

**CASE REPORT**

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## Food-Dependent Exercise-Induced Anaphylaxis due to Wheat in a Young Woman

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### ABSTRACT

Food Dependent Exercise-Induced Allergy is a rare condition. However, the occurrence of anaphylaxis is increasing especially in young people. The diagnosis of anaphylaxis is based on clinical criteria and can be supported by laboratory tests such as serum tryptase and positive skin test results for specific IgE to potential triggering allergens. Anaphylaxis prevention needs strict avoidance of confirmed relevant allergen. Food-exercise challenge test may be an acceptable method for diagnosis of Food Dependent Exercise-Induced Allergy and dietary elimination of food is recommended to manage it.

In this study, a 32 year-old woman visited the allergy clinic with a history of several episodes of hives since 11 years ago and 3 life-threatening attacks of anaphylaxis during the previous 6 months. The onsets of majority of these attacks were due to physical activity after breakfast. On Blood RAST test, the panel of common food Allergens was used and she had positive test only to wheat flour. On skin prick tests for common food allergens she showed a 6 millimeter wheal with 14 mm flare to Wheat Extract. The rest of allergens were negative.

The patient was diagnosed as wheat-dependent exercise-induced, and all foods containing wheat were omitted from her diet.

In this report we emphasized on the importance of careful history taking in anaphylaxis diagnosis.

**Keywords:** Allergy; Anaphylaxis; Exercise; Wheat

### CASE REPORT

A 32-year old woman visited the allergy clinic with a

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history of several episodes of hives since 11 years ago. She told that her hives started from trunk with itchy, erythematous and edematous plaques and then spread to the whole body surface area. These plaques disappeared in one part and reappeared in other parts of her body and sometimes were associated with angioedema. This process lasted at least for 12-24

hours. She was admitted twice because of severe attacks without any specific diagnosis. During these attacks in addition to hives, she had dizziness, vertigo and palpitation. She suffered from abdominal pain during and for hours after episodes. She said that her episodes got better with rest. The onsets of majority of these attacks were due to physical activity after breakfast. The first episode that led to hospital admission happened when she was trying to catch the bus a few minutes after consumption of bread and cheese as breakfast. The second admission occurred during mountain climbing after consumption of a sandwich of butter and honey. She also described severe palpitation which led to the limitation of her physical activities. There was neither a history of other illness nor asthma, allergic rhinitis, food allergy or other atopic diseases. The family history of allergies and drug history were negative. All episodes were after physical activity and she didn't have any episodes of anaphylaxis at rest.

Careful history taking determined that before all episodes she had eaten bread, a food that is culprit in Exercise induced anaphylaxis (EIA) and there was no episode after exercise alone. So, clinically food-dependent exercise-induced anaphylaxis was considered.

On physical examination, vital signs, heart, lung, ear, nose and throat (ENT), abdomen and etc. were normal. Chest X ray, electrocardiogram, routine blood tests and also liver function tests were normal.

To evaluate specific IgE to food allergens, both Skin prick test (SPT) and western blot were done. On semi-quantitative western blot test (Euroimmun, Germany), a panel of common food Allergens (hazel nut, peanut, walnut, almond, milk, egg white, egg yolk, casein, potatoes, celery, carrots, tomatoes, codfish, crab, orange, apple, wheat flour, rye meal, sesame seed and soya beans) were used and the patient showed one plus positive test only to wheat flour. We performed all SPTs according to standard procedures, using purified allergen extracts (Stallergenes, Paris, France). Positive and negative controls were histamine and normal saline, respectively.

On SPTs for common food allergens (Milk, Egg white, Egg yolk, Peanut, Walnut, Sesame, almond, Fishes, Wheat, cereals mix, Soya, tomato, pepper, curry, orange), a 6 millimeter wheal with 14 mm flare to Wheat Extract was detected. The results for the rest of allergens were negative.

The patient was diagnosed as wheat-dependent exercise-induced anaphylaxis, and all foods containing wheat were omitted from her diet. She was also advised to read carefully the ingredients of all unknown foods and to avoid exercise for 4-6 hours after consumption of a suspected food. Based on patient history and lab tests she was advised to use other cereals like corn bread instead of wheat bread which was important in her daily diet. Adrenalin auto-injector (Epipen) and cetirizin tablets were prescribed for the emergency situations. Additional precautions included: never exercising alone, discontinuing exertion immediately when the first symptom of anaphylaxis is noted, and carrying a cell phone (mobile) for calling emergency medical services. In this case, during the five month follow up after avoiding wheat-containing foods, there was no episode of hives or anaphylaxis and the patient quality of life was significantly increased.

## DISCUSSION

Food Dependent Exercise-Induced Allergy is a rare condition. However, the occurrence of anaphylaxis is increasing especially in young people. The diagnosis of anaphylaxis is based on clinical criteria and can be supported by laboratory tests such as serum tryptase and positive skin test results for specific IgE to potential triggering allergens<sup>1</sup>. Food allergic reactions are the most common cause of anaphylaxis seen in hospital emergency departments. In many countries the most common food triggers are peanut, tree nuts, shellfish, fish, milk, egg, and sesame<sup>1,2</sup>; however, there are important geographic variations, and in some countries other foods, such as chestnut, rice and buckwheat predominate.<sup>3,4</sup>

In addition to the rapid onset of cutaneous (>95%), respiratory (50%), and gastrointestinal symptoms (25%), patients may develop cardiovascular symptoms (30%) including hypotension, vascular collapse, cardiac dysrhythmias, myocardial infarction and syncope, presumably caused by massive mast cells and basophile mediator release.<sup>5-9</sup> Food-associated exercise-induced anaphylaxis is occurring more frequently among teenage athletes, especially females.<sup>5</sup> Food dependent exercise induced anaphylaxis is a form of food allergy induced by exercise. Symptoms can include urticaria, angioedema, respiratory and gastrointestinal manifestations, hypotension and shock. Several clinical conditions may present during exercise and manifest as

## Exercise-Induced Anaphylaxis after Wheat Consumption

one or more symptoms attributed to anaphylaxis. These conditions include exercise induced asthma, physical urticaria, and exercise induced anaphylaxis. Patients who show signs and symptoms of allergic reaction as the result of physical stimuli are described as having physical allergy.<sup>6</sup> History and laboratory evaluations indicate that there are at least two subsets of this food dependent exercise related syndrome: food specific and postprandial (non specific).<sup>5</sup>

In this case, the patient had specific reaction to wheat, and had eaten wheat prior to exercise. Baker's asthma, food allergy to wheat, exercise induced anaphylaxis are different clinical forms of wheat allergy.<sup>10</sup> The pathophysiology of exercise induced anaphylaxis is poorly understood. There can be exercise induced modification of previously activated lymphocytes, which innocuous when in the gut, but enter the circulation as a result of exercise and interact with basophiles and mast cells, which release the cytokines that lead to anaphylaxis.<sup>11</sup> Increased absorption of the appropriate food antigen might also occur with exercise.<sup>6</sup> Some cases of exercise induced anaphylaxis seems to occur only in cold weather, which suggests that environmental factors are involved in certain cases and coexisting cholinergic urticaria. The diagnosis of food dependent exercise related anaphylaxis should be evident after a careful history evaluation. Most affected patients report no previous history of reaction to wheat;<sup>7</sup>

In these patients, careful questioning concerning a temporal relationship to foods may be rewarding.<sup>6</sup> Allergy skin prick tests or RAST tests are useful for demonstrating IgE sensitization to specific allergens. Serum tryptase levels are commonly normal and plasma histamine level measurement may be more useful during acute events. The threshold for degree of the exercise provoking the reaction is variable. When it's low, the clinical syndrome may be diagnosed as idiopathic anaphylaxis, when it's high, monitored exercise challenge may be able to reproduce symptoms.<sup>4</sup> Serum IgE ratio of wheat proteins is a useful test for the diagnosis of this disease. It is better to measure the concentration of specific IgE antibodies to omega-5 gliadin than wheat and gluten.<sup>12,13</sup>

Treatment of this problem is primarily preventative with avoidance of eating the culprit allergen at least 4-6 hours prior to physical activities. Portable Epinephrine and oral antihistamines are also advised. Elimination of causative food from diet is useful for prevention of disease.<sup>1,2,5,6</sup>

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