



Food Dependent Exercise Induced Anaphylaxis: A Case Report from Saudi Arabia

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General Note

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ABSTRACT

Introduction: Food dependent exercise induced anaphylaxis is a rare, potentially fatal yet under-recognized condition in which patients develop anaphylaxis only if they exercise within a few hours of food ingestion.

Case presentation: We present a case of food dependent exercise induced anaphylaxis in a 23 years old Saudi girl. She had three episodes of anaphylaxis, all happened during exercise that was preceded by food ingestion. Skin prick test confirmed wheat to be the causative allergen. Avoidance of this food before exercise resulted in absence of further reactions.

Conclusion: Food dependent exercise induced anaphylaxis should be considered in otherwise unexplained anaphylactic reactions. Accurate diagnosis and identification of the causative food allergens will lead to life-saving preventative strategies.

Keywords: food, allergy, wheat, exercise, anaphylaxis, Saudi Arabia

Abbreviations: FDEIA- Food dependent exercise induced anaphylaxis

1. INTRODUCTION

Anaphylaxis is a rapid onset systemic allergic reaction that may lead death. Most often, it occurs after contact with an allergen, and it involves 2 or more systems: skin/mucosal, respiratory, gastrointestinal, or cardiovascular systems.(1) Identification and avoidance of allergen together with carriage of an epinephrine auto-injector are the mainstay treatment strategies.(2) In a large published series, the causes of anaphylaxis were found to be drugs (35.3%), food (21.3%), food-dependent exercise-induced (13.2%), idiopathic (13.2%), insect stings (11.8%), exercise-induced (2.9%), blood products (1.5%) and latex (0.7%).(3)

Food-dependent exercise-induced anaphylaxis (FDEIA) is an unusual form of exercise induced anaphylaxis. It occurs only when the patient exercises within 2-4 h of ingesting a specific food, or occasionally, any food. Neither the exercise alone nor food intake alone can produce the anaphylactic reaction. We present a case of FDEIA in a 23 –year old girl with convincing clinical history and skin test results. To the best of our knowledge, this is the first reported case of FDEIA from Saudi Arabia.

2. CASE PRESENTATION

A 23 years old Saudi Arabian girl was referred to the allergy clinic at King Abdul Aziz University Hospital in December 2015 due to anaphylactic reaction. She developed a sudden onset urticarial rash, dyspnea and wheezing, followed by extreme fatigue and eventually collapsed. This happened few minutes after started running on treadmill in an indoor gym. Her symptoms resolved spontaneously over 1 hour. Two hours before the exercise, she had chicken tortilla sandwich, including white bread, lettuce, garlic, chicken, and French fries.

She described having two similar but milder attacks within the last year. The first attack developed while exercising on a stationary bike, 3 hours after having lunch consisted of rice, lamb, and bread. The second attack developed while running on a treadmill also a few hours after having a meal. She did not take any medications, specifically NSAIDs, before these attacks. There was no relation between the attacks and her menstrual periods. Interestingly, she is able to consume all these foods with no reactions if it was not followed by exercise. Also, she is able to perform exercise if it was not preceded by any food ingestion for at least three hours. Review of her past medical history was only significant for mild allergic rhinitis that was controlled on occasional antihistamines.

In the clinic, her physical exam revealed an average healthy 23 years old female but otherwise unremarkable. Investigations showed positive skin prick test to wheat and dust mite. Serum specific IgE was positive to house dust mite and shellfish mix. Total IgE was 383.

Of note, she was able to tolerate bread in the past. Since her last reaction, she was able to tolerate bread ingestion that was not followed by exercise. there was no shellfish ingestion preceding her attacks. Moreover, she was able to tolerate shellfish before and after her last episode. Interestingly, serum specific IgE to wheat was not detected.

We instructed her to carry epinephrine auto injector during exercise. We advised her to avoid food ingestion, specifically wheat, for at least 4 hours before exercise and to resume exercise gradually. During the next 2 months, she was able to perform 2 moderate-level exercise sessions with no further reactions.

3. DISCUSSION

In 1979, Maulitz *et al* first described FDEIA, as a late allergic reaction to shellfish that was triggered by vigorous exercise.(4) Physical exercise alone can elicit anaphylaxis. This is known as exercise-induced anaphylaxis. Occasionally, in some individuals, additional cofactors are required to develop symptoms. Food-dependent exercise-induced Anaphylaxis is becoming more protuberant.(5)

Some individuals develop anaphylaxis only when specific food is ingested prior to exercise. This is classified as specific FDEIA. However, certain patients will develop symptoms when exercise within few hours of any food ingestion, regardless of the type of food eaten. This condition is called nonspecific FDEIA.(6) In specific FDEIA, wheat, shellfish, tomatoes, peanuts, and corn are among the most commonly involved foods. However, a wide variety of foods have been associated with this condition, such as milk, rice, fruits, lettuce, seeds, peas, soybean, beans, and various meats.(7)

As in other types of anaphylaxis, clinical presentation of FDEIA is variable and may involve several systems. However, the reaction will only develop when the affected individual perform exercise within minutes to a few hours of food ingestion. Usually, signs and symptoms of anaphylaxis develop during exercise. However, there are cases in which anaphylaxis developed just after exercise.(7)

Several cofactors have been described that may enhance the risk of developing anaphylactic reactions. These include the use of aspirin and non steroidal anti inflammatory drugs, stress, menstruation, and environmental factors such as high pollen counts and extremes of humidity and temperature.(8-10) Most patients with specific FDEIA have identifiable specific IgE to the culprit foods either by skin prick testing or immunoassays. As such, FDEIA is believed to be an IgE mediated hypersensitivity reaction to food allergens.(7)

There are several theories about the pathophysiologic changes that occur during exercise which may precipitate the attacks, although the exact underlying mechanism is unknown.(11) Exercise may alter expression of certain enzymes and cytokines. This may lead to changes in food processing and hence an increase in the immunogenicity of food allergens. Morito E *et al* found increased

sensitivity to omega-5-gliadin in 80% of patients with wheat-dependent EIA [and the rest to high molecular weight glutenin].(12) Palosuo et al described modification of this gliadin by tissue transglutaminase (tTG), which results in the formation of large peptide complexes. These complexes have increased IgE crosslinking capacity.(13)

Moreover, IL-6 enhances tissue transglutaminase expression. Marathon-level exercise was associated with hundred-fold increase in IL-6 levels as it is actively released by skeletal muscles contraction and peritendinous tissue during vigorous exercise. However, such significant increase in circulating IL-6 is less likely in lower levels of exercise. During exercise, permeability of the gut tract may increase, allowing for increased absorption of food allergens. Non steroidal anti inflammatory drug can also induce similar physiologic changes to the gut tract. Addition of Aspirin 500 mg resulted in increased rate of positive food/exercise challenges.(10) During physical exercise, blood flow is redistributed from the viscera to skeletal muscles and skin, which may contain different phenotypes of mast cells, resulting in increased potential for anaphylaxis.(11)

FDEIA is usually diagnosed based on typical history, including assessment of all contributing factors, as well as evidence of sensitization to food allergens, and exclusion of other similar conditions. Serum specific IgE to suspected food allergens should be done if skin testing is negative or not possible.(14) If wheat is suspected, fresh food skin testing, as a paste of wheat flour, might be more sensitive than the commercially available extracts for skin prick testing. Measurement of IgE to omega-5-gliadin might be more sensitive to wheat specific IgE as well.(15) Serum tryptase is elevated immediately after the onset of symptoms. This should be repeated later on to confirm absence of persistently elevated baseline serum tryptase levels, a condition that may indicate an underlying mast cell disorder.

Food/exercise challenge may confirm the diagnosis. Unlike food allergy, however, a negative challenge does not reliably exclude the diagnosis. There is no unified protocol for food/exercise challenge. Bruce protocol used in cardiac stress tests have been applied with variable results.(4,13)

The mainstay management of FDEIA is avoidance of ingestion of causative foods within four to six hours of exercise. In non-specific FDEIA, patients are advised to avoid all foods within few hours of exercise.(14) Patients must cease all physical exertion at the first sign of a reaction. Patients must understand the importance of stopping all exertion at the first sign of symptoms. A personalized emergency plan and epinephrine auto injector should be provided to the patient. Patients should exercise with a partner who can recognize and treat symptoms, or educate teachers, coaches or gym supervisors about the disorder and its treatment. Prophylactic H1 antihistamines are not effective in the majority of patients, although a few patients appear to benefit.(14) Treatment of the anaphylactic reaction in FDEIA follows the usual protocol of anaphylaxis management.(17)

4. CONCLUSION

Despite its low prevalence, FDEIA is an increasingly important differential to consider in anaphylactic events. Lack of awareness of the diagnosis of FDEIA by many physicians will potentially lead to wrong diagnoses and management plans, and unnecessarily limit the patient's diet and routine exercise. We are describing the first case of FDEIA in Saudi Arabia and we believe that physician awareness and strategies are needed to ensure accurate diagnosis and management of this condition.

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