

Table 1
Primary and State School Teachers' Knowledge of the Management of Anaphylactic Reactions^a

Question	No. (%) of teachers			
	Total (N = 92)	Public school (n = 52)	State school (n = 40)	P value
What is the initial action to do in the event a serious allergic reaction?				
I call 061/112	70 (76.1)	42 (80.8)	28 (70)	.35
Should children with serious allergies wear something alerting others to their allergy?				
Yes	55 (59.8)	33 (63.4)	22 (55)	.36
What is the initial drug to be used in the event of a life-threatening allergic reaction?				
Adrenaline	27 (29.3)	15 (28.8)	12 (30)	.16
How should adrenaline be administered?				
Intramuscular	40 (43.5)	15 (28.8)	25 (62.5)	.008
Is there an action plan to be used in the event of a serious allergic reaction in your school?				
Yes	66 (71.7)	34 (65.4)	32 (80)	.17
Are the emergency medications to be used in the event of a serious allergic reaction available in your school?				
Yes	67 (72.8)	30 (57.7)	37 (92.5)	.001
What is the correct order of actions to take in the event of a life-threatening allergic reaction?				
He/she could make the correct order ^b	48 (51.2)	27 (51)	21 (52.5)	.055

^aOnly right answers have been included.

^bWhen the typical symptoms of anaphylaxis were identified, teachers called emergency services after (or not) administering epinephrine.

first aid kits of schools because many children have their first allergic reaction in a school setting¹⁰; and (5) to insist that from the moment the teacher calls emergency services to communicate an emergency situation, the medical coordinator who tells them what to do over the telephone is fully responsible for this situation, exonerating the teacher of any responsibility.⁴

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Exercise-induced anaphylaxis associated with the use of bee pollen



The use of alternative and complementary medicine, including herbal supplements, is widespread in the United States. Some supplements have been associated with allergic reactions, even anaphylaxis. One such over-the-counter (OTC) supplement is bee pollen. This product is derived from pollen loads collected by honeybees and held together via enzymes secreted in the saliva of the bees. It contains various pollens that can vary based on the path of the individual insect as well the geographical location and associated plant species. Various beneficial effects of bee pollen have been hypothesized, such as anti-inflammatory, anti-oxidative, and even anti-carcinogenic effects.¹

Prior cases of allergic reaction to bee pollen have been reported.^{2–4} These reactions are typically immediate IgE-mediated hypersensitivity reactions following ingestion of the supplement. The composition of bee pollen has been evaluated and has been shown to contain multiple pollens such as ragweed, mugwort, willow, and fungi such as *Alternaria*.²

To the best of our knowledge, we report the first case of exercise-induced anaphylaxis associated with the use of bee pollen.

A 40-year-old man presented for evaluation of a single episode of anaphylaxis to the outpatient Allergy and Clinical Immunology Clinic at a tertiary health care center. The patient had developed nasal congestion, rapidly followed by shortness of breath, hives, and tongue and hand swelling during a strenuous outdoor run in the autumn. Symptoms began after approximately 2 miles. The patient returned home and took a dose of diphenhydramine. The respiratory

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symptoms and hives resolved over the subsequent 45 minutes, and the angioedema gradually resolved over several days (Fig 1).

The patient had started taking the supplement bee pollen once daily for approximately 1 month before the episode. The bee pollen was purchased from a farm in Ohio. On the day of this episode, the patient had taken the bee pollen supplement approximately 2 hours before his run.

The patient had no prior episodes of allergic symptoms with either bee pollen ingestion alone or exercise alone. He was an athletic individual who frequently engaged in strenuous physical activity such as long distance or marathon running.

The patient did have a history of seasonal allergic rhinitis, with symptoms predominant in the autumn. He denied any history of asthma, urticaria, angioedema, food allergies, *Hymenoptera* allergy, or anaphylaxis.

On skin prick testing, the patient had a 5-mm wheal with 20-mm flare reaction to a prepared slurry of the bee pollen supplement with a positive histamine control of 5-mm wheal and 22-mm flare. He also demonstrated positive skin testing to black willow, cocklebur, marsh elder, and ragweed. Spirometry was obtained, and the result was normal, with forced expiratory volume in 1 second (FEV₁) of 101% predicted, FEV₁/forced vital capacity of 94% predicted, and no bronchodilator response.

The patient was instructed to discontinue the use of bee pollen. He was prescribed self-injectable epinephrine. As a prudent measure, he was instructed to carry the epinephrine during exercise. Within the subsequent year, the patient did not experience any further episodes of anaphylaxis and continued to exercise regularly.

This represents a case of exercise-induced anaphylaxis dependent on the prior ingestion of bee pollen. This reaction was most likely caused by pollens such as ragweed or other weeds contained in the supplement. The specific composition of this bee pollen is not available, because the product is unregulated and may vary in its components.

Anaphylaxis has been previously reported with ingestion of bee pollen. In addition, exercise-induced anaphylaxis has been well described both in isolation and in the context of food-dependent factors. Although the mechanism of food-dependent exercise-induced anaphylaxis is not fully understood, a variety of mechanisms have been proposed. After ingestion of a food to which an individual is sensitized, exercise lowers the threshold for mast cell degranulation, possibly via increasing gastrointestinal permeability or osmotic effects.⁵ Thus typically it is recommended that these individuals avoid

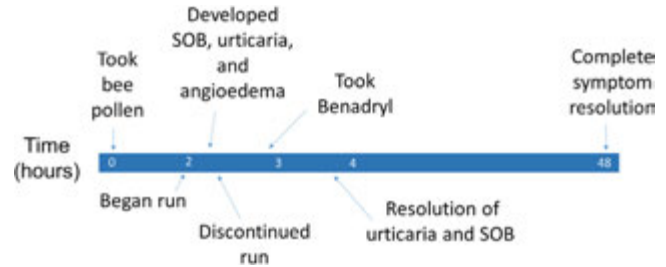


Figure 1. Timeline of events.

exercise for 4 to 6 hours after ingestion of the culprit foods. This case highlights that less common augmenting factors such as health supplements should be considered in the evaluation of exercise-induced anaphylaxis.

Patients, especially atopic individuals, should be made aware of the potential risks, such as serious allergic reaction or anaphylaxis, when taking trendy over-the-counter supplements. We recommend that health care providers discuss all medications, including over-the-counter supplements with patients at every medical visit. Patients that are diagnosed with exercise-induced anaphylaxis should avoid all augmenting factors at least 4 to 6 hours before exercise.

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Omalizumab as single-dose therapy for vernal keratoconjunctivitis



Vernal keratoconjunctivitis (VKC) is a bilateral inflammatory ocular condition often brought on by an allergic response. Patients with VKC commonly exhibit ocular symptoms such as photophobia, redness of the eyes, itching, discharge, and lacrimation, which can have profound effects on quality of life. The pathogenesis of the disease is both immunoglobulin E (IgE) and non-IgE mediated, invoking several hypersensitivity mechanisms. The treatment for VKC is mainly centered on symptom control with the use of antihistamines, calcineurin inhibitors,

and corticosteroids. Although these treatments are able to mitigate the effects of the IgE-mediated response, they are sometimes helpful but not always effective, and they may come with an extensive array of adverse effects when using long-term corticosteroids. In recent years, omalizumab, an anti-IgE monoclonal antibody, has been seen to have promising results in both adults and children in treatment of VKC both effectively and without excessive adverse effects.^{1–7} The orbits are an immunologically privileged site that is mediated by various mechanisms, such as physical barriers of the blood-retina barrier, the blood-aqueous barrier, and lack of efferent lymphatics, which prevent entry and exit of large molecules into and out of the eye.⁸ What the pharmacokinetics and pharmacodynamics are in the various

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