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A HOSPITAL-BASED CROSS-SECTIONAL STUDY TO DETERMINE THE PREVALENCE OF PARENT-REPORTED FOOD ALLERGY IN CHILDREN AGED 1 TO 12 YEARS ATTENDING THE PAEDIATRICS OPD AT MGM MEDICAL COLLEGE HOSPITAL AND RESEARCH CENTER, VASHI, NAVI MUMBAI

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ABSTRACT

Background: Parent-reported food allergy may overestimate clinically confirmed disease and can influence unnecessary dietary restriction.
Methods: This hospital-based cross-sectional study included 494 children aged 1–12 years attending paediatric outpatient services. Parents completed a structured questionnaire regarding suspected food allergy, implicated foods, symptoms, healthcare-provider confirmation, and dietary avoidance. Prevalence was estimated with 95% confidence intervals, and age- and sex-related associations were examined.
Results: Parent-reported food allergy was present in 44 children (8.9%; 95% CI, 6.7–11.7%). Milk was the most frequently implicated food (45.5%), followed by pulses and fruits. Gastrointestinal symptoms predominated (68.2%). Only 11.4% had affirmative healthcare-provider confirmation, whereas 77.3% had stopped at least one suspected food. Age and sex were not significantly associated with reported allergy.
Conclusion: Parent-reported food allergy was relatively common, but formal confirmation was infrequent despite substantial dietary restriction.

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INTRODUCTION

Food allergy is an immune mediated adverse response to certain foods, and it is a significant cause of morbidity in childhood. The epidemiology is hard to define as prevalence estimates vary widely by population, age, geographic setting and importantly the approach used to make the diagnosis [1]. Self- and parent-reported population surveys tend to overestimate the prevalence of food allergy compared with studies that require objective diagnostic confirmation, suggesting that perceived food allergy and clinically verified food allergy should be differentiated when interpreting epidemiological data [2,3].

Children are a special population since symptoms related to food may start early in life and can affect family food patterns. Gupta et al. estimated the prevalence of childhood food allergy in a large survey of 38,480 children in the United States to be 8.0%, and milk, peanut and shellfish were among the most commonly suspected foods [4]. The distribution of suspected allergens, however, varies by region. Nwaru et al. conducted a systematic review of reported milk, egg, wheat, soy, peanut, tree nut, fish and shellfish allergy prevalence, which showed high heterogeneity in prevalence and that it varied depending on the type of allergy (self-reported, sensitization based, or food challenge confirmed) [5].

Indian paediatric data are still relatively sparse and limited. A recent study of school children in the National Capital Region and Delhi found that 0.8% of children had a parent-reported food allergy, gastrointestinal symptoms were common and there was significant variation in the foods reported by families [6]. These results indicate that the prevalence and allergen patterns observed in Western populations should not be extrapolated to Indian children and highlight the importance of locally collected data in various age groups and health care environments.

Another difficulty is that symptoms attributed by parents to food do not necessarily indicate an immune-mediated food allergy. When a food is suspected to be the cause of a reaction, careful evaluation of the food, timing and reproducibility of symptoms, and appropriate use of allergy testing are important components of clinical assessment, and supervised oral food challenge is an important

reference standard when diagnostic uncertainty persists [7]. Recent Indian expert opinion also highlights the importance of structured history, selective testing, and not labelling or restricting diets without proper clinical assessment [8].

In this context, the current cross-sectional study, conducted in a hospital setting, aimed to evaluate the prevalence of food allergy in children aged 1–12 years, as reported by their parents, who attend paediatric outpatient services. Beyond prevalence estimates, the study examined commonly implicated foods, symptom patterns, prior confirmation by a healthcare provider, and dietary restriction practices reported by parents, and specifically treated parent-reported food allergy as a questionnaire-based outcome rather than independently verified disease.

MATERIALS AND METHODS

Study design and setting

The present study was a cross sectional study conducted in the hospital to evaluate the prevalence of food allergy in children attending paediatric OPD of MGM Medical College Hospital and Research Centre, Vashi, Navi Mumbai and its peripheral centre as reported by parents. The recruitment was scheduled for six months. The main aim was to assess the prevalence of parent-reported food allergy. Secondary objectives included identification of the most common foods implicated, the proportion with parent-reported healthcare-provider confirmation, and the description of the exclusion of suspected foods from the child's diet.

Participants and sampling

Children ages 1–12 years with informed consent from their parents/guardians were eligible. For children 7–12 years of age, verbal assent was also obtained. Children whose parents refused consent, children who declined assent when applicable, and children with inadequate information to determine eligibility and/or primary outcome were excluded. A duration-based sampling method was indicated, meaning that children were not selected based on a set number of children, but rather during the time frame of the study.

Data collection

Parents/carers were interviewed by a doctor using a structured questionnaire in a language they understood. The questionnaire was pre-tested in Hindi and Marathi and content validated by three members of paediatrics department. It gathered data regarding age, sex, parental perception of food allergy, suspected foods, symptoms after eating, time between eating and symptoms, and whether the symptoms came back when the child ate the food again. Other questions focused on previous assessment by a healthcare provider, investigations, dietary restriction, hospitalisation, anaphylaxis and personal/family history of allergic diseases.

The symptoms were categorized into gastrointestinal, cutaneous, oral or throat, and respiratory or nasal symptoms. Gastrointestinal symptoms were vomiting, loose stools, abdominal pain, nausea and distention; cutaneous symptoms were rash, pruritus, urticaria and wheals. Oral or throat symptoms were local itching, lesions and mucositis, and respiratory or nasal symptoms were cough, nasal congestion and rhinorrhoea. More than one symptom category could be assigned to an individual child.

Outcome definitions

The main outcome was a positive answer to the question about perceived food allergy or an undesirable response to food in the parental questionnaire. This outcome was reported by parents and not clinically or lab-confirmed. Prevalence was expressed as the proportion of children who answered "yes" to the question divided by the number of children who were age-eligible and who responded to the question.

The foods that were suspected were categorized from the parent descriptions. Foods were consolidated as appropriate, such as pulses, fruits, tree nuts and wheat products. Soybean and peanut were reported separately from other pulses. If an individual ingredient could not be identified, mixed-food reactions were kept as a separate category. Children who reported more than one food item made a contribution to each relevant category.

Healthcare-provider confirmation was based on the parent's answer to the question about prior confirmation via clinical history or investigations. Responses were categorized as positive, negative, indeterminate, or not available. If medical advice or a recommendation for testing was made without a clear "yes" answer, it was designated as indeterminate. This was not considered to be an independently verified or challenge-confirmed food allergy.

Dietary behaviour was defined as documented cessation of at least one suspected food, continued consumption without documented cessation, or unrecorded restriction status. Temporary restriction was included as a cessation. Ongoing use involved eating in another way, in lesser amounts, or occasionally. Proportions of children with parent-reported food allergy who had healthcare-provider confirmation and dietary restriction were calculated.

Data preparation

Demographic variables were standardised before analysis. Records outside the eligible age range, those without an ascertainable age, and those lacking the primary outcome were excluded from the prevalence analysis. Missing responses were not classified as negative. Analyses involving sex used available observations, and regression was restricted to records with complete age, sex, and outcome data. Food and symptom categories were derived from the recorded free-text descriptions using the definitions above.

Statistical analysis

Analyses were performed in Jamovi version 2.7.38. Continuous variables were summarised as mean ± standard deviation and median with interquartile range; categorical variables were expressed as frequencies and percentages. Wilson 95% confidence intervals were calculated for the prevalence of parent-reported food allergy and the principal secondary proportions.

Age distributions were compared between children with and without parent-reported food allergy using the two-sided Mann–Whitney U test. Pearson's chi-square test assessed associations with sex and age categories. Age groups of 1–3, >3–6, and >6–12 years were defined for descriptive comparison. Rank-biserial correlation and Cramér's V were reported as effect-size measures for the Mann–Whitney and chi-square analyses, respectively.

Binary logistic regression was fitted by maximum likelihood, with parent-reported food allergy as the dependent variable and age in years and sex entered simultaneously as predictors. Associations were expressed as adjusted odds ratios with 95% confidence intervals. Individual predictors were evaluated using Wald tests, and overall model significance was assessed using the likelihood-ratio test. Personal and family allergic histories were not included as

predictors because they were not systematically recorded across both outcome groups. All tests were two-sided, with $p < 0.05$ considered statistically significant.

Ethical considerations

The institutional ethics committee approval was taken before recruitment, written informed consent from parents or guardians, and verbal assent from children aged 7–12 years. Participation was voluntary, and confidentiality of participant information was maintained.

RESULTS

Study population and prevalence

The analysis included 494 children aged 1–12 years attending the paediatric outpatient service. Parent-reported food allergy was identified in 44 (8.9%) children (95% confidence interval [CI], 6.7–11.7%). The study population had a mean age of 4.98 ± 3.20 years. Demographic characteristics and comparisons according to parent-reported allergy status are presented in Table 01.

Reported foods and symptom patterns

Milk was the most frequently implicated food, reported for 20 (45.5%) children with parent-reported food allergy. Pulses and fruits were the next most frequently reported groups, whereas tree nuts, soybean and wheat were less common (Figure 01). A total of 5 (11.4%) children reported reactions to more than one individual food. One child reported reactions to khichdi while tolerating rice and dal separately.

Gastrointestinal complaints predominated, followed by cutaneous manifestations (Figure 2). Oral or throat symptoms were reported by a smaller proportion, and respiratory or nasal symptoms were uncommon. Symptom groups were not mutually exclusive; 3 (6.8%) children reported both gastrointestinal and cutaneous symptoms.

Healthcare provider confirmation and dietary restriction

An affirmative response to the healthcare-provider confirmation question was recorded for 5 (11.4%) children with parent-reported food allergy (95% CI, 5.0–24.0%). Most had a negative response, while three responses were indeterminate or unavailable. The distribution of reported confirmation and dietary behaviour is shown in Table 2.

Cessation of at least one suspected food, including temporary restriction, was documented in 34 (77.3%) children with parent-reported allergy (95% CI, 63.0–87.2%). A further 6 (13.6%) continued the suspected food in some form, in smaller quantities or intermittently, without documented cessation. The remaining four had no clear restriction status.

Factors associated with parent reported food allergy

Age distributions and sex composition did not differ significantly between children with and without parent-reported food allergy (Table 01). In the age- and sex-adjusted logistic regression model, neither increasing age nor male sex was significantly associated with the outcome (Table 03). The overall model was not statistically significant (likelihood-ratio $\chi^2 = 1.367$, df = 2; $p = 0.505$).

Table 01: Characteristics of children according to parent-reported food allergy status

Characteristic	Overall (n = 494)	Reported allergy (n = 44)	No reported allergy (n = 450)	Statistic; p-value
Age, years, mean ± SD	4.98 ± 3.20	4.40 ± 3.30	5.04 ± 3.18	—
Age, years, median (IQR)	4.00 (2.00–7.00)	3.00 (1.73–7.00)	4.00 (2.13–7.00)	U = 8,401; p = 0.096
Age group, n (%)				$\chi^2 = 3.595$; df = 2; p = 0.166
1–3 years	205 (41.5)	23 (52.3)	182 (40.4)	—
>3–6 years	134 (27.1)	7 (15.9)	127 (28.2)	—
>6–12 years	155 (31.4)	14 (31.8)	141 (31.3)	—
Sex, n (%)				$\chi^2 = 0.085$; df = 1; p = 0.770
Male	273 (55.6)	23 (53.5)	250 (55.8)	—
Female	218 (44.4)	20 (46.5)	198 (44.2)	—

Values are n (%) unless otherwise stated; percentages are within columns. Sex denominators are 491 overall, 43 with reported allergy and 448 without reported allergy. Age was compared using the two-sided Mann–Whitney U test; age-group and sex distributions were compared using Pearson's chi-square test. Rank-biserial correlation for age = −0.151; Cramér's V = 0.085 for age group and 0.013 for sex. Age groups were defined for descriptive analysis. SD, standard deviation; IQR, interquartile range; df, degrees of freedom.

Table 02: Reported healthcare-provider confirmation and dietary restriction among children with parent-reported food allergy

Characteristic	n (%)
Healthcare-provider confirmation response	
Yes	5 (11.4)
No	36 (81.8)
Medical advice or testing mentioned; confirmation indeterminate	1 (2.3)
Response unavailable	2 (4.5)

Dietary behaviour	
Cessation of at least one suspected food	34 (77.3)
Continued intake without documented cessation	6 (13.6)
Restriction status not recorded	4 (9.1)

Denominator: 44 children. Healthcare-provider confirmation represents the parent's response to the confirmation question. Cessation includes temporary restriction of at least one suspected food and does not necessarily indicate continued avoidance of all implicated foods. Continued intake includes consumption in another form, in reduced quantities or intermittently. Wilson 95% CIs: affirmative confirmation, 5.0–24.0%; food cessation, 63.0–87.2%. These are descriptive outcomes; no hypothesis test was applied.

Table 03: Multivariable logistic regression for parent-reported food allergy

Predictor	Adjusted OR	95% CI	Wald χ^2	p-value
Age, per additional year	0.94	0.85–1.05	1.233	0.267
Male sex versus female sex	0.91	0.49–1.71	0.081	0.775

The model included 491 children with complete age and sex data, including 43 with parent-reported food allergy. Both predictors were entered simultaneously. Wald tests have 1 degree of freedom. Overall likelihood-ratio χ^2 = 1.367, df = 2; p = 0.505. OR, odds ratio; CI, confidence interval.

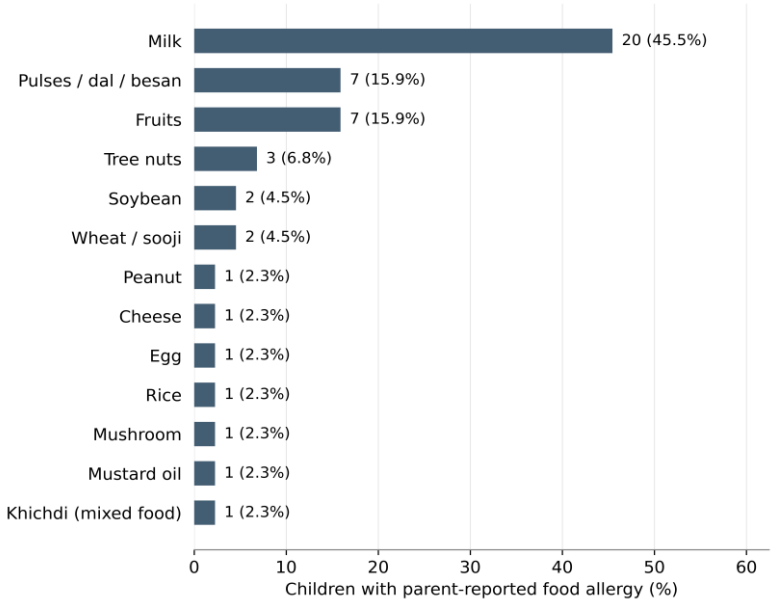

Figure 01: Foods implicated in parent-reported food allergy. Bars show the percentage of the 44 children reporting each food or food group; labels show n (%). Multiple responses were permitted. Pulses exclude soybean and peanut; khichdi is shown separately as a mixed food.

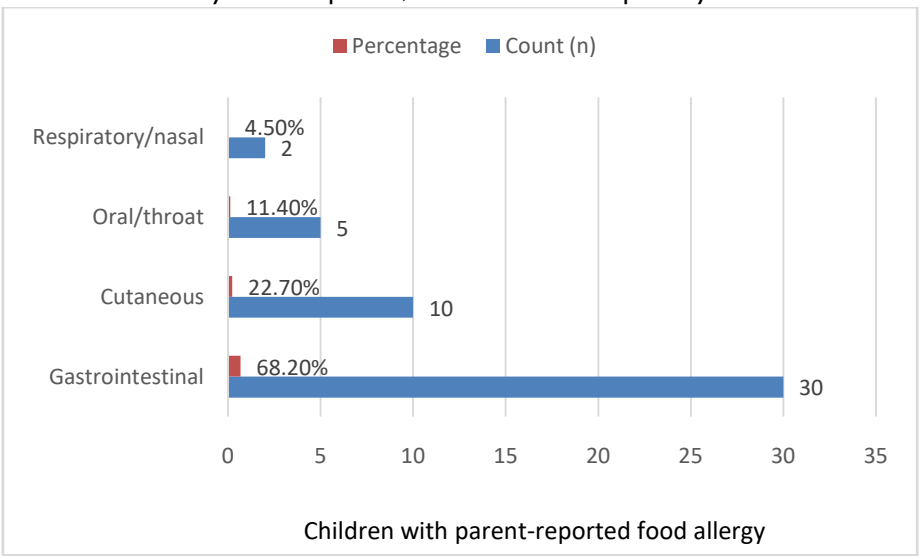

Figure 2. Symptom patterns among children with parent-reported food allergy. Bars show the percentage of the 44 children with each symptom group; labels show n (%). Categories are non-exclusive. Gastrointestinal symptoms include vomiting, loose stools, abdominal pain, nausea or distension.

DISCUSSION

Among the 494 children in this hospital based cohort, 8.9% had a parent-reported food allergy. Milk was the most common food item, followed by pulses and fruits, and gastrointestinal symptoms were the most common. 77.3% of children with a reported food allergy had stopped at least one suspected food, and only 11.4% had an affirmative parental report of healthcare-provider confirmation. There were no independent associations between age and sex and parental reporting. These results point to a key difference between perceived food-related reactions and clinically confirmed food allergy, especially when parents' reports result in significant dietary changes.

The prevalence rates in our study are similar to some questionnaire-based estimates and considerably higher than those found by diagnostic confirmation. In their study of 798 six-year-old children, Venter et al. identified 11.8% with parent-reported food hypersensitivity, and 3.6% were sensitized to the predefined food panel. When clinical evaluation and food challenge are added, the objective assessment of food hypersensitivity dropped to 2.5% or 1.6%, showing a marked decrease in the prevalence of food hypersensitivity [9]. Orhan et al. showed a similar discrepancy between the reported and confirmed rate of IgE-mediated food allergy among 2,739 Turkish school children: 5.7% reported, but only 0.8% confirmed, with a reported rate approximately 7.5-fold higher [16].

This contrast is particularly relevant in the Indian context. Using standardized EuroPrevall-INCO methodology in 35,549 children from China, Russia and India, food-specific IgE sensitization was found in 19.1% of Indian children, while probable food allergy was seen in only 0.14% [10]. Therefore, neither parental attribution nor sensitization alone necessarily represents clinical food allergy. This 8.9% estimate should, therefore, be interpreted as the prevalence of parent-reported food allergy and not as a prevalence estimate for immunologically confirmed food allergy.

The same methodological point is reinforced by large prospective European data. Grabenhenrich et al. evaluated 6,105 children aged 6–10 years in the follow-up study, EuroPrevall-iFAAM, with 16.2% of parents reporting adverse reactions to food; 17 children had a challenge-confirmed allergy among those fully evaluated. Once the non-participation in challenge was accounted for, the prevalence of food allergies was estimated to be between 1.4% and 3.8%, with a high proportion of positive challenges for hazelnut and peanut [11]. Differences in reported prevalence may be partly due to the wider age range and outpatient sampling in our study, but both studies showed that the perceived prevalence of food reactions is broader than the challenge-confirmed allergy.

Milk was the most common food reported in our cohort, with a reported reaction rate of 45.5%, which is considerably higher than that of the other foods. This is a plausible finding in a paediatric population, where children as young as one year were included, but parental reports do not differentiate between cow's-milk allergy and intolerance or other gastrointestinal reactions. In the EuroPrevall birth cohort, Schoemaker et al. followed 12,049 children across nine European countries and confirmed cow's-milk allergy in just 55 (0.54% of the total). Furthermore, 69% of children re-evaluated after one year were tolerant and nearly a fourth of confirmed cases did not have detectable cow's-milk-specific IgE [12]. It is therefore important to view the predominance of milk in our survey as a pattern of parental attribution, and not as an indication that almost half of the affected children had persistent IgE-mediated cow's-milk allergy.

The range of foods involved also seems to be strongly population specific. Feng et al. conducted a survey of 8,856 children in Chinese schools and found that 6.2% of parents reported their children had a food allergy, and 3.3% had a doctor's diagnosis of food allergy. The top foods were shrimp, mango and molluscs, compared to milk, pulses and fruits in our cohort. They also found that 14.1% of children with parent-reported food allergy reported multiple food allergies, compared with 11.4% in our study who reported more than one food [13]. This variation may be due to differences in age, diet exposure, regional food intake, or family perceptions of adverse reactions.

There were also differences in symptom patterns between populations. In our affected children, gastrointestinal manifestations were seen in 68.2% while in the Chinese cohort, Feng et al. observed that skin manifestations predominated. They also found that there was a higher prevalence of parent-reported food allergy in children aged 8–11 years compared to those aged 6–7 years, and sex was not significantly associated with parent-reported allergy [13]. In our study, age and sex were not associated with the outcome, suggesting that demographic associations may be influenced by age structure, recruitment setting, and local exposure patterns, and not be robust across all settings.

This is an important clinical finding, given that the rate of confirmation by a healthcare provider was relatively low in our cohort. There was an affirmative parental report of past confirmation for only 5 of 44 children affected. In contrast, Galic et al. studied a nationally representative sample of 38,408 children in the United States, and estimated that 7.6% of children had convincing IgE-mediated food allergy and 4.7% had a physician-confirmed allergy. However, 38.9% of children with convincing food allergy did not have a physician diagnosis and, among those who did, 68.2% had skin tests, and the diagnostic confirmation was highly variable based on the food implicated [14]. The considerably larger confirmation gap in our study could be due to access to allergy services, variations in diagnostic criteria, interpretation of past medical encounters, or the inclusion of reactions unlikely to represent immune-mediated allergy.

Dietary restriction was much more common than diagnostic confirmation. When parents reported their child's allergy, more than three-quarters of children had discontinued at least one suspected food, although only 11.4% said their child had been confirmed by a healthcare provider. This pattern should be noted as it can make nutrition and feeding within the family more difficult if it is not necessary. In Finland, Kallio et al. interviewed parents of 1,542 children entering school and found that 9.2% reported some type of food allergy that needed to be taken into account when preparing their meals, of which milk allergy was reported by 1.5%, egg allergy by 1.1%, and grain allergy by 1.0%, and nut and fruit/vegetable allergies were also reported [15]. Their results, along with our own, indicate that parental attitudes toward food allergy often lead to actual dietary changes, regardless of the level of diagnostic confidence.

The Turkish data from Orhan et al. Show why restrictions based on food allergy should follow an evaluation. Even though 5.7% of children were thought by parents to have IgE-mediated food allergy, only about one-third of those reported cases showed sensitization. After testing true confirmed allergy was found in 0.8%. The foods that were confirmed as triggers were different from what's usually seen in Western countries. Beef, cows milk, cocoa, egg and kiwi were among the allergens. This shows that what parents believe is a food allergy may not always be accurate. Questionnaire-based reports help explain what people think about food allergies. They should not be used directly to make medical diagnoses or to recommend long-term food avoidance. One major strength of this study is that it focused on what parents reported than on confirmed food allergy. The questionnaire covered suspected foods, symptoms how often they occurred, past visits and dietary changes. This allowed the researchers to study how parents view food reactions and how those views affect their children's eating habits without claiming any diagnosis. The study also included children from 1 to 12 years old which is broader than studies that only look at school-age kids. Still because the study was hospital-based it may not reflect the population. Families who visit clinics might be more health-conscious or have more experience with medical care, which could affect results. Also since the study relied on parent reports there is a chance of memory bias or mistaken blame placed on foods. Without skin tests blood tests for IgE or oral food challenges the true rate of confirmed food allergy couldn't be measured.. Information about personal or family allergies wasn't complete enough to adjust for those factors.

CONCLUSION

8.9% of children had a parent-reported food allergy, with milk being the most common trigger and stomach symptoms being the main problem. Many children had diets changed because of these concerns. Few had their allergies confirmed by doctors. These results remind us that just because a parent thinks a child has a food allergy does not mean it is real. It is important to tell the difference, between what parents believe and what is medically confirmed. Before removing foods from a child's diet for a long time a careful medical evaluation is needed.

FINDING

Nil

AUTHOR CONTRIBUTION

All authors are contributed equally.

ETHICAL STATEMENT AND INFORM CONSENT

The institutional ethics committee approval was taken before recruitment, written informed consent from parents or guardians, and verbal assent from children aged 7–12 years.

CONFLICT OF INTREST

Not Declared

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