

Case report

Occupational asthma in the confectionary industry caused by sensitivity to egg

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We report on a patient with asthma induced by occupational exposure to egg used to spray cakes before baking. A type I hypersensitivity to egg white was demonstrated by means of skin test, immunoassay for specific IgE, and immediate bronchial provocation test response to an egg white extract.

Key words: occupational asthma; egg sensitivity; asthma caused by egg.

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Egg has been recognized as a common cause of food allergy, but its potential role in occupational asthma is rare. Many workers are exposed to egg products in food industries but few become sensitized (1, 2). We report the case of a confectionary worker with demonstrated occupational sensitization to egg white.

Case report

The patient was a 27-year-old man who experienced shortness of breath and wheezing after working for 6 years in the confectionary industry. He sometimes required emergency hospital treatment. When he was not at work his symptoms were significantly improved.

The area in which he worked was a 90 m² and well-ventilated room. Here he shaped the cakes and sprayed them with egg before baking.

He had no personal or family history of other allergies, and tolerated the ingestion of all kinds of foods including egg (cooked or raw).

The clinical examination was normal and there were no eosinophils in the white blood cell count. Chest X-ray was normal. Sputum contained 80% eosinophils. Spirometry was normal (FEV₁ was 85% of the predicted value). Skin prick tests were done with a battery of commercially available allergens (Lab. Aristegui-Ifidesa, Spain) which included *Dermatophagoides pteronyssinus*, *Dermatophagoides*

farinae, storage mites (*Lepidoglyphus destructor*, *Acarus siro*, *Tyrophagus putrescentiae*), *Aspergillus fumigatus*, *Penicillium notatum*, *Cladosporium herbarum*, *Alternaria tenuis*, grass pollen mix, and danders. They were all negative. Total IgE was 140 IU/ml.

Material and methods

Extracts. Two grams of egg white and egg yolk were incubated separately in 10 ml PBS for 1 h at 4°C with continuous stirring. Five grams of wheat and rye flour and α -amylase were incubated separately in 25 ml PBS for 18 h at 4°C. After straining through filter paper the solution was passed through a millipore filter (0.22 micra). Progressive dilutions up to 10⁻⁵ were made from the starting solution.

Skin prick tests were done with the antigenic preparations described above. The positive control was histamine 10 mg/ml and the negative was PBS. Five non-exposed asthmatics, and 5 exposed asymptomatic persons were tested as a control group. All skin tests were examined after 20 min and 6 h.

Specific IgE antibody determination was performed by commercial immunoassay (Phadebas-Pharmacia, Uppsala, Sweden) to wheat and rye flour, α -amylase, egg white and egg yolk.

Bronchial provocation test was done during asymptomatic periods, and the patient received no medication at the time of the study. Vital capacity and

FEV₁ were > 80% of the theoretical values. The test was done by inhalation, using a DeVilbiss 646 with an input of 6 l/min and an output of 0.280 ml/min. The subject's nose was clipped and the solution delivered into a mask over the mouth and inhaled by tidal breathing for 2 min. Challenge was preceded by a control inhalation with PBS solution. The starting solution for the inhalation test was 1-fold greater than that which induced a wheal 3 mm greater than the negative control in the skin prick test. The extract was given in progressively increasing concentrations. The interval between doses was 30 min. FEV₁ and FVC were measured before and at intervals of 5, 10, 20, 30, 60 min, 2, 4, 6, 8, 10, 12 and 24 h after the dose which produced reaction. A positive response was defined as a decrease of at least 20% in the FEV₁.

Two non-exposed asthmatics were challenged with the same egg white extract.

Results

Skin prick tests with wheat, rye, and α -amylase and egg yolk extracts were negative. The skin prick tests with egg white were negative to the dilutions 10^{-5} , 10^{-4} and 10^{-3} . Higher concentrations of 10^{-2} , 10^{-1} and the starting solution, caused wheals of 3, 6 and 13 mm, respectively. There was no later reaction. None of the tested controls showed any skin reactions.

Specific IgE determination to egg white showed a max PRU level (grade 4 in the reference standard rate). It was negative for the remaining allergens tested.

After 1 min, inhalation in the bronchial provocation test of a 10^{-3} dilution of the starting egg white solution caused shortness of breath, wheezing and a drop in FEV₁ of 34% and in FVC of 25%. No later reactions were noted. Pretreatment with disodium cromoglycate (DSCG) inhibited in part the asthmatic response to the same dilution tested (a fall of 12% and 7% in FEV₁ and FVC, respectively). (Fig. 1).

None of the control persons showed any reaction to bronchial challenge with egg white extract at similar dilutions.

Discussion

Various allergens have been implicated in the confectioner's (and baker's) asthma etiology. During dough-making the worker is exposed to dusts (flours, α -amylase) (5), and to parasites (*Aspergillus* sp. *Alternaria* sp. *Penicillium* sp. storage mites) (3).

Occupational asthma in workers in an egg-processing plant (1, 2), or non-occupational asthma in subjects with food allergy to egg proteins (4) has

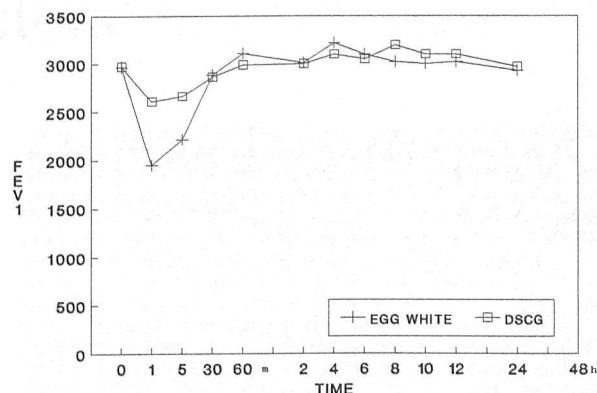


Fig. 1. Bronchial provocation test with 1/1000 egg white dilution.

already been reported. But, as far as we know this is the first case reported of occupational asthma in the confectionary industry caused by sensitivity to egg.

We have demonstrated the immunologic mechanism implicated in our patient. Positive skin prick tests produced an immediate response. The presence of specific IgE in the patient's serum was demonstrated by immunoassay tests. The bronchial challenge test provoked an immediate response partially modified by pretreatment with DSCG. All these findings are consistent with a classic IgE antibody-mediated reaction.

It is important to note that the patient is allergic to the egg white proteins (the most allergenic part); sensitivity to yolk has not been demonstrated. As yolk is used to spray the cakes, we consider the patient's asthma is caused by incomplete separation of yolk and white.

On the other hand, our patient tolerates egg ingestion. This could be because heat or digestive enzymes modify the antigenic egg structure. The fact that the patient has no symptoms from eating eggs suggests that his sensitivity was acquired at work.

References

1. BERNSTEIN DI, KOPP S, GALLAGHER JS, MOLLER AWD, LONDON M, SMITH AB, CARSON G. Occupational asthma in an egg processing plant. *J Allergy Clin Immunol* 1986; 77: 173.
2. NOVEY HS, BERNSTEIN IL, MIHALAS LS, TERR AI, YUNGER JW. Guidelines for the clinical evaluation of occupational asthma due to high molecular weight allergens. *J Allergy Clin Immunol* 1989; 84: 829-33.
3. REVESBECH P, DUEHOLM M. Storage mite allergy among bakers. *Allergy* 1990; 45: 204-8.
4. SAMPSON HA, NICHAMAN MZ, ZWEIMAN B. Workshop on experimental methodology for clinical studies of adverse reactions to foods and food additives. *J Allergy Clin Immunol* 1990; 86 (Suppl): 421-42.
5. SUTTON R, SKERRIT JH, BALDO BA, WRIGLEY CW. The diversity of allergens involved in baker's asthma. *Clin Allergy* 1984; 14: 93-107.

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