

Letter to the Editor

Food intolerance and wheezing in young South Asian and white children: Prevalence and clinical significance

To the Editor:

In the United Kingdom (UK), prevalence of asthma has been reported to be lower in South Asian compared with white children, while hospitalizations and use of health services were more common.¹ Food intolerance has been associated with severe and persistent asthma²⁻⁶ in children. Hospital-based patient surveys in the UK backed up by objective laboratory testing suggest that food and drink more commonly trigger asthma in South Asian than in white children.⁷ A higher prevalence of food allergy in South Asians could therefore help to explain ethnic differences between prevalence and severity. Population-based data confirming these findings are lacking. We therefore assessed the prevalence and predictive value of reported food-related wheeze in a population-based cohort study of South Asian and white preschool children.

We studied a population-based cohort of 6100 white and 2600 South Asian (ethnic origin self-defined as Indian, Pakistani, or Bangladeshi) preschool children born between 1993 and 1997 in Leicestershire, UK, whose parents filled in postal respiratory questionnaires in 1998 and 2003.⁸ In 1998, questionnaires were returned for 4986 (84% of those with a valid address) white and 1825 (72%) South Asian children aged 1 to 4 years, and in 2003 for 3195 (56%) and 1039 (42%) children aged 6 to 9 years, respectively. Questionnaires from both surveys were available for 2962 white and 911 South Asian children. We asked core questions from the International Study on Asthma and Allergy in Childhood, plus detailed questions on frequency and severity of wheeze, triggers of wheezing episodes, environmental exposures, and socio-demographic variables. Food-related wheeze was assessed as one of several answers to the question on triggers: "Did any of the following things cause wheezing in your child? Food or drinks (yes/no/don't know)." We compared the prevalence of food-induced wheeze between South Asian and white children in 1998 and in 2003, assessed clinical features of children reporting food-induced wheeze, and

determined whether food-induced wheeze in 1998 predicted persistence of wheeze 5 years later, using multi-variable logistic regression.

The overall prevalence of wheezing was lower in South Asian than white children in 1998 at age 1 to 4 years (23.0% and 32.0%, respectively; $P < .001$) but similar in 2003 at age 6 to 9 years (13.4% and 13.2%, respectively; Table I). Among wheezers, food as a trigger was reported more commonly by parents of South Asian children (Table I) with unadjusted odds ratios (ORs) of 2.7 (95% CI, 1.9-3.9) for preschool and 5.8 (95% CI, 3.2-10.5) for school children. After adjustment for confounders, food intolerance was even more strongly associated with South Asian ethnicity and was also associated with severity of wheeze (frequency of attacks) and with exercise and furry pets as triggers (Table II). Reported primary health-care utilization was greater in children with food-related wheeze at both age windows ($P < .002$). An association between food as a trigger of wheeze and hay fever (OR, 2.8; $P = .001$) in 2003 decreased after adjustment (OR, 1.7; $P = .12$). In 2003, but not in 1998, prevalence of eczema was higher in children with food-related wheeze compared with other wheezers (42% vs 57%; $P = .046$), the difference being greater in South Asian children.

Persistence of wheeze 5 years later was strongly predicted by food intolerance at age 1 to 4 years after adjustment for age, sex, ethnic group, and frequency of wheeze (OR, 1.9; 95% CI, 1.1-3.2; $P = .014$). Stratified analysis showed that the association with severity and persistence of wheeze was similar in South Asian and white children. Sensitivity analysis, including (1) only children where both parents were South Asian, and (2) only children whose parents correctly identified wheeze as "whistling or squeaking sound from the chest," gave results similar to the main analysis with regard to prevalence, associated factors, and persistence. In fact, the association between food intolerance at age 1 to 4 years and persistence of wheeze 5 years later became even stronger, with the OR changing from 1.9 to 2.0 (95% CI, 1.2-3.4; $P = .011$) and 2.4 (95% CI, 1.4-4.3; $P = .003$) for models (1) and (2), respectively.

TABLE I. Reported prevalence of current wheeze among the whole study population, and of food-related wheeze among currently wheezy South Asian and white children*

	White children				South Asian children				Ethnic difference <i>P</i>
	N	n	Percent	(95% CI)	N	n	Percent	(95% CI)	
Prevalence of current wheeze overall									
At age 1-4 y (1998)	4986	1594	32.0	(30.7-33.3)	1825	420	23.0	(21.1-24.9)	<.001
At age 6-9 y (2003)	3195	422	13.2	(12.0-14.4)	1039	139	13.4	(11.3-15.5)	.888
Prevalence of food-related wheeze among children with current wheeze									
At age 1-4 y (1998)	1594	84	5.3	(4.2-6.4)	420	55	13.1	(9.9-16.3)	<.001
At age 6-9 y (2003)	422	20	4.7	(2.7-6.8)	139	31	22.3	(15.3-29.3)	<.001

*Current wheeze: wheeze within the previous 12 months.

TABLE II. Factors independently associated with reported food-related wheeze in young children with current wheeze*

	1998			2003		
	Age 1-4 y			Age 6-9 y		
	OR*	(95% CI)	P	OR*	(95% CI)	P
South Asian ethnicity	3.84	(2.60-5.67)	<.001	9.06	(4.52-18.18)	<.001
More than 3 attacks of wheeze†	2.06	(1.40-3.02)	<.001	2.06	(1.03-4.11)	.041
Exercise as trigger of wheeze†	2.05	(1.39-3.01)	<.001	4.88	(2.28-10.42)	<.001
Pets as a trigger of wheeze†	3.35	(1.93-5.81)	<.001	1.97	(0.89-4.35)	.093

*Multiple logistic regression, adjusted for age, sex, and all variables listed in table.

†Within the previous 12 months.

In this unselected population-based longitudinal cohort study, wheeze triggered by food or drinks was reported far more commonly among UK-born children of South Asian origin than among white children at both preschool and early school age. A history of food as a trigger in preschoolers was associated with more severe wheeze and doubled the risk of persistence of wheeze 5 years later, even after adjustment for asthma severity. These comprehensive data support and extend hospital-based studies of children with asthma,⁷ strengthening the evidence for an ethnic difference in food intolerance in childhood wheezing and asthma.

The careful definition of ethnicity, population-based sampling, and good initial response rate all strengthen our conclusions, avoiding the potential for selection bias inherent in studies performed in clinical settings.³ Although the response rate was poorer in 2003, results were similar to those in 1998, suggesting that nonresponders were similar to responders with respect to the variables of interest.

Limiting the analysis to families who correctly defined wheezing as a “whistling or squeaking sound from the chest” strengthened the findings. The longitudinal design, in which the exposure (food as trigger of wheeze) was assessed years before the outcome (persistence of wheeze), eliminates reporting bias as a possible explanation for our findings. A limitation of the study is that our data are based only on subjective reports. However, even in an objective challenge situation, there is no single standard test to diagnose food-induced wheeze, because of the different immunological (and other) mechanisms involved, the varying interval between exposure and effect, dependence on the coexistence of other triggers, and the variety of outcome measures.⁹

The association between food intolerance and ethnic group in our study is strongly supported by laboratory studies based on double-blind food challenges, using lung function and bronchial responsiveness as outcomes (see review⁹). A variety of agents, including potential allergens, chemical agents, and physical agents (such as ice-cold drinks), may be responsible for intolerance among South Asian children with asthma.^{6,7,9} No convincing mechanism has been proposed. The only common feature is ingestion, which suggests that mechanism must involve the upper gastrointestinal tract and may therefore involve neural (vagal) reflex phenomena or mediator release,

rather than a direct effect of ingested agents on the airways. Nonatopic mechanisms may explain the greater prevalence of wheeze in migrant populations than in their parent populations in less developed countries.¹⁰ However, the fact that, at age 6 to 9 years, hayfever and eczema were more prevalent among children reporting food-induced wheeze than among other wheezers suggests that IgE-mediated mechanisms contribute.

The findings that food as a trigger of wheeze was associated both with more severe symptoms and with South Asian ethnicity might partly explain the excess of healthcare utilization by wheezy children of South Asian origin in the UK.¹ We have confirmed the association between food-induced wheeze and healthcare utilization in this study.

The prognosis of preschool wheeze was worse among children reporting food intolerance, independently of the severity of wheeze (frequency of attacks), as previously reported in a retrospective survey.⁵

In conclusion, this is the first population-based study to show the excess prevalence of food-related wheeze in young children of South Asian origin born in the UK. The fact that reported food intolerance was associated with both the severity and persistence of wheeze makes it an important marker of clinically significant disease. Research into the mechanisms involved might lead to clues concerning early mechanisms in childhood asthma.

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