Dermatitis Caused by Ingestion of Chia Seeds

Tomas-Pérez M[1], Entrala A[1], Bartolomé B[2], Caballero ML[1], Quirce S[1]
[1]*Department of Allergy, Hospital La Paz Institute for Health Research (IdiPAZ), Madrid, Spain*
[2]*Roxall España, Bilbao, Spain*

J Investig Allergol Clin Immunol 2018; Vol. 28(1): 46-47
doi: 10.18176/jiaci.0203

Key words: Allergy. Chia seed. Dermatitis. IgE. *Salvia hispanica*.

Palabras clave: Alergia. Semilla de chía. Dermatitis. IgE. *Salvia hispanica*.

Salvia hispanica, commonly known as chia, is a species of flowering plant in the mint family, *Lamiaceae*, that is native to Guatemala, Paraguay, Bolivia, Argentina, and central and southern Mexico. The seeds are a source of fiber, proteins, and ω-3 fatty acids. The proteins contained include globulins, albumins, prolamins, and glutelins [1]. Chia seeds are increasingly consumed because they are thought to prevent the development of cardiovascular risk factors [2], and their addition to foods such as breakfast cereals, energy bars, yogurt, and bread is increasingly frequent.

Allergy to chia seeds has been reported. One patient experienced an anaphylactic reaction after intake [3], and another developed allergic contact dermatitis to *Salvia officinalis* (*Lamiaceae*) extract [4]. However, no cases have been published to date in the literature describing other types of allergic reaction due to chia seeds. Our aim was to study a case of IgE-mediated reaction induced by chia seeds with an atypical clinical presentation (ie, eczema and dermatitis).

A 46-year-old man with a personal history of persistent allergic rhinitis and sensitization to mites and pollens was referred to our clinic. He complained of eczematous and itchy lesions on his hands that had first appeared several months earlier and coincided with the introduction of chia seeds in his diet (he ate chia with yogurt in his breakfast every day). The lesions disappeared spontaneously when he stopped eating the seeds.

The allergology work-up was peformed a few weeks after stopping ingestion. Skin prick tests showed positive results to extracts from cat dander, *Dermatophagoides pteronyssinus*, and pollens of *Platanus hispanica*, grass, and *Cynodon dactylon.* Skin prick testing with chia seed extract (10 mg/mL) was positive (3×4 mm). Total serum IgE was 521 kU/L and specific IgE (ImmunoCAP; kU_A/L) was positive to extracts of pollen from plane tree (39.3), oak (3.12), and olive (4.0), as well as to cat dander (0.73), hazelnut (2.98), walnut (1.57), peanut (2.58), white bean (2.47), green bean (3.97) lentil (1), soybean (1.43), wheat (2.09), rye (11.1), maize (2.61), oregano (0.75), sesame (2.67), latex (1.25), and rPru p 3 (5.44).

Crushed chia seeds were defatted and extracted to determine the culprit allergens. The extract underwent heating at 100ºC for 5 minutes, reduction with 5% 2-mercaptoethanol

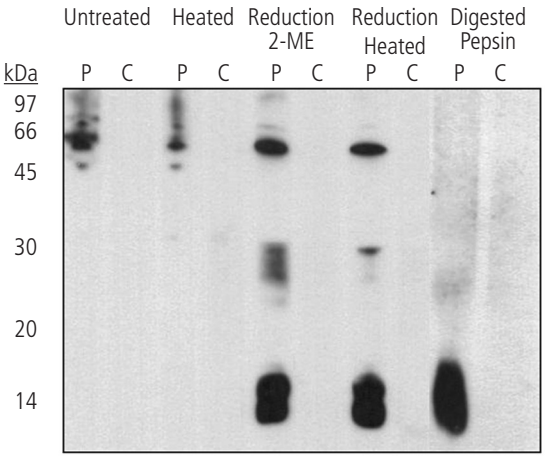

Figure. SDS-PAGE and IgE-immunoblotting performed with an extract of crushed and defatted chia seeds that underwent heating at 100ºC for 5 minutes, reduction with 5% 2-mercaptoethanol at 100ºC for 5 minutes, and digestion with pepsin at 37ºC for 30 minutes. Lane P, patient's serum; lane C, pool of sera from nonatopic controls.

at 100ºC for 5 minutes, and digestion with pepsin at 37ºC for 30 minutes. SDS-PAGE and IgE-immunoblotting were performed with the patient's serum (Figure). In the absence of treatment of the chia seed extract, the patient's serum revealed several allergens of apparent molecular weights ranging from 60 kDa to 70 kDa, although their intensity diminished after heating. As a result of reduction with 2-mercaptoethanol, a well-defined allergen of around 60 kDa appeared together with smeared bands of around 30 kDa. A further 2 allergens weighing around 15 kDa and 10 kDa were intensely detected. Finally, only allergens weighing around 15 kDa and 10 kDa remained after digestion with pepsin. In summary, the most relevant effect was that both heating and digestion of the extract with pepsin did not affect the IgE reactivity of these 2 allergens.

To the best of our knowledge, there is only 1 previous report of IgE-mediated allergy induced by chia seed with an anaphylactic reaction [3]. The authors showed that the peptide sequences of the allergens involved exhibited a high degree of homology with a lectin (29 kDa), an elongation factor (46 kDa), and an 11S globulin (31 kDa) as known allergens. A further 3 allergens with molecular weights around 25, 19, and 17 kDa were detected, although they did not share significant homologies with previously described proteins.

In the case we report, allergens of molecular weights of around 60, 30, 15, and 10 kDa were responsible for sensitization. The allergen weighing around 10 kDa proved to be resistant both to heat and pepsin digestion, features that are compatible with lipid transfer proteins (LTPs). Consequently, an LTP could be involved in the patient's sensitization to chia seeds, even though the patient did not present a typical LTP-induced reaction after ingestion, but rather symptoms such as eczema and dermatitis. Nevertheless, the patient did have specific IgE to rPru p 3 (5.44 kU_A/L), suggesting possible cross-reactivity between these proteins.

In conclusion, we report a case of IgE-mediated reaction induced by chia seeds with atypical manifestations (eczema/dermatitis).

Funding

The authors declare that no funding was received for the present study.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

1. Valdivia-López MÁ, Tecante A. Chia (Salvia hispanica): A Review of Native Mexican Seed and Its Nutritional and Functional Properties. Adv Food Nutr Res. 2015;75:53-75.
2. Sandoval-Olveros MR, Paredes-López O. Isolation and characterization of proteins from chia seeds (Salvia hispanica L.). J Agric Food Chem. 2013;61:193-201.
3. García Jiménez S, Pastor Vargas C, de las Heras M, Sanz Maroto A, Vivanco F, Sastre J. Allergen characterization of chia seeds (Salvia hispanica), a new allergenic food. J Investig Allergol Clin Immunol. 2015;25:55-6.
4. Mayer E, Gescheidt-Shoshany H, Welfriend S. Allergic contact dermatitis caused by Salvia officinalis extract. Contact Dermatitis. 2011;64:237-8.

Manuscript received July 10, 2017; accepted for publication September 28, 2017.

Margarita Tomas Pérez
Department of Allergy, Hospital La Paz
Paseo de la Castellana, 261
28046 Madrid, Spain
E-mail: margui.tomas@gmail.com