

Protein Contact Dermatitis Caused by Allergy to Chapatti Flour

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In 1976 Hjorth & Roed-Petersen (1) described hand and forearm eczema of several kitchen workers, where high-molecular-weight proteins were suspected to be the allergens. They named the condition protein contact dermatitis (PCD). In 1983, Veien et al. (2) defined specific criteria for the diagnosis of PCD: a chronic or recurrent dermatitis caused by contact with high-molecular-weight proteins in foods; an immediate, itching, urticarial eruption occurring within 30 min of contact with the offending agent; positive prick/or scratch testing with the suspected causative substance; often negative patch-test results. We report here a case of PCD caused by chapatti flour in a 31-year-old Pakistani woman living in Sweden.

CASE REPORT

The patient, an office worker with 3 small children, presented with a history of atopic eczema on her fingers since childhood. Patch-testing 4 years before presentation was negative and the hand eczema was said to be due to irritation. She reported worsening of her hand eczema since 3 months. Her family history included bronchial asthma in her father, sister and brother, and allergic rhinitis in a brother. The patient had had bronchial asthma when young. The patient also reported itchy wheals developing on her hands 20 min after handling wet chapatti flour made from a mixture of wheat and rye. She made chapatti bread every day at home. Dry flour did not provoke such symptoms. She did not report any symptoms after eating cooked chapattis, or any hay-fever symptoms.

On examination, slightly hyperkeratotic eczema with erythema, dry vesicles and scaling, was seen on the volar surface of her hands, fingertips and proximal nail folds.

The patient was patch-tested to our baseline series with negative results. Her flour was not patch-tested. Prick-testing results are shown in Table I. She was advised to avoid direct contact with chapatti flour by

wearing nitrile gloves while preparing and cooking the bread. After one month, the eczema had improved considerably. The patient reported that if she forgot to wear her gloves, immediate pruritus and wheals developed on her palms while handling the wet flour or dough (Fig. 1).

DISCUSSION

Flour-associated PCD has been reported primarily among food handlers, kitchen workers, caterers, bar staff, food vendors, food packers, gardeners, dairy farmers, housewives and home helps, sometimes with allergic rhinitis or asthma symptoms (3–6). The most common causes are wheat and rye flour (4). The pathogenesis of PCD is not entirely understood. Investigations show that it is a combination of immediate (type I) and delayed (type IV) hypersensitivity. Approximately 50% of cases are associated with atopy (4). The reasons for this are unclear. It is possible that the immune mechanisms in atopic dermatitis and PCD are similar. It is probable that high-molecular-weight proteins in foods are more able to penetrate the epidermis and cause sensitization if the epidermis is damaged, perhaps due to atopic dermatitis or other kinds of eczema, particularly of the hands (3). Irritation eczema with a compromised skin barrier may also be a major cause, as most described cases have been people who work in “wet work” conditions.

Chapatti is an unleavened flat bread of Indian origin (7). It is the earliest form of bread and is still eaten, especially in the Middle East, Asia, and Africa (e.g. in Turkmenistan, East African countries such as Kenya, Uganda and Tanzania, and in China). Chapattis are made of whole-wheat flour (sometimes mixed with barley or



Fig. 1. Exacerbation of protein contact dermatitis on the palms when the patient forgot to wear gloves while handling wet flour or dough.

Table I. Prick-test results

Test substance	Wheal size, mm
Chapatti flour (wheat and rye) (prick-prick)	7 × 7
Wheat flour (prick-prick)	5 × 5
Rye flour (prick-prick)	4 × 4
Gluten (prick-prick)	5 × 5
Latex (100 IR/ml, Alyostal, Stallergenes, France)	Negative
Histamine hydrochloride (10 mg/ml, Alk-Abelló, Denmark)	7 × 7
0.9% sodium chloride	Negative

rye flour) and water. Some people also add salt and/or oil to the dough. It is cooked on a flat skillet (7).

Wheat is one of the most common food allergens, affecting 0.5–1.3 % of the population (8).

Much of the research on adverse reactions to wheat has focused on respiratory allergy (baker's asthma and rhinitis), which is one of the most important occupational allergies in many countries, food-dependent, exercise-induced anaphylaxis, and on coeliac disease, related to gluten. In addition, wheat proteins can cause contact urticaria or dermatitis herpetiformis (9, 10). In some cases, immunoglobulin E-mediated allergy to wheat may lead to exacerbation of atopic dermatitis or gastrointestinal symptoms. Adult-onset wheat allergies are mostly believed to persist throughout the subject's lifetime (10). It is reported that skin sensitization to hydrolysed wheat proteins in cosmetics not only causes contact urticaria after their application to the skin but also allergy to foods containing them (11).

The cereals form part of the Poaceae, true grasses, family. Wheat, barley and rye belong to the Triticeae tribe. Most allergens of the Triticeae are closely related and frequently cross-react in all 3 species, although other grains could be well tolerated (10). Gluten is a storage protein composite that is present in wheat, barley and rye. It is estimated that gluten proteins account for about 80% of the total grain protein in European wheat (12). They are responsible for triggering coeliac disease and wheat allergy in susceptible individuals. It is not known precisely but it could be that gluten is the main allergen to induce protein contact dermatitis. Gluten gives elasticity to bread dough, helping it to rise and to keep its shape. Although wheat has relatively low protein content (usually 8–15%), for bread-making high-protein species are usually advantageous, where, for most other baked products, such as cookies and cakes, high-protein-containing wheat species are rarely required (12). Processing of wheat and related cereals may lead to decreased allergenicity (10). This is probably why some patients (like ours) with PCD from cereals can consume baked products without symptoms.

While PCD is a recognized occupational and housewives' problem, the present case also emphasizes that PCD may arise in settings where housekeeping is not the main work and where it is not related to the occupation of the patient. In addition, known allergens, such as grains, which are primarily related to gastrointestinal and respiratory allergies, can cause skin problems such as hand eczema.

The authors declare no conflicts of interest.

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