

CASE REPORT

Curry spice allergy associated with pollen-food allergy syndrome and latex fruit-syndrome

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ABSTRACT

We report a 22-year-old woman with urticaria, dyspnea and bronchial asthma-like attacks after eating curried rice. We found the symptoms to be due to an immediate-type allergy caused by spice antigens contained in curry spices by detailed questioning, skin test and measurement of specific immunoglobulin (Ig)E antibodies. This case was complicated with pollen-food allergy syndrome (PFAS) from melon and latex allergy (LA) to natural rubber latex (NRL) antigen and she had also had atopic dermatitis, allergic rhinitis and pollinosis. Serum specific IgE antibodies to birch profilin (Bet v 2), latex profilin (Hev b 8), and timothy profilin (Phl p 12) were detected. She also showed positive reactions to several *Apiaceae* families, fruits and latex antigens in skin prick test. Based on these findings, we considered her symptoms to be involved with spice allergy, PFAS and latex-fruit syndrome.

Key words: class 2 food allergy, curry spice allergy, latex-fruit syndrome, pollen-food allergy syndrome, profilin.

INTRODUCTION

Immediate-type allergy caused by curry powder or spices has been reported, but there have been only a few studies on the detailed evaluation of causal antigens in Japan.^{1–3} Spice allergy sometimes happens to patients with pollen-food allergy syndrome (PFAS).⁴ In such cases, different protein antigens are involved in the completion stage of sensitization and the symptom induction stage.⁵ It has been reported that symptoms are induced because of the cross-reactivity of spice and pollen protein antigens. This new food allergy has been named “class 2 food allergy”.⁶ Latex-fruit syndrome (LFS) induced by cross-reaction of latex antigens contained in natural rubber latex (NRL) and antigens contained in fruits, is also a class 2 food allergy.^{5,6}

We experienced a patient with urticaria from curry spice allergy, PFAS and LFS who had had atopic dermatitis (AD) and pollinosis.

CASE REPORT

The patient was a 22-year-old female dental hygienist with a personal history of AD, allergic rhinitis (AR) and pollinosis in childhood (Fig. 1). She also had noticed numbness and itching in her oral cavity after eating melon or pineapple since then. She had had urticaria, dyspnea and bronchial asthma-like attacks after eating curried rice, when she was a junior high school student. She had avoided eating curried rice and the foods containing spices since she was 14 years old. Because she avoided ingestion of these foods, the symptoms had been remarkably improved, including her skin eruptions of AD. This suggested that food allergy was one of the causes of AD aggravation. When she started her practical training on a dental hygienist course at the age of 19 years, she first felt pruritus on her hands when she wore NRL gloves (Fig. 1).

We performed examinations for immediate-type allergy from curry spices, PFAS and LFS in the

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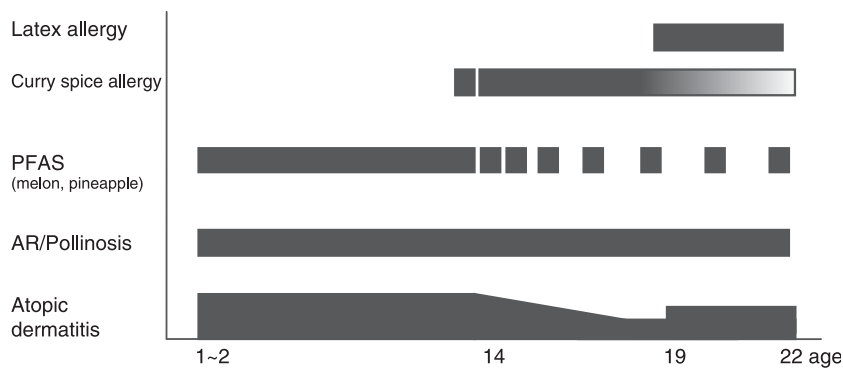


Figure 1. Clinical course. AR, allergic rhinitis; PFAS, pollen-food allergy syndrome.

patient. Commercially available assays for specific serum immunoglobulin (Ig)E antibody (CAP fluorescence enzyme immunoassay FEIA, AlaSTAT and ImmunoCAP; Phadia, Uppsala, Sweden) were performed for fruits, several pollens and latex. Levels of specific IgE antibody more than 0.7 kU/L were considered positive.

To prepare curry spice extracts for the skin examination, commercially available curry powder and its ingredient spices that the patient had ingested were provided by House Foods (Tokyo, Japan). The curry powder and each of the spices were dissolved in sterile physiological saline (PS) (Otsuka Pharmaceutical, Naruto, Japan) at a weight ratio of 1%, and centrifuged at 1000 *g* for 5 min. The supernatants were used for examinations.

An extract from the sap of *Hevea brasiliensis*, clone RRIM 600, was obtained from the Rubber Research Institute of Malaysia, Kuala Lumpur, Malaysia, and provided by the Japanese Latex Allergy Forum. The primary extract solution was 6.5 mg/mL, and it was diluted 1:100 into sterile PS.

The recombinant (r) allergens were Bet v 1, Bet v 2, Phl p 12, Hev b 1, 2, 3, 5, 6.02, 8, 9 and 11 (BIOMAY, Vienna, Austria). The antigens were diluted 100 µg/mL into sterile PS.

Skin prick tests (SPT) were carried out for these antigens as described previously.^{10,11} In the scratch test, a 5-mm transverse scratch was made on the skin using a 26-G injection needle tip, and immediately the extract was dropped onto the scratched place. In SPT, the mean of the maximal diameter of the wheal and its perpendicular diameter was determined. The scores were also assigned as described previously.^{10,11} In the scratch test, the maximal diameter perpendicular

to the transverse scratch was measured. When we performed SPTs and the scratch tests on the patient, she did not show any aggravation of AD or any symptoms such as urticaria on sites other than the test sites.

RESULTS

The patient showed positive reactions to several kinds of foods including spices (Table 1–3). Positive results of specific IgE using fruit, pollens and latex were classified as follows: class 4, sweet vernal grass and orchard grass antibodies; class 3, tomato, ragweed, maple tree, white birch, cedar, *Alnus sieboldiana*, house dust and *Dermatophagoides pteronyssinus* antibodies; and class 2, melon, carrot, grapefruit, kiwi fruit, latex, mugwort and alder antibodies. The positive reactions of SPT were observed with melon, carrot, celery, tomato and latex antigens. Specific IgE using rBet v 2, rHev b 8, and rPh1 p 12 were classified into class 3. The positive reactions of SPT using recombinant antigens were observed with rBet v 2, rHev b 6.02 and 8. The positive reactions of SPT or scratch tests were observed with curry powder extract, cumin, coriander, fennel, dill, fenugreek and cayenne pepper (Fig. 2). The patient was therefore diagnosed as having curry spice allergy, PFAS and LFS.

DISCUSSION

There have been many reports of spice allergy in Europe, but only a few cases have been reported in Japan.^{2,9} Spice allergy and its test methods have not generally been recognized in Japan, because

Table 1. Summary of the examination data of fruits, vegetables, and latex

	Clinical symptoms	Specific IgE Antibody (CAP RAST·AlaSTAT) (Class·UA/mL)	SPT Score
Melon	Oral symptoms	2 (2.80)	2+
Pineapple	Oral symptoms diarrhea	<0.35	Negative
Carrot (raw)	Unknown	2 (2.39)	3+
Celery	Unknown	<0.35	3+
Apple	Negative	1 (0.67)	Negative
Tomato	Negative	3 (3.70)	3+
Grapefruit	Negative	2 (2.15)	Negative
Kiwi	Negative	2 (2.33)	Negative
Avocado	Negative	1 (0.65)	Negative
Banana	Negative	<0.35	Negative
Chestnut	Negative	<0.35	Negative
Latex extract	Contact urticaria	2 (2.23)	3+ [†]
Sweet vernal grass	Unknown	4 (38.6)	NT [§]
Orchard grass	Unknown	4 (35.9)	NT
Ragweed	Unknown	3 (5.43)	NT
Mugwort	Unknown	2 (2.99)	NT
Maple tree	Unknown	3 (3.80)	NT
Alder	Unknown	2 (3.35)	NT
White birch	Unknown	3 (4.90)	NT
Cedar	Unknown	3 (4.13)	NT
<i>Alnus sieboldiana</i>	Unknown	3 (3.85)	NT
House dust	Unknown	3 (4.13)	NT
<i>Dermatophagoides pteronyssinus</i>	Unknown	3 (4.26)	NT
Histamine dihydrochloride (10 mg/mL)			5 mm × 5 mm
Sterile physiological saline			0 mm × 0 mm

Three normal controls were negative by the same examination. [†]Latex extract of *Hevea brasiliensis*. IgE, immunoglobulin E; [§]NT, not tested; SPT, skin prick test.

Table 2. Summary of the examination data of recombinant antigens

Allergen components		Specific IgE antibody ImmunoCAP (kU A/L)	SPT score
rBet v 1(PR-10)	Birch	<0.35	Negative
rBet v 2	Birch	6.06	2+
rPhl p 12	Timothy grass	4.24	NT
rHev b 1	Latex	1.32	Negative
rHev b 2	Latex	0.38	Negative
rHev b 3	Latex	0.45	Negative
rHev b 5	Latex	0.42	Negative
rHev b 6.02	Latex	7.54	2+
rHev b 8	Latex	37.6	3+
rHev b 9	Latex	0.48	Negative
rHev b 11	Latex	0.49	Negative

Three normal controls were negative by the same examination. IgE, immunoglobulin E; r, recombinant; SPT, skin prick test.

Japanese do not use many spices for cooking. In this case, the spices of coriander, cumin, fennel and dill, which showed a strong positive in skin test, were in the *Apiaceae* family (Api g 1, 16.2 kD).¹⁰ It has been reported that patients with mugwort or birch pollinosis showed cross-reactions to spices in the *Apiaceae* family in addition to vegetables and

fruits.¹¹ Celery–carrot–mugwort–spice syndrome is an immediate-type allergy of vegetables such as celery, carrots and spices induced by cross-reactivity of the mugwort pollen antigen, 60-kD glycoprotein (Art v 1 and the major birch pollen antigens, Bet v 1 or 2).¹³ We considered that the patient had this syndrome because she showed positive SPT to

Table 3. Results of skin tests with spice antigens

	Spice antigen	Concentration	SPT score	Wheal (scratch test) (mm)	Spice antigen	Concentration	SPT score	Wheal (scratch test) (mm)
1	Curry powder	1% aq w/w	Negative	2 × 2	15	Coconut milk	1% aq w/w	Negative
2	Cumin	1% aq w/w	1+	8 × 6	16	Orange peel	1% aq w/w	Negative
3	Coriander	1% aq w/w	Negative	6 × 4	17	Allspice	1% aq w/w	Negative
4	Fennel	1% aq w/w	2+	8 × 7	18	Black pepper	1% aq w/w	Negative
5	Dill powder	1% aq w/w	2+	6 × 5	19	Nutmeg	1% aq w/w	Negative
6	Fenugreek	1% aq w/w	1+	7 × 6	20	Thyme	1% aq w/w	Negative
7	Cayenne pepper	1% aq w/w	1+	8 × 6	21	Bay leaves	1% aq w/w	Negative
8	Ginger	1% aq w/w	1+	4 × 4	22	Turmeric	1% aq w/w	Negative
9	Cardamom	1% aq w/w	1+	4 × 4	23	Cinnamon	1% aq w/w	Negative
10	Garlic	1% aq w/w	2+	4 × 4	24	Aniseed star	1% aq w/w	Negative
11	Garam masala	1% aq w/w	1+	4 × 4	25	Sage	1% aq w/w	Negative
12	Mustard seed	1% aq w/w	1+	4 × 4	26	Aniseed star histamine	1% aq w/w	Negative
13	Goraka	1% aq w/w	Negative	1.5 × 1		Dihydrochloride (10 mg/mL)	1% aq w/w	7 mm × 5 mm
14	Clove	1% aq w/w	Negative	2 × 1		Sterile physiological saline	1% aq w/w	0 mm × 0 mm

*aq, aqua.

**Figure 2.** A strong positive reaction to cumin.

fresh carrot and celery, and mugwort-specific IgE antibody was classified into class 2. Because the patient also showed positive reactions to rBet v 2 and rHev b 8 in SPT, and Bet v 2-, Phl p 12- and Hev b 8-specific IgE antibodies, we considered that these antigens that are profilins may be associated with her symptoms.

Profilin is an actin-binding protein, which is common to eukaryotes, and has been reported to be pan-allergen which can elicit several cross-reactions. This pan-allergen is considered to be a causal antigen of cross-reactions to various fruits and vegetables in patients with pollinosis. We considered that pan-allergen associated with class 2 food allergy participated in the food allergy caused by several antigens in this patient.⁶

We also diagnosed that the patient had LA because she had had contact urticaria due to NRL gloves and showed positive reactions by SPT to latex extracts and rHev b 6.02. However, she showed negative reactions to chestnut, avocado and banana. We considered that she did not have cross-reaction

associated with class I chitinase that was the antigen of these fruits. On the other hand, she showed positive reactions to rHev b 8, which was latex profilin, melon and tomato. From these results, we diagnosed that she had LFS associated with Hev b 8.

In future, food allergies may further increase with the development of genetically modified foods.¹⁵ Therefore, we consider that establishment of the examinations of food allergy are necessary to clarify causative antigens.

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