in patterns or levels of exposure to these various spices. Alternatively, it could reflect the possibility that garlic is a much more potent allergen than the other spices tested. At this time, we do not have information on the cross-reactivity of these spices in that RAST inhibition testing was not done. However, in view

Table 1. Main features of specific inhalation challenges

Challenge day (1995)	Agent	Duration of exposure (min)	FEV ₁ (l) baseline	FEV ₁ value (l) at time of maximum reaction (% prechallenge)	Pattern of reaction	PC ₂₀ at end of challenge day (mg/ml)
19 May	Lactose (control powder)	30	3.72	3.68 (−1.1%)	None	3.0
23 May	Garlic powder	5	3.74	2.72 (−27%)	Immediate	1.65
25 May	Rosemary powder	30	3.74	2.97 (−21%)	Immediate	1.6
26 May	Thyme powder	60	3.62	2.62 (−28%)	Immediate	0.38
29 May	Bay leaf powder	60	3.45	2.52 (−27%)	Immediate	0.76
13 July	Mixed spices	120	3.77	3.69 (−2.1%)	None	3.3

Mixed spices included cinnamon, coriander, cloves, pepper, and nutmeg.

Table 2. RAST reactivity to diferent amounts of aromatic herbs

	RAST (mg/disk)					
	100	10	1.0	0.1	0.01	0.001
Garlic	54.0	55.0	51.0	51.6	47.8	44.9
Oregano	7.2	1.8	1.3	NT	NT	NT
Bay leaf	6.1	3.0	1.6	NT	NT	NT
Thyme	2.3	2.7	1.0	NT	NT	NT
HSA control	1.2	NT	0.9	NT	NT	NT

NT = not tested. RAST reactivity expressed as % label anti-IgE bound. HSA control value represents mean of two tests in one control subject.

of the differences in potency, it is likely that garlic does differ from oregano, bay leaf, and thyme.

OA to garlic only has been previously described (1, 2). Increased specific IgE antibodies against garlic have also been found (1, 2).

It is highly unlikely that the bronchial response to aromatic herbs was due to a nonspecific irritant effect. First, the asthmatic reaction to thyme was associated with a significant increase in nonspecific bronchial responsiveness to methacholine, an effect which does not generally occur after an irritant response. Although changes in nonspecific bronchial responsiveness are not the rule after an isolated immediate asthmatic reaction, it occurred in 38% of cases after immediate reactions in a series published by Malo et al. (8). Second, no asthmatic reaction occurred after exposure to other spices to which the subject showed no skin reactivity. Finally, a control asthmatic subject had no asthmatic reaction after exposure to rosemary.

Various aromatic herbs, including bay leaf, thyme, and rosemary, should therefore be included among agents causing OA in the food industry, and the frequency of this should be assessed in exposed workers.

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