

Prevalence of food allergy/intolerance in Europe

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Abstract

Discussed in this paper is the prevalence of allergy and intolerance to foods in Europe. Prevalence of allergy to food additives is not included. A fully reliable estimate of the prevalence of food allergy/intolerance does not exist. Prevalence changes with age, as does the relative importance of the most common food allergens. The cumulative prevalence of allergy and intolerance to cow's milk during the first year of life is approximately 2%. The total prevalence of food allergy/intolerance in children is not as well documented. In 18-month-old infants the Danish estimate is 6.5%. The high prevalence of peanut allergy (0.5%) in British children is not reflected in the results from other European countries. Milk, egg, fish and oranges seem to be the most common causes of allergy and intolerance in European infants and children. Results from epidemiological studies combined with the knowledge on pollen and latex cross-reactivity, systemic reactions to contact allergens and coeliac disease point to a prevalence of food allergy/intolerance in the adult European population of approximately 5%. A mild itch in the mouth and lactose intolerance are not included in this estimate which is a qualified guess. © 1997 Elsevier Science B.V.

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1. Introduction

Discussed in this paper is the prevalence of allergy and intolerance to foods in Europe. Prevalence to food additives is not included.

Food allergy is an adverse reaction to foods where an involvement of the immune system can be demonstrated. Food intolerance, however, is an adverse reaction with allergy-like symptoms, but with no proven involvement of the immune system.

A discussion of the importance of different food allergens will be presented.

The total prevalence of food allergy/food intolerance is not known. It is possible to make relatively well documented estimates of the prevalence of different adverse reactions.

The prevalence of food allergy/intolerance changes with age, as does the relative importance of the most important food allergens.

2. Children

In many countries cow's milk is the most important food allergen in babies and young children. In a prospective study from Sweden, adverse reactions to cow's milk were found in 1.9% of babies during their first year of life (Jakobsson and Lindberg, 1979). In a prospective Danish study of newborns, 2.2% developed cow's milk allergy during their first year of life (Høst et al., 1988). Comparable incidence figures have been found in England, 2.5% (Hide and Guyer, 1983) and the Netherlands, 2.3% (Schrander et al., 1993). In the Danish study the children were followed for 3 years. At the age of 1 year, 56% had recovered from their cow's milk allergy, 77% had recovered at 2 years and 87% at 3 years of age (Høst and Halken, 1990).

The cumulative prevalence of food allergy/intolerance diagnosed by elimination and open challenge in a group of unselected Danish infants 18 months of age was 6%. In the same study the prevalence in high risk infants was 17%. This gives a 6.5% overall estimated prevalence of food allergy/intolerance in 18-month-old infants (Halken et al., 1992).

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In a British study of a birth cohort of children, 4 years old, 0.7% had an allergy to peanuts or tree nuts, while 0.5% had an allergy to peanuts. These figures were based on skin prick tests and positive history (Tariq et al., 1996).

Kaajosari (1982) recorded adverse food reactions in four groups of Finnish children aged 1, 2, 3 and 6 years. By history, adverse reactions were reported in the four groups by 19, 22, 27 and 8% of children, respectively. To confirm the history, open challenge was carried out with the selected allergens: fish, citrus fruits and eggs. In the 1, 2 and 3 year olds, approximately half the histories of adverse reactions to these three allergens could be confirmed by open challenge. In the 6 year olds all the histories could be confirmed.

In some patients allergic reactions to pollen are accompanied by allergic reactions to nuts, fruit and vegetables. In a questionnaire survey of allergic diseases in Danish school children, Saval et al. (1993) found an increase in the prevalence of rhinitis with age and a parallel increase in the prevalence of oral itch (Table 1), a symptom characteristic of allergy to pollen related foods (Eriksson, 1978). The prevalence of oral itch may well reflect the prevalence of allergy to pollen related foods being as high as 2–2.9% in the 14–16 year olds.

3. Adults

3.1. Pollen related food reactions

In countries where tree pollen allergy is a common allergy, pollen related food is perhaps the most common food allergic reaction in adults. In a Swedish study of medical students, Foucard (1991) found that 78% of the students with allergic rhinitis and positive skin test to birch pollen reported clinical sensitivity to nuts and/or apples or other fruits. In another Swedish study, 70% of the birch pollen allergic and 19% of all patients with allergy to other pollen had food related symptoms (Eriksson et al., 1982). These estimates are constructed primarily on self-reported symptoms.

The prevalence of pollen rhinitis in Europe is approximately 10% (Burkholter and Schiffer, 1995). In Switzerland, about 10% (9.1–11.2%) of the adult popu-

lation have current hay fever. The prevalence of sensitisation measured by a skin prick test, but not necessarily followed by clinical symptoms, is 12.7% for grass pollen and 7.9% for birch pollen (Wüthrich et al., 1995).

Using the Swedish figures for pollen related reactions on the Swiss data and taking into account the prevalence of sensitisation to grass and birch pollen, approximately 50% of the hay fever patients have adverse reactions to pollen related foods giving a prevalence of 5% in the adult population. According to a study by Kremser (1989) only about 10% of the birch pollen allergics had more severe reactions than oral itch. Combining this with the Swiss figures gives approximately a 0.5% prevalence of pollen related reactions other than oral itch.

3.2. Classical food allergens

Combining the above data with the frequency of allergic reactions to food in a large adult patient group may give an idea of prevalence of allergy to non-pollen-related food allergens such as milk, egg, shrimp, meat, etc. In a study of 402 patients with food allergy, approximately 75% of the positive reactions were caused by pollen-related foods and 25% of the reactions were caused by non-pollen-related foods (Wüthrich, 1993). Not included in the study were patients where the only food related symptom was itching of the mouth. This means that the 0.5% with pollen-related food symptoms, other than oral itch, represents approximately 75% of true food allergic reactions. The 25% true food allergic reactions to non-pollen-related food represents approximately 0.17% ($25 \times 0.5/75$) of the adult population.

3.3. Natural rubber latex and foods

In some patients an IgE allergy to latex causes allergic reactions to ingested banana, avocado, chestnut, etc. (Blanco et al., 1994). The prevalence of latex allergy in European health-care workers screened with skin prick tests has ranged from 2.8–10.7%. The prevalence in the general population has not been systematically studied, but appears to be clearly less than 1%. About half of the latex allergic patients have experienced symptoms after eating banana (Turjanmaa et al., 1996). In a study by Beezhold et al. (1996), 36% of a group of latex allergic patients had clinical reactions to related foods. The majority of these patients had anaphylaxis.

3.4. Contact allergens

In patients with contact allergy, ingestion of the contact allergen may cause skin flare reactions or other symptoms, e.g. in the gastrointestinal tract (Menné and Maibach, 1991).

Table 1
The prevalence of rhinitis and oral itch in Danish school children

Age (years)	Rhinitis (%) (boys/ girls)	Oral itch (%) (boys/girls)
5–7	9.0/5.7	0.0/0.3
8–10	8.5/7.1	0.8/1.1
11–13	14.0/8.5	1.9/1.5
14–16	17.3/13.0	2.9/2.0

Saval et al. (1993).

Contact allergens in foods, e.g. nickel and flavours/fragrances, may provoke dermatitis in a subgroup of patients with contact allergy to these chemicals (Veien et al., 1993, 1996). Nickel allergy affects 10–20% of females and 1–2% of males (Nielsen and Menné, 1993). Next to nickel, fragrance allergy is the most common and affects 1–2% of the general population (Nielsen and Menné, 1992). Most likely, a small proportion of these patients are at risk of developing symptoms after ingestion of the contact allergen.

3.5. *Coeliac disease*

Coeliac disease is a permanent intestinal adverse reaction to dietary wheat gliadin and related proteins. The prevalence is estimated to be 0.2–0.5%, with considerable geographical variation (Logan, 1992).

3.6. *Lactase deficiency*

Lack of the enzyme that cleaves milk sugar, lactose, gives rise to adverse reactions when lactose is consumed. The prevalence of lactase deficiency varies from a few percent of the population in northern European countries to almost the entire adult population in Asia and Africa (Auricchio, 1993).

3.7. *Epidemiological studies of food allergy/intolerance*

In the Netherlands, an attempt has been made to estimate the total prevalence of adverse reactions to foods and additives in adults, based on the double-blind placebo controlled food challenge (DBPCFC) (Niestijl Jansen et al., 1994). Of the studied population, 12.4% reported food allergy or intolerance to specific foods. The most frequently mentioned food groups were fruit, chocolate and vegetables. Of the 198 individuals claiming to have adverse food reactions, 90 entered the study. Of the 90 entering the study, 17 dropped out and 37 were challenged. Of those challenged, 12 subjects had positive challenge tests. Two had positive reactions to food additives, three had glucose intolerance and two reacted to histamine. The remaining reactions were caused by kiwi, white wine, trassi (contains dried fish and shrimp), pork and menthol. Assuming that the prevalence is equal among participants and non-participants, the prevalence of food allergy or intolerance in the adult Dutch population is estimated to be 2.4%. The estimated prevalence of food allergy/intolerance is 1.2% if the positive reactions to food additives, including menthol and glucose, are disregarded.

It is surprising that only one pollen-related and IgE-mediated reaction was found (kiwi), since fruit and vegetables were among the most common foods reported to give adverse reactions. The authors mention that of the subjects dropping out during the follow-up,

more had an atopic constitution than subjects that completed all the necessary procedures. It is tempting to conclude that subjects who were well aware of their immediate type reactions (IgE mediated) and/or afraid of severe reactions after provocation (IgE mediated) were less motivated to go through a time-consuming provocation procedure than were persons with less clear symptoms or more obscure offending foods, who could benefit from a correct diagnose.

In a British study, approximately 20% of a survey population reported adverse reactions to foods (Young et al., 1994). Eight foods commonly perceived to cause sensitivity were canned or made into candy bars and used for the double-blind placebo controlled challenge. After a diet period, all foods combined were used for challenge for 3 days. These foods were: cow's milk, hen eggs, wheat, soya, citrus fruits (oranges), fish/shellfish (prawns), nuts (peanut, brazil, hazel and walnut) and chocolate. These eight foods accounted for 49.3% of the reactions reported in the study questionnaire. Included for challenge were persons reporting symptoms to one or more of the eight foods, but not displaying severe reactions. Of the 336 persons relevant for food testing, 47 were excluded for severity of reactions and 128 declined the study. Of the remaining 161 participants, 93 completed the study and 18 had positive challenge results. The symptoms recorded after challenge were intestinal symptoms in 5 participants, headache in 3 participants, behavioral symptoms in 2 participants, urticaria in 2 participants, joint symptoms in 7 participants, asthma in 1 participant, and multiple symptoms in 4 participants. Because of the design with simultaneous challenge with all foods, it is not possible to deduce which foods gave reactions.

By adding some of the persons with severe reactions and estimating the number of theoretically positive in the non-challenged groups, the estimated prevalence of food allergy/intolerance to the eight foods were 1.4–1.8%. As the eight foods used for challenge accounted for approximately 50% of reported reactions, the total prevalence estimate must be 3–4%.

4. *Foods commonly involved in allergy/intolerance*

Foods most commonly involved in allergy differs with the age group considered, as well as between different countries. This is probably due to the differences in eating habits and in the flora (allergenic pollen).

Some food allergies appear early in life and tend to disappear, e.g. allergy to cow's milk and hen eggs (Høst and Halken, 1990; Hattevig et al., 1993). Others are more persistent, e.g. allergy to fish and peanuts. Some food allergies develop in older children and adults concurrent with pollen allergies. Crespo et al. (1995)

found that allergy to cow's milk, hen eggs and fish begins predominantly before the 2nd year of life whereas allergy to fruit, legumes and vegetable begins predominantly after the 2nd year.

In milk allergic Danish infants the five foods most commonly involved in allergy/intolerance (in descending order) were: milk, eggs, oranges, tomatoes and cereals (Høst and Halken, 1990). In Swedish milk allergic infants, the five most common food allergens were: milk, soy, oranges, eggs and fish (Jakobsson and Lindberg, 1979).

In Spain, a patient group of 355 children with a mean age of 5.4 years showed an IgE mediated allergy (SPT, RAST and open challenge) to a variety of foods. In descending order, the five most common food allergens were: egg, fish, milk, lentils and peaches. The sixth most common food allergen was peanuts. Eggs, fish and milk were responsible for 52.2% of the allergic reactions (Crespo et al., 1995).

In 112 Israeli patients with a history of immediate food reactions, in descending order, the five most common food allergens, based on skin prick tests and challenges were: peaches, almonds, sunflowers, peanuts and oranges. All allergies had began after the age of 10 years (Kivity et al., 1994). These results are probably relevant for the Mediterranean area.

In a group of 402 Swiss patients, the five most common foods resulting in IgE-mediated allergy were in descending order: celery, milk and milk products, carrots, eggs and meat. Celery accounted for 42.8% of the reactions. Peanuts were not a common allergen.

5. Discussion

All the European studies on allergy and intolerance to cow's milk during the 1st year of life have incidence figures of approximately 2%. The study by Høst and Halken (1990) showed that by the age of 3 years nearly all the children had outgrown their milk allergy. The prevalence of food allergy/intolerance in 18-month-old Danish infants was 6.5%. This figure is lower, but perhaps more realistic than the ones from Finland, which were mainly based on history. The high prevalence of peanut allergy (0.5%) in British children is not reflected in the results from the other European countries. This may change if eating habits in continental Europe become more 'Americanised'.

Milk, eggs, fish and oranges seem to be the most common causes of allergy/intolerance in European infants and children. As the children become adults, allergy to milk and eggs become less frequent and allergies appear towards pollen-related food, e.g. celery, peaches, almonds, hazel nuts and apples. The differences in the prevalence of these allergies are probably due to the differences in geographical regions.

As illustrated above, estimating the total prevalence of food allergy/intolerance in the adult population is very difficult. To design an experiment that will allow all the different types of reactions to be diagnosed, as well as attract and maintain the people with adverse reactions including those that are well aware of their diagnoses, is an enormous task.

If a mild itch in the mouth and lactose intolerance are not included, the results from the epidemiological studies combined with the knowledge on pollen and latex cross-reactions, systemic reactions to contact allergens and coeliac disease point to a prevalence of food allergy/intolerance in the adult European population of approximately 5%. This estimate is a qualified guess; the true prevalence probably lies within the same order of magnitude.

It is not known whether the prevalence of food allergy/intolerance is increasing. There is evidence that the prevalence of pollen rhinitis has increased (Sibbald, 1993; Wüthrich et al., 1995). This could mean that the prevalence of pollen related food allergies has increased, as well.

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