Sensitization in early age to food allergens in children with atopic dermatitis

C. García1, D. El-Qutob1, A. Martorell1, I. Febrer2, M. Rodríguez2, J.C. Cerdá1 and R. Félix1

1Unit of Allergology. 2Service of Dermatology. Consorci Hospital General Universitari. Faculty of Medicine, University of Valencia. Valencia.

ABSTRACT

Background: Clinical and laboratory evidence increasingly supports the notion that food allergy plays a role in the pathogenesis of atopic dermatitis (AD). However, the prevalence of clinically significant food hypersensitivity among children with AD remains an unanswered question.

Objective: To prospectively determine the prevalence of IgE-mediated food hypersensitivity among patients referred to a dermatology department for evaluation of AD, and to analyze the clinical relevance of these sensitizations in AD.

Methods: We studied 44 infants of both sexes, aged less than 12 months old, who attended the dermatology department with symptoms of AD. Compliance with Hanifin-Rajka criteria was confirmed and the severity of AD was evaluated using the SCORAD index. IgE-mediated sensitization to cow’s milk, alpha-lactalbumin, beta-lactoglobulin, casein, egg-white, egg-albumin, ovomucoid and foods introduced into the diet was studied using the skin prick test (SPT) and measurement of specific serum IgE (sIgE) by CAP System fluorescein-enzyme immunoassay.

Results: Of the 44 patients studied, sensitization to foods was detected in 27 (61%). No changes were observed in AD during the elimination diet or when the eliminated foods were subsequently reintroduced into the diet. The results of open controlled food challenges were positive in 12 patients (27%).

Conclusions: A high prevalence of food sensitization was found in infants with AD. The most frequent sensitization observed was to egg, although with little clinical relevance since this food had not been introduced into the diet.

In the sample studied, the clinical relevance of the observed food hypersensitivities was confirmed in relation to AD. Further studies are required to confirm these results.


INTRODUCTION

Atopic dermatitis (AD) is a chronic inflammatory skin disorder that affects between 10% and 12% of the pediatric population. There is an increasing body of clinical and laboratory evidence suggesting that food hypersensitivity plays a pathogenic role in AD in a subset of patients, primarily infants and children.
In the early part of this century, Schloss reported several cases of patients who had improvement in their eczematous skin lesions after avoiding specific foods. That report was followed by many others with conflicting findings and led to controversy about the role of specific food allergens in AD. Some authors demonstrated by double-blind placebo-controlled food challenge (DBPCFC) an acute-onset clinical reaction of urticaria, pruritus, and erythema in a subset of patients with AD, whereas others had delayed-onset eczematous reactions. No relationship has been established between reactivity in skin prick tests (SPT) and delayed-onset clinical reactions.

The prevalence of clinically relevant food hypersensitivity among children with AD remains unknown, the aim of this study is to determine the prevalence of clinically relevant food hypersensitivity in patients who were referred to a Service of Dermatology. These patients were referred to the dermatologist without selection for any adverse reaction to foods. The OCFC were made with a ready-to-use infant formula of cow’s milk. In the challenge with cow’s milk was extended to one month following the protocol of the study of Isola and. During this month patients were reviewed in the hospital at the time of any exacerbation of AD.

All of the challenges were performed in the Unit of Allergy at the Hospital, where appropriate medication and resuscitation equipment was directly available. Informed consent was previously obtained from the parents. Each patient remained for 2 hours under observation after the last food dose intake before going back home. Before OCFC infants must fulfil the following conditions: controlled atopic dermatitis, absence of acute rash and not being treated with anti-histamines in the previous 7 days, topical corticoids (48 hours), systemic corticoids (one month) and oral and inhaled beta-adrenergics (12 hours).

The OCFC were made with a ready-to-use infant formula of cow’s milk. In the challenge with cow’s milk, rising doses (5, 10, 25, 50 and 100 ml) were given: 1/8 of the total dose, 1/4 of the total dose and later the rest of the total dose. If there was history of an IgE-mediated type immediate reaction it was eliminated from the infants’ diet for at least 2 weeks. Open controlled food challenges (OCFC) with cow’s milk were performed on all patients after one month of elimination from the diet, and the same test were carried out with the foods with positive allergy evaluation (sIgE and/or SPT) after two weeks of elimination from the diet. Elimination diet with cow’s milk was extended to one month following the protocol of the study of Isola and. During this month patients were reviewed in the hospital at the time of any exacerbation of AD.
started with 1/16. The challenge was discontinued when a clinical reaction was noticed. After two hours, the patient was sent home with instructions to the parents to record the symptoms of the infant for 48 hours. Patients were reviewed in the hospital at the time of any adverse reaction. If the response was positive with clear and objective signs of urticaria and/or angio-oedema, whether or not combined with other clinical symptoms, elimination of the food from the diet was indicated.

Follow up was carried out for one month after the challenge test. During this month patients were reviewed in the hospital if any exacerbation of AD occurred. AD was evaluated using the SCORAD index. Informed consent was previously obtained from the parents of each patient.

RESULTS

AD starts between the 2nd and 8th month of life, 80 % being concentrated between the 2nd and 4th month. 68 % received breast-feeding for 1 to 8 months, with a mean of 5 months. Almost half (45 %) of the infants from the sample studied started with AD when exclusively on breast feeding (without receiving bottles during their stay in the Maternity Ward after birth), and before having been introduced to any other food in their diet. As regards SCORAD score of AD, it was evaluated as mild in 14 children (32 %), moderate in 28 (64 %) and severe in 2 (4 %).

Food sensitization (positive prick test and/or specific IgE > 0.35 kU/L) was seen in 27 out of the 44 (61 %) patients studied. Among the patients with AD there was food sensitization in 43 % (6/14) of those who had mild AD, 68 % (19/28) of those with moderate AD and 100 % (2/2) of those who had severe AD (fig. 1).

Sensitization to egg was present in 61 % (27/44) of the total infants with AD and the second most common food involved was egg (100 % of the infants sensitised to foods) and the second was cow’s milk (30 % of those sensitised to foods). None of them had egg introduced into the diet. We carried out the challenge test with egg in those sensitised (positive prick test and/or specific IgE > 0.35 kU/L) when the children were 15 months old, before the triple virus vaccine. OCFC with egg was positive in 44 % (12/27) of the sensitised children. In those with negative OCFC, there was no exacerbation in DA next month after reintroduction in the diet.

Other foods sensitization observed were chicken meat in 7 % of patients (3/44), hake in 2 % (1/44), tomato 2 % (1/44) and banana in 2 % (1/44) (fig. 2).

We did not observe differences in the evolution of DA after two weeks of elimination diet and OCFC with these foods was negative in all cases. 61 % of the patients (27/44) had a total IgE value between 0 and 25 KU/L, of which 48 % (13/27) were sensitised; 25 % (11/44) between 25 and 100 KU/L, with 64 % (7/11) sensitised and 14 % (6/44) above 100 KU/L, with 100 % (6/6) sensitised (fig. 3).

DISCUSSION

The pathogenic role of food allergy in AD was first suggested by clinical observations and uncontrolled studies performed more than 80 years ago and has been supported further by the results from large controlled studies using DBPCFC performed in the...
past 20 years. Moreover, our study confirms that infants with AD frequently do have IgE-mediated food sensitization. However this is a sensitization that often does not lead to the appearance of symptoms of AD.

Of the 44 patients in the study, 69% had a moderate/severe AD of which 40% (12/30) had an immediate response in OCFc. These results are similar to those observed by other authors, where approximately 40% of infants and young children with moderate-severe AD had a food allergy confirmed using DBPCFC. But in these studies they include patients with suspected adverse reactions to foods, which could explain the symptomatic sensitization results obtained in them.

The majority of existing studies in patients with AD have been carried out on patients sent to Allergy Clinics and in these, AD is normally accompanied by other allergic diseases, which are generally the main reason they are sent for an allergy evaluation. To prevent this bias that may have affected previous studies, the sample of infants of the present study was gathered in a Paediatric Dermatology Clinic where the infants were sent for diagnosis and treatment of AD without suspected food allergy. The same was done by Eigenmann et al, who also studied a sample of patients, but from six months to twenty years old, who were referred to a pediatric dermatologist with suspected AD, and detected food allergy (with positive DBPCFC) in 37% of patients, higher than that obtained by us, which was 27% (12/44), but similar to the percentage obtained by this same author, 39%, in a sample of patients who attended his Allergy Clinic for AD or other allergic diseases. This is even more than that observed by Burks, in which the selection of the sample was criticized because two thirds of the patients came from an Allergy Clinic. But if we closely review the study, and looking at the characteristics of the patient studied by Eigenmann et al, we see that the majority of these patients had a history of adverse reactions to foods as well as AD.

Although virtually any food protein can cause a reaction, only a small number of foods account for more than 90% of reactions in infants (cow’s milk, eggs, peanut, soy). In children with AD and food allergy, two thirds are reactive to eggs. In our study sample, the foods most commonly implicated were egg followed by cow’s milk, but we did not observe sensitizations to peanut or soy maybe a cause of the age of the patients.

Some authors consider that egg and cow’s milk could be aetiologically implicated in infant AD. This consideration, however, does not seem to be confirmed in our study. On evaluating the results obtained in the sample of 44 infants, firstly, we see that in 45% of them the AD started while they were on breast-feeding, before introducing any other food into the diet. Egg protein is secreted into breast milk after maternal dietary ingestion and, exposure to egg protein during breast-feeding is a route of hidden exposure that may result in sensitization of at-risk infants.
In the DBPCFC with foods, according to several authors, two types of positive responses can be seen: immediate and delayed. Double-blind challenge on patients with AD, generally show clinical reactions of the immediate type, which occur between 5 minutes and two hours, with mainly cutaneous symptoms (pruritus, erythema, morbilliform exanthem, bumps mainly in the areas of the eczema), secondly digestive system (nausea, vomiting, abdominal pain, diarrhoea), and can also have respiratory symptoms (wheezing, nasal congestion, sneezing, cough) but they do not mention reactions which reproduce the atopic eczema. Some patients, after the immediate response, experience a second episode of increasing pruritus with morbilliform or transient erythematous exanthem which starts 4 to 10 hours after the initial positive response and in a small proportion of cases the exacerbation of the symptoms occur from 2 to 5 days after the normal ingestion of the food. In the years following, after an avoidance diet, in those who remain sensitised and the eczema is reduced, the symptoms with the DBPCFC is generally urticaria.

Some authors believe that the responses to the food provocation test can also appear in a delayed form, much later than the first three hours, generally in the following 48 hours or even in the days after, specifying that for the appearance of eczema the patient should take the food for several days. Delayed symptoms are difficult to diagnose and attribute to a particular food, or, as reported by Werfel and Kaap, it may be impossible. Vanto et al. studied 305 infants, the majority (74%) of them with AD, suspected of having hypersensitivity to CMP and concluded that it is very difficult to assess the results of a positive delayed response since the improvement in the AD during the elimination period was not total, not being completely free of eczema, and to evaluate the difference between the initial skin disorder and the additional ones during the days of provocation was, in many cases, very difficult. They suggested that in an orthodox clinical trial, such as indicated by Metcalfe and Sampson, it should include confirmation by carrying out three double-blind tests, which would surely be difficult for the parents to accept.

Burks et al found that in 266 DBPCFC carried out on 169 patients with AD, the symptoms began in the first two hours and did not have any significant delayed responses. In the studies by Sampson only some patients developed diffuse pruritus and rarely maculopapulonecrotic exanthem at 4-8 hours after a positive DBPCFC. In the patients in our study we found that 12 (27%) had an immediate response in the provocation test and no delayed responses were seen.

However, there is still controversy over whether food allergy in patients affected by AD is implicated in the etiopathogenesis of the disease or is only an expression of the atopic constitution of the patient. Therefore, once there is diagnosed a food allergy, its influence on the evolution of AD will need to be evaluated. Many authors report that with a suitable elimination diet, food allergic patients could experience a noticeable improvement in clinical symptoms compared to those who did not demonstrate food allergy. In a later prospective study by Sampson and Scanlon, in which a small sample of children with AD were followed up for 3 to 4 years, only 17 children, who were allergic to foods and had an elimination diet, significantly improved in the 3-4 year of follow up. But, Novembre et al, in a recent study on the natural progress of AD over 9 years in children from 2 to 11 years old, observed that it is better in those who have allergic sensitization, although do not have an elimination diet.

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food sensitizations observed has not been verified with regard to AD. Allergy and sensitization to foods in our patients appear associated as one more expression of the atopic constitution of these children but they are not the cause of AD. More studies are needed to confirm these results.

REFERENCES


