



# A hidden food allergen : soy

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## Abstract

Soy products are widely used in a variety of processed foods such as meat products, sausages, chocolate and breakfast cereals. The prevalence of soy allergy in adults is unknown. The development of soy allergy in the late adulthood is rare. In adults soy allergy mostly presents either as an occupational allergy or pollen-food syndrome developed on the ground of birch sensitization. A 38-year-old female referred to Allergy Unit with a history of oral allergy syndrome (OAS), itching of the scalp and palms, generalized urticaria, rhinitis and dyspnea necessitating intervention in the emergency department in few minutes after ingestion of meat with sauce or meatball at the restaurant for ten years. She also reported to experience OAS after ingesting ready soup, chocolate, pastry and cookies. The personal history did not reveal allergic rhinitis, asthma, atopic dermatitis, drug or venom allergy. The repeated SPTs with soy revealed a remarkable wheal which is greater than the positive control. The SPT with aeroallergens including birch was found to be negative. The soy-specific IgE was noticeably positive (82.30 IU/L). We described herein an adult patient presented anaphylaxis upon ingestion of soy-containing foods in the absence of a triggering factor such as exercise, previous food allergy history, aeroallergen sensitization including birch and occupational soy exposure that make this case as unique.

**Keywords:** Anaphylaxis, soy, food allergy, adult

## background

Soy is widely used in a variety of processed foods such as meat products, sausages, chocolate, cookies, pastries, breakfast cereals, ice-cream and soy drinks, yet soy allergy is quite rare in adults [1]. It mostly presents either as an occupational allergy or pollen-food syndrome associated with birch sensitization [2,3].

Six of the twenty-eight different soy proteins were designated as "major allergens" (Gly m1- Gly m6). The Gly m3, a proflin, and Gly m4 are responsible for pollen-food syndrome in patient sensitized to birch. The Gly m1 and Gly m2 have been described to be relevant allergens in workers presenting respiratory symptoms at soy processing facility [4]. Peanut is known to share cross-reactive antigens with soy [5]. The soy allergens Gly m5 and Gly m6 named as  $\beta$ -conglycinin and glycinin, respectively were shown to be responsible for this cross-reactivity [6].

Here we described an adult patient presented anaphylaxis upon ingestion of soy-containing foods in the absence of a triggering factor such as exercise, previous food allergy history, aero allergen sensitization including birch and occupational soy exposure that made us to define this case unique.

## Case description

A 38-year-old female referred to Allergy Unit with a history of itching of mouth, scalp and palms, generalized urticaria, rhinitis and dyspnea in few minutes after ingestion of meat with sauce or meatball at the restaurants necessitating multiple medical interventions in the emergency departments for ten

years. She did not experience any allergic symptoms when she prepared a dish of meat at home. She also did not specify a previous diagnosis of an atopic disease including asthma, food allergy, taking a drug or stung by a bee before the onset of anaphylaxis. After a detailed questioning of the medical history she reported oral allergy syndrome (OAS) after ingesting ready soup, chocolate, pastry and cookies.

The skin prick test (SPT) with common commercial food allergens including peanut and aeroallergens (Stallergenes, Paris, France) was performed. The repeated SPTs with soy revealed a remarkable wheal which is greater than the positive control (Figure 1). The SPT with aeroallergens including birch was found to be negative. The soy-specific IgE measured by CAP system (Phadia, Uppsala, Sweden) was noticeably positive (82.30 IU/L, normal range: 0-0.10 IU/L). The total IgE and serum basal tryptase levels were normal (Table 1). Food challenge test with soy was not carried out due to a convincing anaphylaxis history.

## Discussion

Soy allergy usually presents as either pollen-food syndrome or occupational disease characterized with respiratory symptoms such as rhinitis and/or asthma. Twenty patients over the age of 18 with soy-related food allergy was reported in a multi center study. The major birch allergen Bet v1 specific IgE was found to be positive in 14 of them. In 4 of them remaining 6 patients both peanut specific IgE and peanut-related food allergy history were positive while other two patients had a positive peanut



**Figure 1.** Values are expressed as means of the longest and the shortest wheal diameters in the presence of erythema; soy 7 mm, positive control; 5 mm. S: soy; N:negative control; P: positive control.

**Table 1. Laboratory analyses.**

Total IgE (N: 0-87 kU/L)	83
Basaltryptase (N: <11.4 µg/L)	4.5
Soy-specificIgE (N: 0-0.1 IU/L)	82.3
<b>*Skin prick test (mm)</b>	
soy	7
negativecontrol	0
positivecontrol	5

\*Values are expressed as means of the longest and the shortest wheal diameters in the presence of erythema.

specific IgE or peanut allergy history [7,8]. Similarly, a recent multi center study aiming to assess IgE sensitization to different food related allergens in adults revealed that IgE sensitization to true food allergens not cross-reacting with pollens is rare and IgE sensitization to foods was positively correlated with the sensitization to birch pollen allergens Bet v1 and Bet v2. The prevalence of IgE sensitization to soy was found to be 2.33% despite the fact that soy is cross-reactive with Bet v1 [1].

To our knowledge two patients presenting soy related allergic symptoms in the absence of birch and/or peanut sensitizations were defined in the literature. The first one is a 29 years old male who experience anaphylactic reaction after

an effort on bicycle followed by ingestion of a soy containing Japanese drink. His medical history did not reveal atopy or food allergy. The SPT with food allergens was positive to only soy. Oral challenge with soy in resting condition was negative while food challenge associated with exercise was positive [9]. The other adult patient was a 53-year-old woman developed rhinitis followed by sudden onset of pruritus, swelling of the lips and tongue, dysphonia, shortness of breath, cough, dyspnea, wheezing and simultaneously appearing urticaria required hospitalization while cooking a processed food-sausages made of pork-meat which was learned to contain soy protein. She specified that she had noticed nasal itching and sneezing with inhalation of fumes while cooking beans some years ago. The SPT with commercial aeroallergens was negative. She had positive SPT responses to commercial food extracts of lentil, pea, bean and soy bean. A prick-to-prick test with the culprit processed food was also positive. The specific IgE measurement with CAP Immuno assay revealed positive results to soy, bean and pea [10].

Our case experienced OAS and anaphylaxis upon ingestion of foods containing soy. Different from the cases mentioned above, her symptoms were not related to a triggering factor such as exercise nor were they developed on the basis of a known food allergy other than soy.

Albeit oral provocation test could not be performed, repeatedly recorded positive prick tests, remarkably high serum soy-specific IgE level and the coherence between the history and the laboratory data, absence of allergic symptoms after removal of soy and soy products from diet as well as lacking of a factor explaining the underlying ingestion of the reactions suggested the diagnosis of soy allergy.

The patient was informed to avoid processed foods containing soy that may pose a risk for developing anaphylaxis and carry an epinephrine auto injector whenever she has her meals at a restaurant.

Although soy is not consumed as pure or in the form of soy drink in Turkey, it is a common food-additive used in restaurant sandwiches and processed foods making it a hidden allergen. It should be kept in mind that soy related food allergy may present as severe anaphylaxis in the absence of an atopic background in adults.

#### Competing interests

The authors declare that they have no competing interests.

#### Authors' contributions

Authors' contributions	MU	OA
Research concept and design	✓	--
Collection and/or assembly of data	✓	✓
Data analysis and interpretation	✓	--
Writing the article	✓	✓
Critical revision of the article	✓	✓
Final approval of article	✓	✓
Statistical analysis	--	--

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