

Oat Allergy: About two Cases

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Oat (*Avena sativa*) is a cereal from the *Poaceae* family widely used in our environment due to its high nutritional value. All varieties of oats contain gluten, with a prolamin similar to wheat gliadin, called avenin. In our environment, oats are used as animal feed or as food in our diet, whether in grain, flour or oat drinks. In recent years, its use is increasing due to high nutritional properties. Despite its widely used, few cases of oat allergy have been described.

We report two cases of anaphylaxis to oat with tolerance to other cereals:

Case 1. A 14-year-old male with a personal history of atopic dermatitis and recurrent croup. He consulted because immediately after the ingestion of oat milk he presented pharyngeal, hands and foot pruritus and facial erythema without other symptoms and with a good resolution with antihistamines and corticosteroids in the emergency room.

Previously he had presented oral pruritus with the ingestion of oat. He tolerates the ingestion of wheat and other cereals.

Allergy study was performed. Skin prick-test (SPT) was done with the most common aeroallergens (dust mites, pollens, molds, pet dander) with a negative result. SPT to oat extract, being positive (6x6mm); Total Ig E (IU/ml) 80; Specific IgE (CAP kU_A/L): oat 6.79; wheat 0.38; rye, barley, corn, rice, Tri a 19 and Tri a 14 <0.35.

Case 2. A 62-year-old male with a personal history of ischemic heart disease, who developed an anaphylaxis after ingestion of oat milk. Within five minutes of taking oat milk, the patient presented oropharyngeal pruritus, dysphonia and dyspnea, followed by acute generalized urticaria, which required treatment in the emergency department with epinephrine, corticosteroids and antihistamines to resolve the symptoms. The patient did not take NSAIDs or practice exercise previously to the oat milk ingestion, and no other cofactors or possible triggers of the adverse reaction were associated. Currently he consumes all other types of cereals, except oat, without problems.

Allergy study: SPT performed with the most common aeroallergens (dust mites, pollens, molds, pet dander) were all negative. SPT performed with cereal extracts showed a positive result to oat (10x9mm), maize (10x10mm), wheat (7x6mm), rice (5x5mm) and barley (6x5); Total Ig E (IU/ml) 82.40; Specific IgE (CAP kU_A/L): oat 40.10; wheat 1.68; maize 1.61; barley 2.70 and rye 2.04.

Protein extracts from oat milk and oat seed were prepared by homogenization in phosphate buffer saline, dialyzation and lyophilization. SDS-PAGE Immunoblotting was carried out according to Laemli in reducing conditions (with mercaptoethanol) with oat seed and oat milk extracts and both patient sera. Case-1 serum revealed IgE binding bands of 35 / 34 kDa, 29.5 kDa, 28 kDa, 22.5 kDa in oat milk extract and bands of 70 kDa, 50 kDa, 35 / 34 kDa, 26 kDa, 22.5 kDa in oat seed extract. Case-2 serum detected a pair of IgE reactive bands of 55 kDa and 42 kDa in both oat extracts, in addition a faint 33-kDa band was detected in oat seed extract.

Two cases of allergy (anaphylaxis) due to ingestion of oat milk were presented, one adult and one child, demonstrating a mechanism mediated by IgE. Both patients were

sensitized to wheat, and one of them (case 2) was also sensitized to other cereals (rice, maize and barley). Both patients tolerated all other types of cereals except oats. Regarding the identity of the IgE-binding proteins detected in the immunoblotting, according to their molecular weights, the band of 34/35 kDa could correspond to an oat protein homologous to the wheat allergen Tri a 20 (molecular weight between 35-38 kDa) justifying the slight sensitization to wheat in this patient. The 22.5 kDa-band could be a 12S oat seed globulin, and the band around 50 kDa would correspond to a 48 kDa oat serpin previously described as an oat allergen in milk oat. [1,2,3]. Patient serum 2, detected only 3 bands of 55, 42 and 33 kDa.

We have found in the literature three more cases of allergy to oats [4,5,6]. Inuo *et al* described a case of anaphylaxis in a child with positive SPT against oat and wheat (although tolerant to wheat). This case resembles our first patient, describing possible allergens with molecular weight around 23kDa, 30 kDa and 35kDa, the first one which could correspond to 12S seed storage proteins, as mentioned above. On the second case could be correspond with the 33 kDa protein identified. Prados-Castaño M *et al* reported a 48-kDa serpin from oat seed, identified by proteomic technology, as the probable cause of the anaphylactic reaction after oat milk ingestion. In both cases, we describe a band around 45 kDa (42kDa) which could correspond to this previously described serpin. Finally, Ototake Y *et al* [6] described an anaphylaxis case induced by oats ingestion with the similar results in IgE-immunoblotting. They detected bands at approximately 25, 30, 33, and 45 kDa, similar by Inuo case mentioned before. In our cases we detected bands around 22.5, 34/35 kDa in case 1 and bands with 42 and 33 kDa in case 2 that could be corresponding with that.

In spite of the sensitization to other types of cereals, our patients are tolerant to them. This could be explained because cereals (wheat, oats, rye) have homologous prolamins and those of oats are less similar to each other [5].

We present two cases of allergy to oat with concomitant sensitization to other cereals but a good tolerance of them. We emphasize the importance of defining a specific sensitization profile in these patients that helps us predict the importance of possible future allergic reactions in our patients.

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Conflict of interest

The authors declare no conflict of interest.

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Figure 1. SDS-PAGE Immunoblotting. A) Oat milk extract. B) Oat seed extract. Lane P₁: Patient sera 1, P₂: Patient sera 2. Lane C: Control serum (pool of sera from non atopic subjects). Lane M: Molecular mass standard.

