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IgE-mediated flaxseed allergy in non-atopic toddler polysensitized to tree nuts but tolerating other seeds

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KEY WORDS

IgE-mediated allergy; anaphylaxis; flaxseed allergy; flaxseed; urticaria.

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To the Editor

Flaxseed use has been increasing worldwide for its health benefits of high content of omega-3 fatty acids and laxative effect (1, 2). While limited cases of flaxseed hypersensitivity have been described, most of them describe anaphylactic reactions in adult patients with associated atopic disease (1-5). This report presents a case of IgE-mediated allergic reaction to flaxseed in a non-atopic toddler.

An 18-month-old male patient developed a raised erythematous pruritic rash throughout his face and chest about 20 minutes after consuming a packet of oatmeal with premixed flaxseed. He consumed approximately 1,800-2,200 mg of flaxseed protein per manufacturer. The event self-resolved within 4 hours. Mother reported that she consumed flaxseed protein shakes daily during her pregnancy and lactation. However, this was the first time the patient orally ingested flaxseed.

The patient did not have a history of atopic disease. Skin prick test was performed at 24 months revealing positive peanut (11 mm wheal), walnut (13 mm wheal), cashew (7 mm wheal), hazelnut (5 mm wheal), and fresh flaxseed (10 mm wheal) with saline (0 mm wheal) and histamine (6 mm wheal). Evaluation also included measurement of serum IgE levels (**table I**). Based on history and test results, a diagnosis of IgE-mediated reaction to flaxseed was made.

The patient had never consumed: peanut, almond, hazelnut, Brazil nut, cashew, pistachio, pecan, walnut, lupine seed, chestnut, chia seed, poppy seed, hemp seed, lychee nut, or macadamia nut. He had orally tolerated without reaction: sesame seed, pumpkin seed, pine nut, sunflower seed, lentil, black bean, chickpea, green pea, and soy. He did tolerate one entire granola bar containing approximately 122 mg of flaxseed protein per manufacturer which is less than 10% of flaxseed protein the patient reacted to.

Table 1 - Laboratory results.

Laboratory testing	Result (19 months)	Result (31 months)	History
Total IgE	595 kU _A /L	396 kU _A /L	N/A
Flaxseed IgE	15.20 kU _A /L	47.50 kU _A /L	Reaction
Peanut IgE	52.00 kU _A /L	13.00 kU _A /L	Never consumed
Ara H1 IgE	2.58 kU _A /L	0.33 kU _A /L	Never consumed
Ara H2 IgE	49.30 kU _A /L	7.92 kU _A /L	Never consumed
Ara H3 IgE	1.49 kU _A /L	0.93 kU _A /L	Never consumed
Ara H8 IgE	< 0.10 kU _A /L	< 0.10 kU _A /L	Never consumed
Ara H9 IgE	4.12 kU _A /L	1.11 kU _A /L	Never consumed
Almond IgE	12.70 kU _A /L	8.80 kU _A /L	Never consumed
Hazelnut IgE	11.40 kU _A /L	11.70 kU _A /L	Never consumed
Cor a1 IgE	< 0.10 kU _A /L	1.92 kU _A /L	Never consumed
Cor a8 IgE	0.67 kU _A /L	0.34 kU _A /L	Never consumed
Cor a9 IgE	11.70 kU _A /L	10.5 kU _A /L	Never consumed
Cor a14 IgE	0.40 kU _A /L	0.34 kU _A /L	Never consumed
Brazil Nut IgE	7.08 kU _A /L	5.88 kU _A /L	Never consumed
Ber e1 IgE	< 0.10 kU _A /L	0.52 kU _A /L	Never consumed
Cashew Nut IgE	10.50 kU _A /L	7.60 kU _A /L	Never consumed
Ana 03 IgE	5.00 kU _A /L	0.41 kU _A /L	Never consumed
Pistachio IgE	15.80 kU _A /L	9.75 kU _A /L	Never consumed
Pecan Nut IgE	7.15 kU _A /L	2.42 kU _A /L	Never consumed
Walnut IgE	44.30 kU _A /L	7.20 kU _A /L	Never consumed
Jug r1 IgE	38.10 kU _A /L	5.67 kU _A /L	Never consumed
Jug r3 IgE	3.79 kU _A /L	1.02 kU _A /L	Never consumed
Soybean IgE	N/A	3.52 kU _A /L	Tolerates
Macadamia Nut IgE	4.89 kU _A /L	N/A	Never consumed

IgE: Immunoglobulin E; kU_A/L: kilounits per liter; N/A: not applicable.

A direct oral challenge for flaxseed and other nuts was offered but not performed per parents' preference. A diet avoiding flaxseed was recommended, but the patient was allowed to consume products containing trace amounts.

This is the first reported case to our knowledge of a toddler with an immediate IgE-mediated reaction to flaxseed with positive flaxseed-specific IgE in the setting of polysensitization to other seeds and nuts. Interestingly, the flaxseed-specific IgE is very high (15.20 kU_A/L, 47.50 kU_A/L) with a mildly elevated total IgE. The patient does not have any atopic conditions explaining an elevated IgE beyond food allergies. We do not have sufficient population data to determine the positive predictive value of a positive specific flaxseed IgE but our patient's laboratory values would suggest that flaxseed specific IgE in flaxseed allergic individuals runs higher than other seeds and tree nuts.

We question if this patient is truly allergic to other related foods such as peanuts and other seeds for which he has positive IgE testing. The flaxseed IgE is higher than the other food-specific IgE values, making

us suspect that this is the prominent allergen and the other positive tests may only represent sensitization and not true allergy, although IgE values are food specific and cannot be directly compared. Another case report in an adult patient is consistent with our theory that flaxseed allergy might have positive sensitization to other nuts and seeds without true allergy (2, 6). Our patient reacted to first known oral ingestion of flaxseed, suggesting that he was previously sensitized. We hypothesize that he was sensitized cutaneously as an infant from his mother who consumed flaxseed smoothies regularly (7). Given the use of flaxseed is increasing, the number of allergic reactions associated with this seed will likely increase (3). Allergists need to be aware of flaxseed allergy and more research needs to be performed on cross-reactivity among nuts, legumes, and other seeds, and positive predictive values of flaxseed specific IgE established.

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Contributions

AXA, MG: conceptualization, writing – original draft, writing – review & editing. TS: writing – original draft, writing – review & editing. JG, HAS, GK: writing – review & editing.

Conflict of interests

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