

CORRESPONDENCE

Barley's lipid transfer protein: a new emerging allergen in pediatric anaphylaxis

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To the Editor,

We report the case of a 7-yr-old girl with no previous history of atopic disease who developed abdominal pain with vomiting and anaphylactic reaction few minutes after ingestion of cow's milk and cereals containing barley malt. Arrival to our emergency pediatric hospital took only 5 min where a grade III shock had been detected, according to the classification of Ring and Messmer. After adrenaline IV and anti-histaminic administration, her condition gradually improved.

Native skin prick tests (SPT), performed remotely, showed negative tests for milk from cow, goat, ewe; and also for wheat, corn, lupine, buckwheat, honey, rye, oat, soy milk, wheat isolates, and consumed cereals. Aeroallergens were also negative. The diameter of the wheal was 5 mm for positive control, 3 mm for pearl barley, 2 mm for a heavily malted beer, 10 mm for purified barley and barley malt. Specific IgE (Phadia, Uppsala, Sweden) results were negative for foods with negative skin test and positive for barley (1.47 kU/l). A control group of 10 atopic and non-atopic children had negative SPT for barley and purified barley malt.

The serum IgE reactivity pattern to barley and purified barley malt (Fig. 1) was determined by SDS-PAGE immunoblotting (Luminata Forte, Merck Millipore). It revealed a strong IgE binding to 9-kDa protein and a lower binding to 12-, 23-, and 35-kDa proteins in barley (Fig. 1, lane 1). IgE binding to 9-kDa protein was also revealed in malt extract, although with a lower intensity (Fig. 1, lane 2). After in-gel trypsin digestion and analysis of peptides sequences by mass spectrometry (nanoLC-ESI-MS/MS), the 9-kDa protein has been identified

as the barley's lipid transfer protein (LTP). Using both SDS-PAGE immunoblotting and protein macroarray, no IgE reactivity has been detected against fruits extracts and purified LTP from peach and apple.

Barley (*Hordeum vulgare*) malt is a germinated grain commonly used to produce alcoholic beverages such as whiskey and beer mostly. Proteins represent only 10% of the total mass of the grain. Most important allergens belong to the groups of prolamins (gamma-3 hordein Hor v 21), alpha- or beta-amylase inhibitors (Hor v 15, Hor v 16 and Hor v 17), and lipid transfer protein (Hor v 14). Cross-reactions of hordeins with wheat had been investigated in the case of exercise-induced anaphylaxis (1). Amylase inhibitors could be the main cause of baker's asthma induced by barley flour (2). The lipid transfer protein, Hor v 14, is heat and protease resistant (3, 4) and, due to its properties, is one of the most responsible allergen for barley's beer allergy in adults (5, 6).

Our case is, to our knowledge, the first one to be reported for children. All other already reported cases of LTP reactions to barley seemed only to occur in adults after beer consumption. The LTP has been previously identified in beer (6) but, for the first time and even if only low amounts are present in the barley kernel, a severe reaction occurred without beer consumption. Moreover, as no IgE cross-reactivity has been detected with other LTP from peach and apple, we strongly believe that our patient react with a 'private' IgE-binding epitope, with no homologies with fruits nsLTP. LTP from fruits is well known for the severity of induced reactions, and avoidance is advised if possible. As barley is actually intensively used in the agro-food chain and found in many food products, avoidance is not always possible because of hidden barley or presence of small amounts or traces in 'cereal-based' products. If barley's LTP could be presented as an emerging allergen in children severe reactions to cereals, allergen tests and protocols should include barley and/or barley's LTP in the future to reach a proper diagnosis.

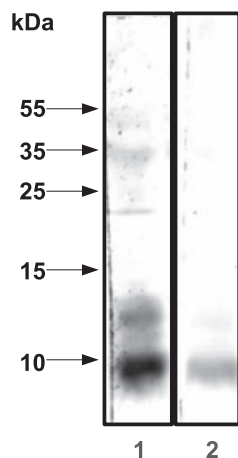


Figure 1 IgE immunoblotting of barley extract (lane 1) and purified barley malt extract (lane 2) with the patient serum. Molecular weights are indicated to the left.

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