

CASE REPORT

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Oral Immunotherapy to Wheat in Allergic Asthmatic Female: A Case Report

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ABSTRACT

Wheat is the most commonly grown cereal. Immunological reaction to wheat may be IgE or T-cell- mediated. Asthma could be induced by inhaled flour or by exposure to allergens present in bakery products. In patients with IgE-mediated allergy to wheat proteins there is no specific therapy, except oral immunotherapy (OIT). There are few data regarding OIT with wheat protein in allergic patients.

We present a case of a 32-yearold female patient, who worked for 5 years in wheat and bakery products industry, who developed an occupational asthma and chronic urticaria after flour inhalation or ingestion of foods that containit.

The patient underwent wheat OIT, that was well-tolerated with no severe reaction during treatment.

We may conclude that wheat OIT is a safe therapy and may induce symptoms improvement in allergic asthma and urticaria in patients with wheat allergy. Wheat OIT may induce tolerance to allergic patients.

Key words: Asthma; Oral immunotherapy; Wheat allergy

INTRODUCTION

Wheat is the most common crop and is widespread all over the world. In genetically predisposed individuals it may cause immunological disorders, either IgE or T-cell mediated.¹ IgE mediated reaction to wheat may be produced by inhalation or ingestion of

allergens.^{1,2}

Baker's asthma is the most common form of wheat allergy.² The respiratory manifestation of wheat allergy is more common in persons who are exposed for several hours to flour or bakery products.¹ There was also proven that respiratory IgE mediated reactions to wheat are more common in patients with atopy,² being demonstrated a cross-reactivity between wheat flour and grass pollen due to common IgE epitopes.³

Most of the patient with asthma and/or rhinitis tolerate wheat intake, but they have symptoms when they inhale the allergens.² The management of IgE-mediated wheat allergy is based on avoidance of both

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food and inhaled wheat allergens, in order to prevent the occurrence of anaphylaxis.¹ Regarding specific treatment there are few data related to specific immunotherapy to wheat. If specific immunotherapy has a clear indication for respiratory allergic diseases, in case of food allergies the existing data are inconsistent.⁴ In patients with IgE-mediated allergy to wheat protein there is no standardized immunotherapy, but there are few cases treated with oral immunotherapy⁵⁻⁷ The major limitation of OIT widespread use is related to its safety concerns, since almost 10% of the patients following this immunotherapy developed systemic reactions that require epinephrine administration.⁴

The aim of this case presentation is to underline the possibility to induce a safe tolerance in a patient with allergy to wheat proteins.

CASE PRESENTATION

We present the case of 32-year-old female patient, who worked since the age of 24, for 5 years in wheat and bakery products industries. She had had a personal history of mild allergic rhinitis for 12 years (since 12 years old), before she started her work in a bakery, but she developed asthma after 4 years (at the age of 28 years). In the last 5 years she has had also a chronic urticaria.

During the last year of working period her asthma

had constantly worsen, with frequent exacerbations. She was evaluated for asthma and rhinitis and received a chronic therapy with antihistamines, intranasal and inhaled corticosteroids for few months. At the age of 29 she stopped working in the bakery industry because of asthma exacerbations. After that she began to present rhinitis and asthma symptoms at home when she cooked bread or cakes using flour. In the last 5 years she also presented urticaria after ingestion of bakery products and in the last months she also presented asthma symptoms after ingestion.

At presentation she had no respiratory symptoms under aforementioned treatment, but she had mild urticaria.

Skin prick test (SPT) was performed. We noticed a mild sensitization for *dermatophagoides farinae* (wheal 5 mm) and an intense one for wheat (wheal 12 mm) (Figure 1). Spirometry was performed and FEV1 was over 87% from predicted values.

Wheat allergy was confirmed due to positive SPT. We also determined specific IgE for wheat. The detected value was 18.6 kU/l. Anti-transglutaminase IgA and anti-endomysium antibodies were negative, so we excluded a celiac disease. Based on the clinical picture (rapid onset of symptoms after wheat ingestion, with no relation to physical effort) and negative specific IgE to recombinant omega-5 gliadin we also excluded wheat-dependent exercise-induced anaphylaxis (WDEIA).



Figure1. Skin prick test performed in the patients was positive for wheat (1) and *dermatophagoides farinae* (2)

Oral Immunotherapy to Wheat

We performed a double-blind-placebo controlled wheat challenge (DBPCFC) test using 4 g of pasta. The patient presented mild asthma exacerbation treated with 2 puffs of salbutamol, rhinorrhea and urticaria, treated with desloratadine 5 mg. DBPCFC for wheat was positive.

An elimination diet was recommended for 2 months. Her urticaria and asthma symptoms improved significantly, but she was unsatisfied with her diet. Because the quality of life for this patient was affected we decided to start oral immunotherapy to wheat, trying to improve the control of her disease.

After having signed an informed consent, the patient underwent wheat OIT. We started OIT with 1 g pasta that was maintained for 7 days at home. The dose increasing was performed weekly for 8 weeks, in the Allergy Department by doubling the previous dose, up to 128 g. During the dose increasing period, the patient had mild symptoms of rhinitis within the first 4 weeks, with no severe reactions. In this period of time the patient continued aforementioned chronic treatment.

The dose of 128 g was maintained for 6 months. During the maintenance period, the patient did not have urticaria and asthma exacerbation. She also reduced the dose of inhaled corticosteroid, stopping the intranasal one.

After 1 year-OIT, IgE for wheat decreased to 3.2 kU/l. At the end of the maintenance period, DBPCFC was performed to confirm the induction of tolerance to wheat. No symptoms of wheat induced-asthma, rhinitis or urticaria were noticed during DBPCFC. The patient was followed one more year after desensitization. On long-term she could tolerate more than 100 g of bread without any complications.

DISCUSSION

Our case is a typically IgE mediated respiratory disease induced by wheat in a previous allergic patient after occupational exposure. It is interesting that in this patient the symptoms occurred after both ingestion and inhalation of allergen.

Commonly, in patients with wheat allergy, avoidance and changing the occupational place are the main important measures, added to the pharmacological treatment for allergic manifestations.^{8,9} These are restrictive measures, which may affect the patients' quality of life. Even if our

patient was well controlled by an avoidance diet and pharmacological therapy, due to an impairment of quality of life we decided to start oral immunotherapy to wheat.

There are few data regarding the efficacy of OIT with wheat protein in allergic patients.^{4,5} The most data are related to milk and hen's egg. The published results from clinical trials regarding OIT for milk, egg and peanut suggest that the desensitization occurs in 90% of cases. The desensitization disappears if the food is not eaten every day, but the obtained tolerance could be easily maintained in case of common foods, like milk and egg.^{4,10,11}

The most commonly used OIT protocol consists in three phases, requiring ingestion of allergen-specific flour in a food vehicle: 1) initial escalation phase in the first day of OIT, administering 6-8 doses of involved allergen; 2) build-up dosing phase, made under medical observation, consisting in up-dosing every 1-2 weeks, until a target dose is reached; and 3) home daily maintenance dosing (for years or lifelong).⁴ In this case we partially followed the presented protocols, avoiding increasing the dose in the first day of OIT due to rhinorrhea. There are also other studies that changed the classical OIT protocol¹²⁻¹⁴ and the authors have obtained positive responses similar to our patient's.

OIT is less performed for wheat allergy. The major concern of OIT for wheat allergy is the safety of this method, because wheat is one of the most common foods involved in food dependent, exercise-induced anaphylaxis (FDEIA).¹⁴⁻¹⁶ FDEIA is less commonly induced by egg or milk. In the present case there were mentioned mild symptoms of rhinitis at the beginning of build-up dosing phase, but these were controlled under pharmacological therapy, with no severe reactions.

Wheat OIT has been used in small trials, for both adults and children, but there are no reported data from randomized clinical trials. In the reported cases wheat OIT had proven similar efficacy to OIT for milk and egg. There are studies showing the efficacy of sublingual and subcutaneous immunotherapy, but there is no product available for clinical use. Even if standard subcutaneous immunotherapy has been reported to be effective in a few case series in baker's asthma,¹⁷ FDA does not recommend it with food extracts.^{16,18} In the present case the OIT to wheat was efficient and all clinical manifestations were improved afterwards. Similar to other published data^{13,14,19} we obtained

desensitization and long term tolerance to wheat after OIT.

This case highlights the efficacy of OIT in wheat allergy in a patient with associated manifestations after ingestion and inhalation of flour. The OIT has proven the efficacy on both respiratory and cutaneous symptoms and significantly have changed the quality of life of our patient, without secondary severe reactions. This method induces long-term tolerance to wheat and could be an effective method not only in children but also in adults with wheat allergy.

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