

Perceived Food Allergy in Children in 10 European Nations

A Randomised Telephone Survey

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Key Words

Food allergy prevalence · Parental perception of food allergy

Abstract

Background: Food allergy is targeted as a public health priority by the European Union Commission. Parental perception of food allergy in their offspring is a proxy measure of the potential demand for allergy medicine services in the paediatric population. **Methods:** A representative sample of the general population was contacted by a randomised telephone survey in Austria, Belgium, Denmark, Finland, Germany, Greece, Italy, Poland, Slovenia and Switzerland. A standardised questionnaire was administered regarding parentally perceived food allergy reports, symptoms, foods and medical service use by their live-in children. **Results:** 40,246 adults were polled, yielding data on 8,825 children. Parentally perceived food allergy prevalence was 4.7% (90% CI

4.2–5.2%). The most affected age group was 2- to 3-year olds (7.2%). Single-country incidence ranged between 1.7% (Austria) to 11.7% (Finland). Milk (38.5%), fruits (29.5%), eggs (19.0%) and vegetables (13.5%) were most often implicated, although with significant age-linked variations. Medical treatment was needed by 75.7% of affected children because of a food reaction. This translates into a proxy measure for food allergy prevalence of 3.75%. Skin symptoms were widespread (71.5%), followed by gastrointestinal (27.6%) and respiratory (18.5%) symptoms. **Discussion:** We provide the first point prevalence of parentally perceived food allergy in the general paediatric population across the European Union. Parental reports confirm the public health significance of adverse reactions to some foods in specified age groups. Our data may inform intervention planning, cost of illness assessments and quality-of-life-enhancing public health measures.

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Introduction

The European public is increasingly aware of the food allergy problem among children, but scarce epidemiological data and heterogeneous studies make comparing frequency rates difficult for public health authorities. The prevalence of food allergy in the general population is reported to be between 3.24 and 34.9% [1] and falls short of meeting the planning needs necessary for research or governance. The industry also needs information to improve manufacturing practices, food safety and specific products for allergic consumers. Allergists are likely to be faced with an unknown demand for the diagnostic services they perform or order, such as referral consultations and work-up by skin, in vitro and oral food challenge tests [2]. The present study was carried out to meet the brief of the European Union Commission to target food allergy [3] from the perspective of children and their families.

In this context, we integrated consumer survey methods [4] in order to measure the burden of disease from an ecological perspective. Considering patients as medical care users, we designed a children-specific questionnaire to estimate the potential demand for services, measured by their parents' report of food-linked symptoms.

Methods

Parental allergy reports, food-linked symptoms and provoking foods (main outcomes) were recorded as well as between-country differences and overall response rates (measures of interest) to provide cross-sectional data on paediatric patients and po-

tential consumers of allergy services across Europe. A telephone survey was carried out by the IFAV (Institute for Applied Consumer Research, Cologne, Germany), a non-profit market research institute, in 10 European nations. The sampled population was defined as the 1:5,000 ratio of their general population (1 responder in 5,000 inhabitants). Adult respondents (≥ 18 years) were interviewed about their live-in youngest child (< 18 years). Interviews were performed using a generated random digit dialling telephone survey set-up, generating verified high-scale randomised private telephone numbers. All numbers were replicated and screened for disconnects before interviewing subjects. From a single call centre, skilled interviewers received ad hoc training and handled all telephone contacts with interviewees from Austria, Belgium, Denmark, Finland, Germany, Greece, Italy, Poland, Slovenia and Switzerland in their own language (table 1). All inquiries on provoking foods and symptoms were open-ended and unaided. In a pre-test, 2.4% of the sample were contacted to check the comprehensibility of the questionnaire. Question A (table 1) defined parentally perceived reactions to food [5]. Descriptive statistics were used to construct rate tables of frequencies, cross-tabulations and means.

Table 1. Telephone-administered basic questionnaire (contacts 40,246, children reported with food allergy 8,825)

A	Does your child suffer from an allergy to certain foods?
B	Does your child receive/has received medical treatment because of food allergy?
C	Please specify the food(s) (s)he is allergic to
D	Please describe the symptoms when your child has/had an allergic reaction
E	Does your child avoid certain foods because of allergic reactions?

Table 2. Percentage of children reported with food allergy in different countries

	Austria	Belgium	Denmark	Finland	Germany	Greece	Italy	Poland	Slovenia	Switzerland
Prevalence	1.7	4.9	2.5	11.7	3	4.8	3.9	8.3	4.6	3.1
Fish	0	4.7	0	19.8	4.8	8.3	6.1	1.1	7	17.4
Seafood	0	2.3	4.5	2.1	4.8	0	3	2.3	4.7	13
Wheat	28.6	9.3	4.5	12.5	19	0	15.2	6.8	23.3	13
Meat	0	4.7	4.5	1	4.8	10.4	15.2	10.2	9.3	8.7
Eggs	7.1	14	0	14.6	9.5	27.1	15.2	27.3	27.9	21.7
Milk	28.6	55.8	22.7	41.7	23.8	16.7	33.3	55.7	27.9	34.8
Fruits	50	23.3	22.7	35.4	66.7	14.6	27.3	26.1	27.9	26.1
Legumes	7.1	11.6	9.1	7.3	4.8	8.3	0	1.1	14	8.7
Vegetables	28.6	7	27.3	24	14.3	8.3	9.1	8	4.7	13
Nuts	7.1	9.3	13.6	13.5	19	2.1	9.1	6.8	9.3	13
Other foods	50	18.6	18.2	11.5	23.8	27.1	12.1	18.2	18.6	8.7

Foods reported as elicitors (multiple answers allowed).

Results

Study Population

Between September and December 2003, 40,246 interviews were performed. Respondents were mainly women (25,083 or 62.5%). 8,825 children (4,277 girls and 4,548 boys, or 48.5 vs. 51.5%) were identified and 438 of them (4.7%) were claimed to suffer from 'an allergy to certain foods'. The results vary across survey nations between 1.7% in Austria and 11.7% in Finland (table 2). The distribution of affirmative responses to question A in different age groups peaked in toddlerhood, with a secondary

peak in late school age (fig. 1), and slightly more boys (5.0%) than girls (4.4%) are claimed to be 'food allergic' by respondents.

Reported Provoking Foods

Cow's milk is prominent among reported elicitors followed by fruits, hen's eggs, vegetables, wheat, nuts, fish and meat (fig. 2). Cow's milk is more often reported in Finland, Poland and Belgium, while it is mentioned less often in Greece, Denmark and Germany (table 2). Eggs, another important elicitor of food allergy in infancy, were often blamed in Slovenia, Poland and Greece, while in

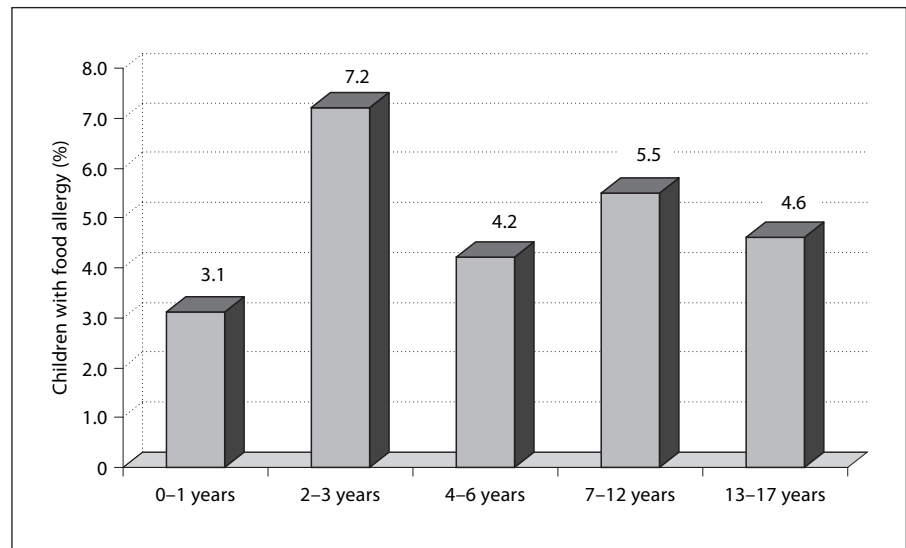


Fig. 1. Reported food allergy according to age.

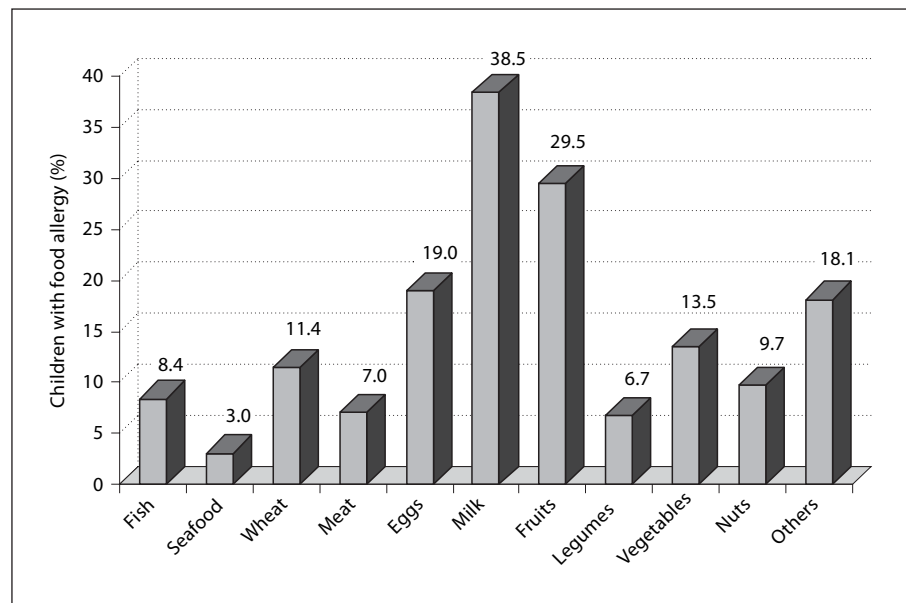


Fig. 2. Reported foods by categories in European children (n = 438; multiple answers allowed).

Denmark, it was not mentioned at all in children. Meat was mentioned by Italian parents but not by Austrians. Allergic reactions attributed to fruits stand out in Germany and Austria but rarely in Greece. Milk and dairy products are the most often blamed foods in infancy (65.2%), while eggs and fruits account for 17.4% each. In toddlerhood, milk dropped to 41.9%, while eggs almost doubled to 42.3% and fruits dropped to 16.1%. In early school age (4–6 years), the downward trend continues for eggs (18.5%) but not for fruits which begins to show an upward pattern (24.1%). In later school age (7–12 years), milk decreased to 36.5% and fruits peaked to 29.5%. In the teenage years, the major perceived food allergen is fruits (39.3%), followed by dairy products at 31.9% and eggs at 10.4%.

Reported Symptoms of Food Allergy

In the nations polled, 71.5% of parents reporting food allergy indicate skin symptoms in their child, with a variation in different countries ranging between 56.3 and 84.6%, followed by gastrointestinal tract symptoms with 27.6% of reports and respiratory (18.5%) and cardiovascular symptoms (1.6%) (table 3).

Physicians' Treatment and Elimination Diets

According to their parents, 75.7% of children received help from a physician because of their symptoms and, among these, 86.7% claim an elimination diet recommendation. Question B (table 1) translated into differing national response patterns according to age and gender. The largest consumer group (90%) seeking medical treatment was represented by 4- to 6-year olds. The highest likely consumer rate was found in Austria (100%) followed by Poland (89%), Germany (81.8%), Slovenia (84.1%), Denmark (77.3%), Belgium (71.1%), Finland (70.8%), Greece (68.8%) and Italy (58.8%), while Switzerland had the least likely claimant rate with 54.2%. Children seen by a specialist were highly likely to follow an elimination diet (90.3%), while children with perceived food allergy, but lacking such a referral, were not (22.5%).

Discussion

In the absence of epidemiological surveys, putting the improved delivery of allergy care on the Union food allergy agenda will require a clearer picture than can be extrapolated from case series in the literature and clearly needs the input of allergists and food safety technologists

Table 3. Percentage of reported affected organ systems (multiple answers allowed)

	Skin	Respi- ratory	Gastro- intestinal	Cardio- vascular	Others
Austria	71.4	14.3	7.1	14.3	21.4
Belgium	68.9	31.1	33.3	0	0
Denmark	63.6	9.1	27.3	0	9.1
Finland	56.3	21.9	49	0	6.3
Germany	77.3	9.1	27.3	4.5	9.1
Greece	81.3	10.4	20.8	4.2	10.4
Italy	65.6	9.4	28.1	0	6.3
Poland	84.6	20.9	15.4	0	0
Slovenia	79.5	15.9	13.6	0	4.5
Switzerland	62.5	25	29.2	8.3	4.2

[6]. Prevalence of food allergy in unselected populations, which is reported within a 3.24–34.9% range [1], falls short of meeting the planning needs or diagnostic test performance calibrations [7] of research or governance. Three recent studies in unselected populations on perceived [8] and confirmed food allergy [9, 10] report estimates for a prevalence of approximately 3%, but their criteria for including subjects as being positive are not identical, although they do overlap. Geographical differences due to genetic, cultural or nutritional influences are expected, but epidemiologic data from an unselected population are scarce [11–14].

Our study evaluates parentally perceived food allergy in European children using a single uniform definition across the spectrum of national differences. The point prevalence we found for children with food allergy (4.7%) is lower than the self-reported rate in the general population according to most studies [1], perhaps reflecting the fact that parental reports may be more objective than self-reports. Though questionnaire studies overestimate food allergy prevalence compared with food challenge evidence, parentally perceived food allergy is a study outcome in its own right [15] which, in the general population, affords a proxy measure of the potential demand for allergy medicine. Thus, our data poll the likely future claimant of public health allergy services as perceived by the adult respondent who is likely to start his/her child on the trek from generalist to specialist that has been dubbed the 'march of the allergic child' [16]. These data may be used in estimates for food industry strategies and public health planning. The response to this demand varies in different countries. With 268 paediatric allergy facilities, the Italian ratio of 1:37,400 (centre for children)

[17] is comparable with Finland where 25 hospital-based paediatric departments provide paediatric allergy care for the 1 million Finnish children under the age of 14 (a 1:40,000 ratio) [18]. By contrast, in the United Kingdom, only 6 major centres operate a consultant allergist service, including paediatric allergy [19]. The extent of the supply side of public health requires surveys to implement adequate services for the general paediatric population. Given the perception of symptoms highlighted in this survey, paediatric allergy services should provide a dermatological and gastroenterological expertise.

A secondary finding of this survey is that perceived food allergy does not follow the textbook description of clinical food allergy during childhood, when toddlers and school-aged children are supposed to 'outgrow' their infant food-linked symptoms (fig. 1). This discrepancy with conventional wisdom on the early onset of food allergy may reveal underreporting or lack of awareness of parents and physicians in considering immunoglobulin-E-mediated food hypersensitivity in infants. Conversely, the perception of allergy to milk and dairy products does not follow the expected natural history of the disease [20]. However, our cross-sectional database does not allow generalisations on natural history of food allergy. The high report rates after 7 years of age may indicate the extent to which paediatricians will have to deal with children and adolescents in need of screening for cow's milk allergy. Fruits present a mirror image of the situation for milk with an unexpectedly high prevalence of reports in children aged 0–3 years, consistently rising thereafter.

The main weaknesses of the present study are the limitations imposed by the sampling of the general population, with consequent, child-oriented questions. This may explain some inconsistencies such as the absence of egg and fish allergy in Danish children, of legume allergy in Italian children, or of wheat allergy in Greece (table 2). In this poll, cow's milk was not only the dominant elicitor of food allergy in infancy, but remained a matter of concern for parents later on. Reactions triggered by fruits are far more prevalent in this survey than previously reported. This may reflect emergent allergies linked to fruits added relatively recently to European children's diet [21].

Conclusion

Given the lack of large-scale epidemiological surveys, putting the improved delivery of allergy care on the food allergy agenda of the European Union will require a

clearer picture than can be extrapolated from selected population studies. In coordinated European projects, claimants for the services of allergists and food safety technologists need to be surveyed in terms of demand for public health organisation and planning [6]. In the face of the growing allergy share of the healthcare burden in Western countries, the need for population surveys (also incorporating double-blinded diagnostic evidence) is hardly a moot point. Even the narrow range of a paediatric questionnaire such as ours indicates – with diverse local point prevalence – that knowledge and treatment deficits exist among parents of potential claimants of medical services. Our data further suggest that with an overall 4.7% of food allergy claims in need of specialist screening, European allergists could have to deal with 1 out of 20 children in the population. This public health emergency should be met with adequate services to narrow the gap between the perceived problem of food allergy and the supply side of clinical care.

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