

Letter to the Editor

Dust mite ingestion–associated, exercise-induced anaphylaxis

To the Editor:

Exercise-induced anaphylaxis (EIA) was reported for the first time in 1980 by Maulitz et al.¹ The clinical picture of this physical allergy includes premonitory symptoms (diffuse warmth, itching, and erythema) followed by urticaria and angioedema that can progress to include gastrointestinal symptoms, laryngeal edema, and/or vascular collapse.² Drugs (aspirin and nonsteroidal anti-inflammatory drugs) and foods (wheat, shellfish, celery, hazelnut, soy, peanut, pea, cauliflower, and banana) taken before or after exercise have been associated with EIA,³ and individuals with this condition have a higher incidence of a personal and family history of atopy.¹

Oral mite anaphylaxis (pancake syndrome) is a generalized allergic/anaphylactic reaction caused by the ingestion of foods prepared with contaminated wheat flour containing domestic or storage mites, more often foods such as pancakes and beignets.^{4,5} It is observed in atopic individuals generally living in subtropical and tropical regions of the world; a large proportion of these susceptible subjects are intolerant to aspirin and nonsteroidal anti-inflammatory drugs.⁵

In this article we report one patient who had a clinical picture resembling EIA occurring after the ingestion of pancakes. The patient is a 16-year-old girl who experienced upper limb and later generalized itching accompanied by facial (eyelid) edema and breathlessness while playing soccer at school. Approximately 30 minutes before starting to play, she had taken lunch consisting of homemade pancakes made from a commercial pancake mixture that had been stored in a previously opened container. It

took about 15 minutes of exercising for symptoms to begin. The patient was transported to the emergency department, where intravenous corticosteroids, chlorpheniramine, and nebulized albuterol were administered; after discharge, she received oral methylprednisolone, desloratadine, inhaled budesonide, and formoterol. She had a previous medical history of asthma, allergic rhinoconjunctivitis, atopic dermatitis, and allergy to squids.

Immediate-type hypersensitivity skin tests were carried out by means of the skin prick method with commercial allergenic extracts (ALK-Abelló and Laboratorios Leti S.L., Madrid, Spain) with the following results: *Dermatophagoides pteronyssinus*, 23-mm wheal, *Blomia tropicalis*, 13-mm wheal; pancake mix extract 1:5 (wt/vol) in normal saline solution, 6-mm wheal; and histamine phosphate 1%, 6-mm wheal. Other allergenic extracts, including mold mix, Bermuda grass, ragweed, rye grass, tree mix, feathers, dog, cat, cockroach, milk, egg, wheat, oat, barley, corn, soy, peanut, orange, chicken, pork, beef, cocoa, shellfish mix, fish mix, tomato, salmon, tuna, pineapple, strawberry, and glycerosaline solution did not induce immediate cutaneous reactions (0-mm wheal).

To investigate possible cross-reactions between mites present in the pancake mixture, skin prick tests with *D pteronyssinus*, *B tropicalis* (Laboratorios Leti S.L., Madrid, Spain), *Dermatophagoides farinae*, *Acarus siro*, *Chortoglyphus arcuatus*, *Lepidoglyphus destructor*, and *Tyrophagus putrescentiae* extracts (Diater Laboratories, Buenos Aires, Argentina), as well as with pancake mix extract, were carried out in 20 unselected patients (13 female and 7 male patients) with allergic rhinitis (n = 11), rhinitis and asthma (n = 4), rhinitis and atopic dermatitis (n = 1), rhinitis and chronic urticaria (n = 1), vasomotor rhinitis

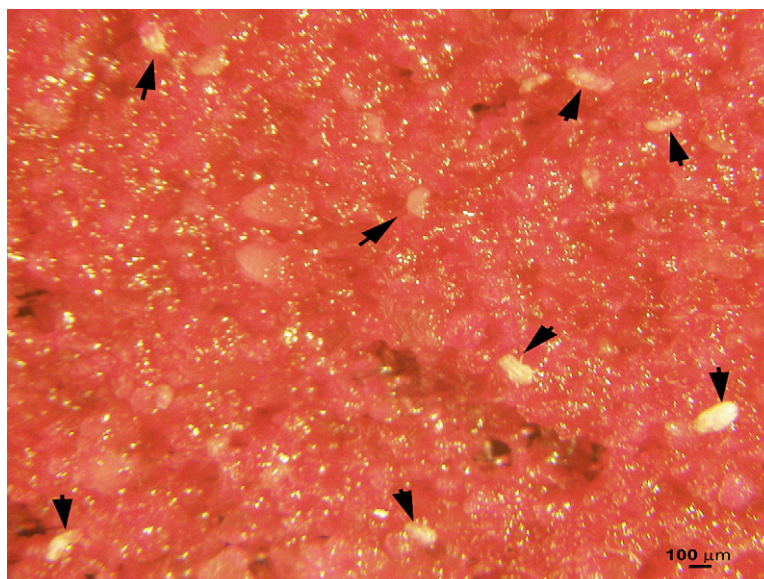


FIG 1. Mites present in pancake mix eaten by the patient. *Suidasia* species mites are stained in yellow (arrows), and wheat flour appears in red. Fucsin red staining was used.

($n = 1$), chronic angioedema ($n = 1$), or acute urticaria ($n = 1$). Two patients, one who had vasomotor rhinitis and another who had acute urticaria, did not react either to mite extracts or to *Suidasia* species-contaminated pancake mix. Seven of the remaining 18 patients reacted to various mite species but did not react to contaminated pancake mix, whereas 11 patients had positive skin prick test results to mite extracts and *Suidasia* species-contaminated flour.

Pancake flour ingested by the patient before the initiation of the clinical picture was available for study. No live contaminants were observed during direct microscopic examination of the flour. However, after clarification and staining, *Suidasia medianensis* in a concentration of 4814.8 mites per gram of flour was found (Fig 1 shows several *S medianensis* mites contaminating the flour). Levels of Der p 1 and Der f 1 in the flour were quantified by means of enzymatic immunoassay with species-specific mAbs (Indoor Biotechnologies, Manchester, United Kingdom). Der p 1 and Der f 1 levels were less than the detection level of the assays ($0.05 \mu\text{g/g}$ of flour), confirming the absence of *D pteronyssinus* and *D farinae*.

We present in this article one patient who experienced signs and symptoms of anaphylaxis precipitated by physical exercise. Wheat flour pancakes heavily contaminated only with the mite species *S medianensis* were ingested before the exercise. In our previous studies on oral mite anaphylaxis, we found a number of mite species, such as *D pteronyssinus*, *Aleuriglyphus ovatus*, *L destructor*, *B tropicalis*, and *Suidasia* species, contaminating foods made with wheat flour. The quantity of mites present in this flour is within the range of inducing anaphylaxis, as observed previously by our group.⁴ Skin prick test results were positive for *D pteronyssinus*, *B tropicalis*, and pancake mix extract and negative for other inhalant and food extracts, including wheat.

Presently the patient described in this report is under our observation, and she has been recommended not to exercise within 4 hours after eating,² to carry an EpiPen autoinjector, and to preserve the flour in the freezer as a preventive measure to avoid mite and insect contamination.⁶ She continues to practice sports without recurrence of symptoms. Both the family and the patient rejected a double-blind food challenge with the purported food.

The diversity of mite species in our environment has been recently demonstrated by Capriles-Hulett et al,⁷ who have shown the presence of several species of mites, including *D pteronyssinus*, *D farinae*, *Euroglyphus maynei*, *B tropicalis*, *S medianensis*, and other mite species, in mattress dust from allergic Venezuelan patients. Thus there is a potential risk for some of these species present in human dwellings to contaminate foods, as demonstrated by this and previous investigations.

Cross-reactivity between *Suidasia* species and other mite species has been previously investigated. The results suggested high-to-moderate degrees of cross-reactivity between *Suidasia* species and *B tropicalis* and between *Suidasia* species and *Dermatophagoides* species.⁸

We acknowledge that in our study the patients were not skin tested with a standardized *S medianensis* extract.

However, the large numbers of *S medianensis* present in the flour sample and the fact that this species was the only one colonizing the sample in the absence of wheat allergy suggested to us that these mites could be responsible for the clinical picture.

Furthermore, the allergens responsible for these reactions seem to be heat resistant, as we have previously reported.⁴ Also, it is interesting to point out that 9 of 20 additional patients tested with the contaminated flour extract did not react, suggesting that this preparation is not an irritant and does not induce false-positive skin test results.

To the best of our knowledge, there is only one report in the literature in which EIA was associated with food contaminant ingestion. This was a report of a 14-year-old asthmatic boy who presumably had 3 episodes of EIA after eating salami contaminated with the fungus *Penicillium lanoso-caeruleum* and running in the school or playing soccer.⁹

We would like to propose that dust mite ingestion-associated, exercise-induced anaphylaxis be recognized as a new disease and its diagnosis considered in allergic patients who experience anaphylactic manifestations after eating foods prepared with flour contaminated with mites and performing physical activities.

Mario Sánchez-Borges, MD^a

Victor Iraola, PhD^b

Enrique Fernández-Caldas, PhD^b

Arnaldo Capriles-Hulett, MD^{a,c}

Fernán Caballero-Fonseca, MD^a

From ^aCentro Médico-Docente La Trinidad, Caracas, Venezuela; ^bLaboratorios Leti S.L., Madrid, Spain; and ^cHospital San Juan de Dios, Caracas, Venezuela. E-mail: malsan@cantv.net.

Disclosure of potential conflict of interest: The authors have declared that they have no conflict of interest.

REFERENCES

- Maulitz RM, Pratt DS, Shocket AL. Exercise-induced anaphylactic reaction to shellfish. *J Allergy Clin Immunol* 1979;63:433-4.
- Lieberman P, Kemp SF, Oppenheimer J, Lang D, Bernstein IL, Nicklas RA. Joint Task Force on Practice Parameters. The diagnosis and management of anaphylaxis: an updated practice parameter. *J Allergy Clin Immunol* 2005;115(suppl):S483-523.
- Lewis J, Lieberman P, Treadwell G. Exercise-induced urticaria, angioedema, and anaphylactic episodes. *J Allergy Clin Immunol* 1981;68:432-7.
- Sánchez-Borges M, Capriles-Hulett A, Fernández-Caldas E, Suarez-Chacón R, Caballero F, Castillo S, et al. Mite-contaminated foods as a cause of anaphylaxis. *J Allergy Clin Immunol* 1997;99:738-43.
- Sánchez-Borges M, Capriles-Hulett A, Capriles-Behrens E, Fernández-Caldas E. A new triad: sensitivity to aspirin, allergic rhinitis, and severe allergic reaction to ingested aeroallergens. *Cutis* 1997;59:311-4.
- Codina R, Jaen C, Lockey RF. Cockroach debris in purchased flour. *Allergy* 2002;57:260-1.
- Capriles-Hulett A, Sánchez-Borges M, Fernández-Caldas E, Iraola V, Daboin de Veer M, Caplin J. Why some allergic patients develop an isolated IgE response to *Blomia tropicalis*? Genetics versus environment [abstract]. In: XXV Congress of the European Academy of Allergology and Clinical Immunology; 2006; Wien, Austria.
- Puerta L, Lagares A, Mercado D, Fernández-Caldas E, Caraballo L. Allergenic composition of the mite *Suidasia medianensis* and cross-reactivity with *Blomia tropicalis*. *Allergy* 2005;60:41-7.
- Fiocchi A, Mirri GP, Santini I, Bernardo L, Ottoboni F, Riva E. Exercise-induced anaphylaxis after food contaminant ingestion in double-blinded, placebo-controlled, food-exercise challenge. *J Allergy Clin Immunol* 1997;100:424-5.

doi:10.1016/j.jaci.2007.04.017