

Lupin allergy in a child

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Lupin (*Lupinus albus*), a member of the Leguminosae family, is a pea-like plant cultivated all over the world, primarily for use as animal feed, although in some countries there is a habit for human consumption (especially during country fairs). A particular lupin strain (sweet

Abbreviation used

SPT: Skin prick test

lupin) has been suggested for use in bread, cookies, and pasta.¹

CASE REPORT

A 3-year-old child with a history of episodic asthma was studied in our clinic. In 2 circumstances, particularly when playing with the dust of a lemon tree (manured with lupin in dust form), the asthma attacks were severe, with abrupt onset of rhinorrhea, conjunctivitis, cough, dyspnea, and cyanosis. Skin prick test (SPT) responses to a

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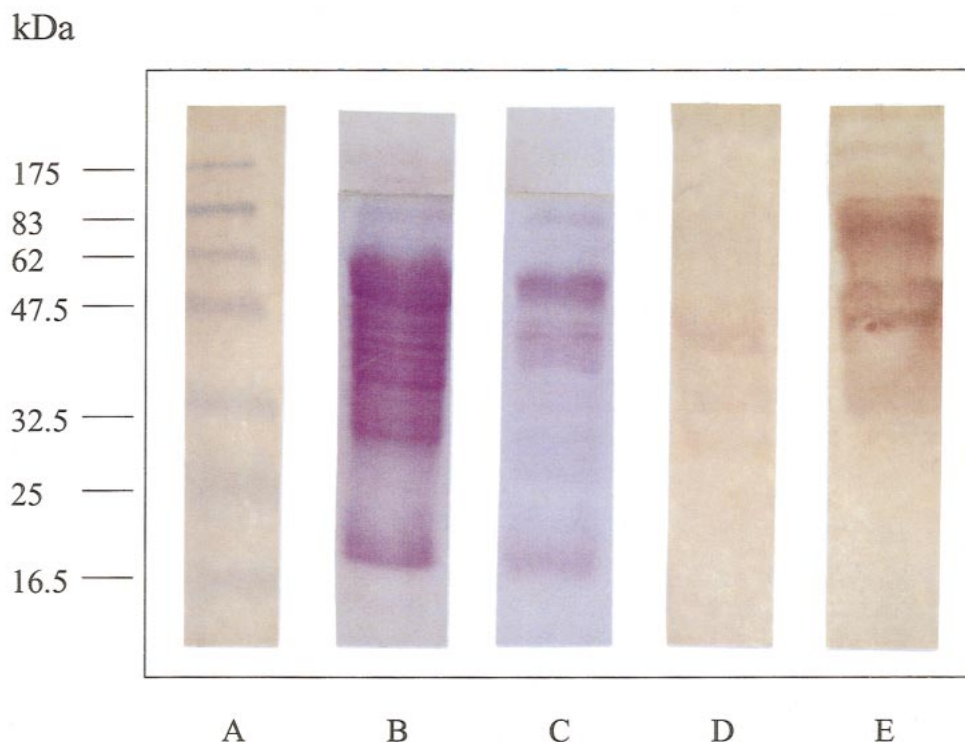


FIG 1. Immunoblotting experiment. *Lane A*, Molecular weight markers; *lane B*, lupin extract profile from dried seeds; *lane C*, lupin extract profile from seeds preserved in salt and water; *lane D*, immunoblotting with patient serum (dried lupin); and *lane E*, immunoblotting with patient serum (preserved in salt and water lupin).

battery of commercial extracts (Lofarma-Milan) of aeroallergens (grass pollen, olive tree pollen, *Parietaria officinalis*, *Artemisia* spp, *Dermatophagoides pteronyssinus*, cat and dog epithelia, *Alternaria tenuis*, and *Cladosporium* spp) and food allergens (milk, egg, codfish, peanut, wheat, tomato, and soy bean) were all negative except for responses to *D pteronyssinus* and grass pollen. Other SPT responses to some members of the Leguminosae family (lentil, bean, chick pea, and carob) were also negative. A prick-by-prick test response with lupin preserved in salt and water was markedly positive.

Informed consent was obtained from the patient's parents to perform a provocation test (manipulation of lupin in the same powder form present in the lemon tree), and the patient had rhinitis and conjunctivitis, cough, and wheezing in 3 minutes.

The in vitro IgE binding of the legumes was measured after use of the CAP RAST system (Pharmacia-Uppsala). The legume allergens investigated were lupin, lentil, bean, soy, chick pea, peanuts, and carob. Only lupin (4.76 KU/L) and peanut (0.68 KU/L) elicited positive responses.

METHODS

The laboratory investigation was made with 2 different types of extracts. One extract was obtained from dried seeds, and the other was obtained from seeds preserved in salt and water. The extraction (from both dried seeds and those preserved in salt and water) was made according to Hefle et al.¹ The total protein concentration of the lupin extract from seeds preserved in salt and water and in the dried form, which was determined by using the Bradford method with bovine gamma-globulin as standard, were 2 mg/mL and 5 mg/mL, respectively.

SPTs with the lupin extracts (both from dried seeds and from those preserved in salt and water) were performed on the patient, as well as on 5 healthy volunteers and on 5 atopic children without a history of lupin hypersensitivity. Vertical slab gel electrophoresis (SDS-PAGE) and immunoblotting were carried out as described by Alenius et al.²

RESULTS

The patient's SPT responses with the lupin extracts (both from dried seeds and those preserved in salt and water) were strongly positive, whereas SPT responses with the same lupin extracts in 5 healthy volunteers and in 5 atopic children without a history of lupin hypersensitivity were negative.

The SDS-PAGE profile of lupin extracts showed several bands, ranging from 16.5 to 175 kd. The extract obtained from dried lupin showed more protein bands in SDS-PAGE than the extract obtained from lupin seeds preserved in salt and water.

Immunoblot analysis performed with the serum showed bands with molecular weights in the range of 30 to 80 kd with the extract of dried lupin and bands in the range of 32.5 and 175 kd with the extract of lupin preserved in salt and water (Fig 1). A band with an approximate molecular weight of 45 kd appeared to be a major IgE-binding protein in the extract of dried lupin.

DISCUSSION

The patient in our study experienced episodes of rhinoconjunctivitis and severe asthma caused by inhalation of lupin in dust form. A type I hypersensitivity to lupin is strongly suggested by the positivity of SPT, CAP, RAST, and provocation test results.

An extensive immunologic cross-reactivity among legumes has been demonstrated in some studies,³ but it was not clinically relevant.⁴ Our patient did not show sensitization to legumes other than lupin (except a class 1 CAP RAST result to peanut) and presented symptoms only by inhalation of lupin in dust form.

Only 1 case of urticaria-angioedema after ingestion of spaghetti-like pasta fortified with sweet lupin seed flour¹ and 1 case of contact urticaria caused by lupin⁵ have been published until now. Therefore this is the first case report of respiratory symptoms after the inhalation of lupin in dust form. The allergens in lupin have not yet been well characterized.

In our study, performed in a patient with a demonstrated lupin allergy, the band with an approximate molecular weight of 45 kd appear to be the major IgE-binding protein in the extract of dried lupin.

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