

Food hypersensitivity among Caucasian and non-Caucasian children

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There are little data regarding the frequency of different foods that cause hypersensitivity in the UK. Furthermore, there are no data regarding food hypersensitivity related to ethnic variations. This prospective study involved 76 children with IgE-mediated food allergy presenting consecutively over 18 months to a Paediatric Allergy Clinic serving a well-defined population that is 21% non-Caucasian. A total of 52.6% of the paediatric allergy clinic population was non-Caucasian compared with 35.9% in General Paediatric Clinics giving a mean difference in percentage of 16.7 (5.6, 27.8), $p < 0.01$. The average number of food allergens per child in the non-Caucasian group was 2.05 vs. 1.22 in the Caucasian group, mean difference 0.83, which is significant ($t = 4.15$, d.f. = 74, $p < 0.01$). Analysis of other allergic conditions revealed no significant increase in the non-Caucasian group. The mean age of first reaction to any food was 2.6 yr (range 0.3–12 yr) in Caucasian, and 1.7 yr (range 0.3–8 yr) in non-Caucasian, children ($p < 0.05$). There were 125 reactions in the study population, with egg, peanut, tree nut, cow milk and cod being the commonest food allergens. Some novel foods, such as kiwi, lentil and sesame, were also represented in the top 10 food allergies, particularly in the non-Caucasian population. Ethnic minorities are over-represented in terms of the number of children with food allergy and number of food allergies per child, present at an earlier age with food allergy, and possibly have a greater variety of food allergies compared with Caucasians. This is important in terms of health education. Our findings need confirmation by a more detailed population based study, ideally using food challenges in addition to history and skin prick testing.

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IgE-mediated food allergy in children has increased in prevalence over the last few years (1, 2), with tertiary centre data showing variations in the commonest foods causing food hypersensitivity in different countries (3–8). Although a recent paper suggests that there are ethnic and socio-economic variations with skin and respiratory allergy (9), there are no published data regarding food hypersensitivity in relation to ethnicity.

The aim of this study was to look at the frequency of different food allergies within a

geographically defined UK population, looking specifically at any ethnic variations.

Materials and methods

Study population

A prospective observational study was conducted at the Paediatric Allergy Clinic at Hillingdon Hospital NHS Trust, the sole secondary healthcare provider for the London Borough of Hillingdon which has a non-Caucasian popula-

tion of 21% (13.6% Asian/Asian British, 3.3% Black/Black British, 1.8% Chinese, 2.3% mixed race). Between January 2003 and August 2004, a total of 76 children were studied (mean age 4.0 yr, range 0.5–13.5 yr, 40:36 M:F). The children presented consecutively to the paediatric allergy clinic for the first time over an 18-month period. A single doctor (GAK) took the history and a single allergy nurse (AS) performed the skin prick test (SPT). Details of other allergic conditions (including eczema, asthma, allergic rhinitis and urticaria/angioedema), and ethnicity were collected at the same time.

A history of an acute reaction (one or more of cutaneous, respiratory, cardio-vascular, rhino-conjunctivitis or gastro-intestinal symptoms), within 20 min of the food allergen being ingested, with a positive SPT result or specific IgE, confirmed allergy. The vast majority of children underwent SPT alone to confirm the clinical history, with only 6/76 (7.9%) having the diagnosis confirmed using specific IgE levels when severe eczema, dermatographism or recent antihistamine use prevented skin prick testing. Food challenges were not undertaken to confirm food allergy in any child.

The Local Ethics Committee was contacted and advised that approval for the study was only needed from the Caldicott Guardian. The recommendations of the latter, relating to patient anonymity and paper and electronic data security, were followed.

Methods

Skin prick tests. A positive skin prick test was defined as a weal more than 3 mm in diameter with a negative normal saline control read at 15 min. Soluprick SQ (skin prick testing) solutions (ALK-Abello, Hoersholm, Denmark) were used for cow milk, egg, wheat, soya, cod, peanut, hazelnut, brazil nut and almond, with modified (prick–prick) skin testing used for other food allergens. Prick–prick testing involved passing the lancet through whole extract of the food allergen being tested and then pricking through the skin.

Specific IgE

Specific IgE was measured using the ImmunoCAP® Specific IgE test (Pharmacia Diagnostics, Uppsala, Sweden). A specific IgE of 0.35 kU/l or more was regarded as positive.

Statistics

Values are stated as the mean difference $\pm$ 2 s.e. (95% confidence intervals). Significance was taken as $p < 0.05$ unless stated otherwise. Student's t-test was used to calculate differences in the mean number of allergies between ethnic groups.

Results

In 76 children, a total of 125 reactions to 23 different food allergens were documented.

The top five food allergens were egg, peanut, tree nut, cow milk and cod, in that order. Together these five foods accounted for almost 90% of all the reactions. Some novel foods including sesame, kiwi and pulses (bean, peas and lentils) were also ranked in the top 10 most common food allergens. There were a small number of reactions to other food allergens (banana two, shrimp two, avocado one, pumpkin one, wheat one and coconut one).

The mean age at which the first reaction to any food was seen was 2.01 ± 2.0 yr. In the Caucasian group, the mean age was found to be 2.6 yr (range 0.3–12 yr) compared with a mean age of 1.7 yr (range 0.3–8 yr) in non-Caucasian children. The mean difference in age at first reaction between Caucasian and non-Caucasian children is 0.85 yr ($p < 0.05$).

There was a disparity in the proportion of children from non-Caucasian ethnic groups presenting to the allergy clinic compared with both the local paediatric population and the general paediatric outpatient ethnic distribution. The food allergy clinic had a 52.6% non-Caucasian population (32.9% Asian/Asian British, 9.2% Black/Black British, 2.6% Chinese, 7.9% mixed race) compared with 36% in the general paediatric outpatient clinic (see Table 1).

An analysis of the Caucasian vs. non-Caucasian population in the allergy clinic compared with paediatric outpatients (excluding the allergy clinic patients) reveals a mean difference in percentage of 16.7 (5.6, 27.8), $p < 0.01$. This represents a significant over-representation of non-Caucasian children in the allergy clinic compared with general outpatients.

When the number of allergens per child was analysed it was found that in the non-Caucasian group, the mean number was 2.05 vs. 1.22 in the Caucasian group, mean difference 0.83. This was found to be highly significant ($t = 4.15$, d.f. = 74, $p < 0.01$).

The top four foods (egg, peanut, tree nut and cow milk) remained similar across different ethnic groups. However, novel foods such as

Table 1. Comparing ethnic background of population presenting to allergy clinic compared with population presenting to general outpatient clinic and local population as a whole

Ethnic background	n (study)	Allergy clinic – new patients seen (%)	General paediatric OPD – new patients seen (%)	LBH population – 2001 census (%)	p-values
Caucasian	36	47.4	64.1	79.0	Non-significant (ns)
Non-Caucasian	40	52.6	35.9	21.0	$p < 0.01^*$
Asian/Asian British	25	32.9	21.5	13.6	ns
Black/Black British	7	9.2	1.5	3.3	ns
Other	8	10.5	12.9	1.8	ns

*Difference between attendance in allergy clinic and general outpatient clinic compared to population ethnicity distribution data (Caucasian vs. non-Caucasian).

kiwi, sesame and legumes (such as beans, lentils and chickpeas) were seen predominantly in the non-Caucasian population although the numbers were too small for statistical analysis (see Fig. 1).

With the exception of asthma, there was no significant difference in the prevalence of other allergic conditions (eczema, allergic rhinitis and urticaria/angioedema) between the Caucasian and non-Caucasian populations in the allergy clinic. The prevalence of asthma was found to be 47% in the Caucasian group compared with 27% in the non-Caucasian group ($p < 0.001$), suggesting that the non-Caucasian population was not more prone to other atopic diseases.

Discussion

The children we studied are those served by a hospital closely linked to the local population, rather than a true population-based study. The most common foods causing allergy seen in our study were broadly similar to those documented in other studies from the USA and Europe (3–8). Our study also confirms the increased prevalence of novel food allergens such as sesame and kiwi noted in other studies (4, 10), but adds the possibility that these novel food allergens may cause allergy preferentially in the non-Caucasian population.

The main statistically significant findings of this study are an over-representation of ethnic minorities, in terms of the number of children presenting with food allergies to an allergy clinic and the number of food allergies per child, when compared with the Caucasian population, and an earlier age of presentation with food allergy. The reasons for these differences are not clear. The findings are important in terms of health education for these children and their families, particularly when advising about the risk of developing food allergy, and the number and variety of food allergies that may be involved.

This study does have some limitations. We did not collect detailed dietary history including

breastfeeding or introduction of solids, nor detailed ethnic demographic data, e.g. whether the children were first or second generation immigrants. It is possible that some children were seen in other allergy clinics, so our study population may not have been completely representative of the local population. Furthermore, food challenge confirming an allergy diagnosis is more robust than a diagnosis based on history and supportive skin prick testing, used in the current study. Extended sensitization data in the study children, for example, to the 10 most common food allergens as well as the index food, may also have provided interesting data. We therefore feel that our findings need confirmation in future studies without these limitations, and conducted in a population-based setting.

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