

Short Communication

Lupine inhalation induced asthma in a child

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The ingestion of lupine seed flour has been reported as a cause of allergic reactions. There is some evidence of its allergenic potential after inhalation. An 8-year-old asthmatic child, who was allergic to peanut, was studied in our clinic with the suspicion of an adverse drug reaction due to salbutamol. He suffered an asthma attack while playing with his brother, who had been eating lupine seed as snack; surprisingly, the asthma attack worsened with salbutamol. The skin tests showed a positive result with *Lupinus albus* extract, peanut, garbanzo bean, navy bean, pea, green bean, lentil, soy, *Olea europea* pollen, grass pollen and *Plantago lanceolata* pollen. The prick-by-prick tests both from dried seeds and those preserved in salt and water were strongly positive. Serum specific IgE antibodies were positive to *Lupinus albus* (1.43 kU/l), peanut (4.32 kU/l), soy (2.15 kU/l), lentil (3.12 kU/l) and garbanzo (0.7 kU/l). After informed consent salbutamol was well tolerated but the patient had asthma in 5 min of manipulation of the lupine seeds. In our case, reactivity with other legumes was also demonstrated, but only peanut allergy was relevant because boiled legumes were tolerated. It is also notorious that anamnesis is so important to assess the true etiological agents of asthma.

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Lupine (*Lupinus* sp.), a member of the legume family is a plant cultivated around the world. Sweet lupine protein or flour has been used in the food industry to improve the nutritional value of other foods. The roasted seeds can be used as a snack in much the same way as peanuts. It has been described several cases of allergy to lupine (1–7). Few cases of lupine contact urticaria (4) and respiratory symptoms after inhalation of lupine dust have been reported (5, 6).

Case report

An 8-year-old child with a history of pollen induced allergic asthma was studied in our clinic with the suspicion of an adverse drug reaction due to salbutamol. In a circumstance, while playing with his brother, who had been eating lupine seed as snack, he suffered an asthma attack. The brother, a 14-year-old boy, recognized the symptoms and took the salbutamol

aerosol (Ventolin®, Glaxo Smith Kline, UK), put it into a Volumatic chamber® (Glaxo Smith Kline, UK) and gave two puff to his sick brother. Surprisingly, the asthma attack was quickly worsening and the child had to be taken to the emergency room of our hospital. There, he was treated with 5 mg of nebulized terbutaline (Terbasmin solution for nebulisation® Astra Zeneca) and 40 mg of intravenous methylprednisolone with fast recovering of the crisis.

Diagnostic procedures

The first diagnostic stage consisted of the taking of a comprehensive true history, because we suspected that salbutamol was not the etiologic agent of the asthma attack: the attack occurred in winter, the two brothers had been playing at home, much closed while a big plate of lupine seeds was on the table. The patient's brother was eating this snack while playing. Our patient did

not eat the seeds neither any other food. The asthma began before the salbutamol, but worse after the brother – without washing his hands-, administered it. The patient had suffered two episodes of urticaria after peanut, so he was previously diagnosed of allergy to legumes. However, he can tolerate very intense boiled legumes as garbanzo, navy bean and lentils.

Skin testing

Skin prick tests (SPTs) were performed with salbutamol solution 25 mg/ml (Ventolin nebulization solution®, GlaxoSmithKline, UK), *Lupinus albus* extract (1:10 wt./vol.), prepared according to previous method (1), and with legumes and inhalants (ALK-Abello Laboratories, Copenhagen, Denmark). Prick-by-prick tests response with dried lupine seed and those preserved in salt and water were also done. A positive SPT result was defined as a wheal 3 mm or greater in diameter in comparison with the negative control. Positive and negative controls for skin testing were histamine dihydrochloride (10 mg/ml) and saline solution, respectively. The skin tests showed a positive result with *L. albus* extract, peanut, garbanzo bean, navy bean, pea, green bean, lentil, soy, *Olea europea* pollen, grass pollen, and *Plantago lanceolata* pollen. The patient's responses with the prick-by-prick tests both from dried seeds and those preserved in salt and water was strongly positive.

In vitro testing

Serum samples were tested for specific IgE antibodies to lupine and other legumes by means of the CAP-FEIA System (Pharmacia, Uppsala, Sweden) as detailed by the manufacturer. The cutoff value for a positive result was set at 0.35 kU/l. The legume allergens investigated were lupine, lentil, bean, soy, chickpea, peanuts, and carob. Positive responses were showed by *Lupine albus* (1.43 kU/l), peanut (4.32 kU/l), soy (2.15 kU/l), lentil (3.12 kU/l) and garbanzo (0.7 kU/l).

Challenge tests

Informed consent was obtained from the patient's parents to perform a provocation test with inhaled salbutamol and a manipulation challenge with few lupine seeds (in the same form presented in the plate at the moment of the asthma attack). Both challenges were performed in the Provocation Test Unit, just closed to Intensive Care Unit of our hospital, under proper medical

supervision. Salbutamol was well tolerated; but the patient had rhinitis and conjunctivitis, cough, and wheezing in 5 min of manipulation of the lupine seeds. After this reaction, the parents did not give the consent to perform an oral challenge with lupine seeds.

Discussion

The lupine is a legume belonging to the genus *Lupinus*. It includes 450 species. Some species are of interest: the white lupine (*L. albus*), the blue lupine (*L. angustifolius*), the yellow lupine (*L. luteus*), and *L. mutabilis*. Lupine flour is an excellent source of proteins. Lupine flour is used in biscuits, pasta, sauces, dietetic products sold as milk, and soy substitutes.

The seeds are served with aperitifs. Some case report points out the fact that lupine flour is a high-risk allergen in patients presenting allergy to peanuts. The risk of crossed peanut-lupine allergy is high, contrary to the risk with other legumes. The inclusion of 10% lupine flour in wheat flour without mandatory labeling makes lupine a hidden allergen, presenting a major risk of cross-reaction in subjects already allergic to peanut products (8). In our case, lupine seed became a hidden allergen due to an indirect contact. Moreover, the involvement of a drug administration increased the difficulty of the final diagnosis. A drug challenge was necessary to rule out the implication of salbutamol. Inhalation of food allergens can elicit respiratory symptoms. In some cases, the patients had not got previous histories of food adverse reactions, and allergic sensitization to lupine likely occurred via the respiratory tract; moreover, subjects were not currently reactive to legume ingestion (6).

Lupine allergy may also occur in young children (5). A 5-year-old girl with Peanut allergy experienced urticaria and angioedema after ingesting spaghetti-like pasta fortified with Lupine seed flour (1). Lupine-induced anaphylaxis has also been reported in a child. Skin-specific IgE was positive and *in vitro* cross-reactivity with other legumes was demonstrated, but was shown in this instance to not be clinically relevant (2). The physicians of any Emergency Room should be trained to detect this kind of severe reactions in order to administer the best treatment which, despite of the good evolution of our patient, should be epinephrine better than corticosteroids in the first stage.

Our data objectively demonstrate that lupine seed should be considered a potential etiologic agent by inhalation in exposed patients who were previously allergic to peanuts. In our case, *in vitro*

cross-reactivity with other legumes was also demonstrated, but as shown previously (2), only peanut allergy was relevant because boiled legumes were tolerated. It also notorious that anamnesis is so important to assess the true etiological agents of asthma.

References

1. HEFLE SL, LEMANSKE RF, BUSH RK. Adverse reaction to lupine-fortified pasta. *J All Clin Immunol* 1994; 94: 167–72.
2. MATHEU V, DE BARRIO M, SIERRA Z, GRACIA-BARA MT, TORNERO P, BAEZA ML. Lupine-induced anaphylaxis. *Ann All Asthma Immunol* 1999; 83: 406–8.
3. MONERET-VAUTRIN DE, GUERIN L, KANNY G, FLABBEE J, FREMONT S, MORISSET M. Cross-allergenicity of peanut and lupine: the risk of lupine allergy in patients allergic to peanuts. *J All Clin Immunol* 1999; 104: 883–8.
4. GUTIÉRREZ D, CONDE A, DURÁN S, et al. Contact urticaria from lupin. *Contact Dermat* 1997; 36: 311.
5. NOVEMBRE E, MORIONDO M, BERNARDINI R, AZZARI C, ROSSI ME, VIERUCCI A. Lupin allergy in a child. *J All Clin Immunol* 1999; 103: 1214–5.
6. CRESPO JF, RODRIGUEZ J, VIVES R, et al. Occupational IgE-mediated allergy after exposure to lupine seed flour. *J All Clin Immunol* 2001; 108: 295–7.
7. KANNY G, GUERIN L, MONERET-VAUTRIN DA. Risk of serious acute asthma due to lupine flour associated with peanut allergy. *Rev Med Interne* 2000; 21: 191–4.
8. MONERET-VAUTRIN DA, GUERIN L, KANNY G, FLABBEE J, FREMONT S, MORISSET M. Cross-allergenicity of peanut and lupine: The risk of lupine allergy in patients allergic to peanuts. *J All Clin Immunol* 1999; 104: 883–8.