

## CLINICAL CASES

# Angioedema induced by inhalation of vapours from cooked white bean in a child

J.C. Martínez Alonso<sup>a</sup>, A. Callejo Melgosa<sup>a</sup>, M.<sup>a</sup>J. Fuentes Gonzalo<sup>b</sup> and C. Martín García<sup>a</sup>

<sup>a</sup>Allergy Unit. Hospital Virgen de la Concha. Zamora. Spain. <sup>b</sup>Family Medicine. ZBS Zamora. Spain.

### ABSTRACT

**Background:** There are few references of allergic reaction to beans in childhood. We report the case of a seven years old boy who suffered from angioedema associated to inhalation of vapours from cooked white bean.

**Methods:** skin prick tests (SPT) were performed by prick-by-prick with cooked white bean and legumes. It was also determined total IgE and specific IgE antibodies to bean and legumes with the use of the CAP enzyme-immunoassay. Subsequently, a oral challenge test was carried out with white bean.

**Results:** The prick-by-prick with white bean was positive in our case, and negative in ten controls patients. Specific IgE in patient serum, assayed by CAP was positive for white bean and green bean. The patient developed angioedema after ingestion cooked white bean.

**Conclusion:** we demonstrated a type I hypersensitivity to white bean in a seven years old child by SPT, specific IgE antibodies and challenge test.

**Key words:** Angioedema. Green bean. Legumes. Oral challenge test. White bean.

### RESUMEN

**Antecedentes:** Hay pocas referencias de reacciones alérgicas a alubias en la infancia. Presentamos el caso de un niño de siete años que refiere angioedema asociado a la inhalación de vapores de alubias blancas cocidas.

**Métodos:** Se realizaron pruebas cutáneas por prick-by-prick con alubia blanca y legumbres. También se determinó IgE total e IgE específica a legumbres. Posteriormente, se realizó provocación oral con alubia blanca.

**Resultados:** El prick-by-prick con alubia blanca fue positivo en el paciente y negativo en 10 controles. La determinación de IgE específica fue positiva para alubia blanca y alubia verde. El paciente desarrolló angioedema tras provocación oral con alubia blanca.

**Conclusión:** Hemos demostrado una reacción de hipersensibilidad tipo I a alubia blanca en un niño de 7 años por pruebas cutáneas, IgE específica y provocación oral.

**Palabras clave:** Angioedema. Alubia verde. Legumbres. Provocación oral. Alubia blanca.

### INTRODUCTION

Legumes are an important source of proteins and their consumption is very frequent in the Mediterranean region. They are also used as food additives due to their emulsifying properties and can be present in many manufactured foods. In Spain, the consumption of several legumes is frequent and, therefore, clinical allergy to more than one species in children is common<sup>1</sup>.

#### Correspondence:

J.C. Martínez Alonso  
Unidad de Alergia. Hospital Virgen de la Concha  
Avda. Requejo, 33-35  
49022 Zamora. Spain  
E-mail: med023218@nacom.es

Legumes are dycotyledoneous plants belonging to the Fabales order. This botanical order is formed by three families: Mimosaceae, Caesalpiniaceae and Fabaceae. The white bean and green bean (*Phaseolus vulgaris*) are a member of the Fabaceae family and few cases of systemic reactions after its ingestion or inhalation of vapours in children have been reported.

We report a case of 7-year-old child who suffered two episodes of angioedema related to white bean. The first episode occurred after ingestion of this legumbre. Subsequently he presented angioedema with inhalation of vapours from cooked white bean. The symptoms responded promptly to glucocorticoids. He had no allergic personal or familiar background. He had previously been tolerating this legume without any problem. There were no previous episodes of angioedema.

## MATERIAL AND METHODS

Skin prick-test (SPT) were performed with common airborne, latex, *Anisakis simplex* (1 mg/ml), and a common food battery (IPI, Madrid, Spain and Leti, Barcelona, Spain) and standardized extracts of legumes (white bean, green bean lentil, peanut, soybean, chickpea and pea) with the allergy pricker lancet (Dome-Hollister-Stier) as described elsewhere<sup>2</sup>. Histamine phosphate (10 mg/ml) served as positive control and negative control was NaCl (0.9%). The test were read after 15 minutes and we considered a positive reaction if the wheal size was at least 3 mm diameter larger than negative controls.

A prick-by-prick test was also performed with cooked white bean. Five atopic and five non-atopic controls were tested for SPT with white bean and green bean. Atopics were defined as having a positive clinical history and a SPT reaction more than 3 mm to at least one common allergen.

Total and serum-specific IgE were measured by CAP enzyme-immunoassay (Pharmacia Diagnostics AB, Uppsala, Sweden) to identify specific IgE antibodies to various legumes. This test was considered positive when a value higher than 0.35 KU/l was obtained for the tested serum.

Subsequently, a controlled oral challenge test was performed with cooked white bean and the other legumes, to confirm clinical reactions to food ingestion. The patient was not exposed to legumes for two weeks previous to the challenge test, and he did not take any medication that might affect the test results. The challenge test is positive when objective symptoms (cutaneous, gastrointestinal or respiratory) appear within 2 hours. Subjective symptoms are

not used in diagnosis. During the procedure blood pressures, peak expiratory flow values and possible allergic reactions were monitored every 15 minutes up to three hours.

## RESULTS

Skin prick test with white bean and green bean were positive with an immediate response wheal of 8–8 mm in diameter. Prick-by-prick with cooked white bean was positive with 10 mm wheal and 15 mm erythema. The same test in ten controls patients, 5 atopic and 5 non-atopic, were negative. The rest of the skin prick test performed with other commercial food allergens, including other legumes, were negative.

Specific serum IgE against white bean (24.30 KU/l) and green bean (7.2 KU/l), with total serum IgE of 230 KU/l was demonstrated by CAP assay. In vitro test were negative with 6 control subjects (3 atopic and 3 nonatopic). Specific IgE antibodies to peanut, pea and soybean were negative (< 0.35 KU/l).

An oral challenge test with several legumes were performed showing an immediate response after ingestion of white bean, with symptoms of angioedema involving lips and tongue. The reaction was resolved using antihistamines and corticosteroids in two hours. No late response was observed. The patient tolerated chickpeas, lentils, and soybean without problems. There were no further episodes of angioedema in the patient after the withdrawal of the involved food.

## CONCLUSION

Acute reaction to food allergens is a fairly common problem that is often seen in the allergist's office, its incidence being specially high in childhood. Milk and eggs are the most common sensitizing foods, but usually the type of food allergens responsible for these reactions varies according to food habits in different countries.

Among Spanish children, sensitivity to legumes is the fifth most prevalent food allergy. Lentil and chick-pea are the most frequent cause of allergic reactions to legumes. The clinical manifestations of the allergy to legumes are similar for all legumes and range from oral allergy syndrome, urticaria, angioedema, rhinitis and asthmatic crises to anaphylaxis and even death. The allergenic composition of various legumes has been investigated.

Several authors have described cross-reactivity among different legumes and between legumes and

various vegetables probably due to profilins and lipid transfer proteins<sup>3</sup>. Ibañez et al demonstrated that peanut allergy can be associated to allergy to lentil, chick-pea and pea, but white bean and overall green bean are well tolerated by children allergic to other legumes. Pea and bean are the legumes with more in vitro cross-reactivity with *Lolium perenne*, *Olea europea* and *Betula alba*<sup>4</sup>. However, Bernhisel-Broadbent et al demonstrated that clinically important cross-reactivity to legumes in children is very rare<sup>5</sup>.

The reports on allergic reactions to legumes have been seldom reported. This food has been associated with occupational asthma in a homemaker during preparation and cooking of raw green beans<sup>6</sup>, with asthma and rhinitis induced by exposure to raw green beans and chards<sup>7</sup>, and with rhinoconjunctivitis and acute asthma associated with green beans<sup>8</sup>.

Although the vast majority of IgE-mediated allergic reactions to foods occurs through ingestion, a few cases of unexpected allergic reactions to foods may occur through the exposure to airborne food allergen particles. Kalogeromitros et al describe a child with repeated anaphylactic reactions related to lentils after ingestion of cooked lentils and one episode with inhalation exposure to cooking lentil soup<sup>9</sup>.

As a member of the legume family, the white bean is frequently associated with food allergy but the allergic reactions caused by inhalation of vapours from boiling legumes in children are rare. We report a non-atopic child, who referred two episodes of angioedema occurred after ingestion and during cooking of white beans. Type I hypersensitivity to the antigens in white beans was demonstrated by means of skin tests, specific IgE determination by CAP, and the oral challenge test corroborated it. This case is interesting because it demonstrates that a food allergen,

when inhaled, can induce cutaneous symptoms in sensitized patients.

It is important to emphasize that in spite of an evident clinical and immunological cross-reactivity, the diagnosis of legume allergy should not be based only on specific IgE tests. The decision to eliminate one legume from the diet should be based on a positive oral food challenge. In our patient, the results indicate that he has type I hypersensitivity to white bean and green bean, but he tolerated other legumes without problems.

## REFERENCES

1. Martínez San Ireneo M, Ibañez Sandin MD, Fernández-Caldas E. Hypersensitivity to members of the botanical order Fabales (legumes). *J Invest Allergol Clin Immunol*. 2000;10:187-99.
2. Malling HS, Andersen CE, Boas MB, Holgersen F, Munch EP, Weeke B. The allergy prick test. *Allergy*. 1982;37:563-7.
3. Pereira MJ, Belver MT, Pascual CY, Martín Esteban M. The allergenic significance of legumes. *Allergol Immunopathol*. 2002;30:346-53.
4. Ibañez MD, Martínez M, Sánchez JJ, Fernández-Caldas E. Legume cross-reactivity. *Allergol Immunopathol*. 2003;31:151-61.
5. Bernhisel-Broadbent J, Sampson HA. Cross-allergenicity in the legume botanical family in children with food hypersensitivity. *J Allergy Clin Immunol*. 1989;83:435-40.
6. Igea JM, Fernández M, Quirce S, de la Hoz B, Díez Gómez ML. Green bean hypersensitivity: an occupational allergy in a homemaker. *J Allergy Clin Immunol*. 1994;94:33-5.
7. Daroca P, Crespo JF, Reano M, James JM, López-Rubio A, Rodríguez J. Asthma and rhinitis induced by exposure to raw green beans and chards. *Ann Allergy Asthma Immunol*. 2000;85:215-8.
8. Parra FM, Lázaro M, Cuevas M, Ferrando MC, Martín JA, Lezaun A, Alonso MD, Sánchez-Cano M. Bronchial asthma caused by two unrelated vegetables. *Ann Allergy*. 1993;70:324-7.
9. Kalogeromitros D, Armenaka M, Galatas I, Capellou O, Katsarou A. Anaphylaxis induced by lentils. *Ann Allergy Asthma Immunol*. 1996;77:480-2.