

CASE REPORTS

Pollen-food syndrome during pediatric age: a case series

Síndrome Pólen-frutos em idade pediátrica: uma série de casos

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ABSTRACT

Introduction: Pollen-food syndrome (PFS) is an immunoglobulin E-mediated reaction, caused by cross-reactivity between pollen and antigens of foods such as those in fruits, vegetables, and/or nuts, in patients with pollinosis.

Aims and Methods: The aim of this study was to present clinical manifestations of PFS, using a case series of six pediatric patients with PFS and pollen allergy referred to our Allergy and Clinical Immunology Department.

Results: The age at diagnosis ranged between 10 and 17 years old, and three of the patients were male. All patients reported experiencing oral allergy syndrome. The main foods reported as triggers were apple, peach, pear, kiwi and banana. The allergic diagnostic workup revealed sensitisation to PR-10 and profilins, the main proteins involved in PFS. Currently, all patients remain asymptomatic after the fresh fruits' eviction.

Conclusion: We emphasize the importance of recognition of this entity to provide an adequate management.

Keywords: cross-reactivity; food allergy; pediatric age; pollen-food syndrome

RESUMO

Introdução: A síndrome pólen-alimento (SPF) é uma reação IgE mediada, causada pela reatividade cruzada entre o pólen e antígenos alimentares (frutos e vegetais crus) em doentes com polinose.

Objetivos e métodos: O objetivo deste estudo foi apresentar as manifestações clínicas da SPF, ao analisar seis doentes pediátricos com diagnóstico de polinose e SPF, referenciados ao Departamento de Imunoalergologia.

Resultados: A idade ao diagnóstico variou entre os 10 e os 17 anos e três dos doentes eram do sexo masculino. Todos os doentes referiram síndrome de alergia oral. Os principais alimentos desencadeantes foram a maçã, o pêssigo, a pera, o kiwi e a banana. A investigação diagnóstica alérgica revelou sensibilização ao PR-10 e às profilinas, as principais proteínas envolvidas na SPF. Atualmente, todos os doentes permanecem assintomáticos após a evicção dos frutos frescos.

Palavras-chave: alergia alimentar; idade pediátrica; reatividade cruzada; síndrome pólen-frutos

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INTRODUCTION

Pollen-food syndrome (PFS), previously known as oral allergy syndrome (OAS), is typically characterized by symptoms restricted to the oral cavity, mainly presenting as immediate mild oropharyngeal itching or swelling.⁽¹⁾ More rarely, an association with systemic reactions, like anaphylaxis, can be present.^(2,3) PFS is an immunoglobulin E-mediated reaction, triggered by cross-reactivity (CR) between pollen and food antigens (particularly raw fruits and vegetables) in patients with seasonal allergic rhinitis or rhinoconjunctivitis.⁽⁴⁾ This cross-reactivity occurs due to the heat labile and homologous allergens in raw plant foods.⁽⁵⁾ The specific cross-reactivities in PFS vary and are influenced by both the pollen source and local dietary habits.⁽¹⁾ The primary antigens involved in PFS include the PR-10 family, profilins and plant lipid transfer proteins (LTPs).⁽⁶⁾ Many of these pan-allergens such as PR-10-like proteins and profilins, are labile to heat and digestion.⁽⁶⁾ PFS can occur at any age, and according to literature, its prevalence may be higher than previously thought, with an estimated prevalence of 4.7-20%, especially among school-age children.⁽⁷⁾

CASES DESCRIPTION

We analysed the clinical data of six patients previously diagnosed with PFS, followed in our Allergy and Clinical Immunology Department (Table 1.). The age at diagnosis ranged between 10 and 17 years old, and three patients were male. None of the patients had any relevant

medical or surgical history, nor a relevant familial history of allergies.

According to the Allergic Rhinitis and its Impact on Asthma (ARIA) Guidelines, four patients had persistent moderate-to-severe allergic rhinitis due to grass pollen, one had intermittent moderate-to-severe allergic rhinitis due to grass pollen, and one had persistent mild allergic rhinitis due to grass pollen. Regarding food allergies, all patients initially reported mild oral symptoms triggered by a single fruit ingestion, and upon consequent later ingestions of several different fresh fruits, experienced a worsening progression of those initial symptoms. The main foods reported as an OAS trigger were apple, peach, pear, kiwi and banana.

The diagnostic workup at the Allergy and Clinical Immunology Department, initially included: prick tests to standard aeroallergens and fresh fruit, along with prick-to-prick testing with culprit foods. Due to the polysensitization observed in these patients, an Immuno-Solid-Phase Allergen Chip (ISAC) test was performed to clarify the specific molecular allergens involved in the disease and accurately ascertain which foods should be evicted from their diets. Given the ISAC test, the following results were shown: a high and true sensitization to grass pollen (Phl p 1,2,5,6,11); a cross-reactivity sensitization to profilins (Phl p 12, Bet v 2, Hev b 8) in four patients; sensitization to PR-10 protein (Bet v 1, Mal d 1, Pru p 1, Act d 8) in two patients; and in three patients that reported kiwi as a trigger, there was a sensitization to a major kiwi allergen, Act d 1. This cysteine protease is a marker of primary sensitization to kiwi and is not considered a panallergen. All patients have remained asymptomatic upon eviction of fresh fruits and have tolerated these fruits in cooked form, except for the patients with primary kiwi allergy.

Table 1 - Characterization of patients with PFS.

* - According ARIA Classification; ¥ - Main food report as a trigger; a - Positive results; # - Allergen immunotherapy.

Sex	Age	Rhinitis classification*	Manifestations of food allergy	Trigger Food*	Prick test and Prick-prick to fresh fruit ^a	Molecular sensitization profile	AIT [#]
F	10	Persistent moderate/severe	Lip redness and itching	Kiwi and cherry	PT: kiwi, peach, apple PP: kiwi	Phl p 1, 5, 6, 11, 12; Bet v 2, Hev b 8, Act d 1	Grass pollen
M	10	Persistent moderate/severe	Lip redness, swelling, oropharyngeal itching	Apple, peach and kiwi	PT: apple, peach PP: kiwi and peach	Phl p 1, 5, 6, 11, 12; Bet v 2, Hev b 8, Act d 1	Grass pollen
M	12	Persistent moderate/severe	Lip redness, swelling, itching	Pear, apple and peach	PT: banana, pear, apple, peach PP: peach	Phl p 1, 5, 6, 11, 12; Bet v 2, Hev b 8	Grass pollen
F	15	Persistent moderate/severe	Oropharyngeal itching	Apple, cherry, pear, kiwi	PT: pear, apple, peach, orange PP: kiwi and apple	Phl p 1, 5, 6, 11, 12; Bet v 2, Hev b 8, Act d 1	Grass pollen
F	15	Intermittent moderate/severe	Lip redness, swelling, itching	Apple and kiwi	PT: pear, apple, peach, mango PP: negatives	Bet v 1, Mal d 1, Pru p 1, Act d 8	-
M	17	Persistent mild	Lip swelling and itching	Peach and kiwi	PT: banana, apple, peach, kiwi PP: apple and peach	Bet v 1, Mal d 1, Pru p 1, Act d 8	-

DISCUSSION

Despite the PFS incidence in pediatric age remains unclear, a limited number of pediatric studies report incidences ranging from 5% to 48%.⁽⁸⁾ The increase in allergic rhinitis cases in recent years suggests that PFS may follow a similar trend. The mechanism behind PFS involves CR between pollen and food allergens. The first requirement for this CR is the presence of allergic rhinitis with pollen sensitization⁹. The “second step” is contact with raw fruits and vegetables that share allergenic epitopes with pollens. The pollen-specific IgE recognize homologous food allergens that share those same epitopes and trigger oral allergy syndrome (OAS). The main food allergens causing IgE sensitization in PFS are classified as class 2 food allergens, in which their structure is homologous to plant proteins such as pollen allergens. Also called panallergens, the most typical are the profilins and the PR (pathogenesis related protein)-10 group, which are heat and protease sensitive.⁽¹⁰⁾ Due to regional differences in pollen distribution, it has been shown that the incidence of PFS and related foods varied between geographic regions, with PR-10 being more frequent in Central and Northern Europe, and profilins in southern Europe. The mainly causal foods in PFS are kiwi, pineapple, peach, and apple.

However, despite in a typical PFS in southern Europe being due to profilins, in our cases we observed a sensitization to both profilins and PR-10 in two patients. A sensitization to Act d 1, the major kiwi allergen and a protein stable to heat and digestion was observed in three patients. Act d 1 seems to be responsible for OAS symptoms when consuming kiwi, and, despite having been associated with severe systemic reactions, in these cases, no patient reported systemic symptoms.⁽¹¹⁾ In those three patients, we presumably assume that they have an SPF, and at the same time an IgE-mediated kiwi allergy.

The pollen immunotherapy in OAS looks promising enough although remaining somewhat controversial. Some studies, particularly those in patients with birch pollen immunotherapy, have demonstrated a decrease of both rhinitis/rhinoconjunctivitis and PFS symptoms.⁽¹²⁾ In this study, four-patients with-persistent moderate-to-severe rhinitis and the major allergens to *Phleum pratense* were prescribed grass pollen immunotherapy, which reduced of nasal symptoms, but we cannot yet extrapolate about the improvement of oral symptoms with raw fruits.

Patients typically tolerate cooked fruits, with exception for kiwi fruit. Act d 1 is the major kiwi allergen and is stable to heat and digestion. It was associated with severe systemic reactions in Northern Europe.⁽¹³⁾ Although only OAS symptoms were observed in our patients, systemic reaction remain a possibility, highlighting the need for eviction of both raw and cooked kiwi fruit. Here, the using of component-resolved diagnostics is clearly important, because it allows the identification of different proteins within the same food, proteins that will trigger different symptoms, different risks at the time of ingestion or in the way of ingesting the food, enabling

individualized management plans.

We believe it is crucial to recognize PFS not only in the adult population, but also within children and adolescents, in order to promote a correct diagnosis and management of PFS for the patients and their families. Since PFS symptoms are generally mild and transient, patients may choose to tolerate them, avoid the trigger food and may not report symptoms unless specifically asked, potentially leading to underestimation of PFS frequency in children.-

We want to emphasize the importance of recognizing that different allergens can produce similar symptoms in the same patient. Immunotherapy to pollens is not an effective treatment for PFS, and although oral IT to foods seems more promising, large, controlled studies concerning the effect of Immunotherapy in PFS are needed.

AUTHORSHIP

Francisca Cunha - Conceptualization; Formal Analysis; Investigation; Methodology; Writing – original draft

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