

Original Research Article

Prevalence and risk factors for bronchial asthma in an urban area of Puducherry: a cross-sectional study

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Received: 06 August 2018

Accepted: 26 September 2018

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ABSTRACT

Background: Food allergy is mostly IgE-mediated which is estimated to affect 6% to 8% children and 3% to 4% adults the clinical and social impact of which takes a hard toll in early childhood. The objective of this study is to study the magnitude of food allergy and differences in food allergens among the urban and rural school-going children.

Methods: A cross-sectional study was conducted among 350 school going children, aged 5-10 years, attending to two private schools (n=192) and two government schools (n=158) in the urban and rural field practice areas respectively and data regarding food allergens was collected using a semi-structured proforma.

Results: There was a significant higher ($p<0.001$) proportion of wheeze symptomatics among the urban (n=70, 44.3%) than the rural students (n=37, 19.3%). The students had higher allergies to Ice-cream (14.57%, n=51), prawn (11.14%, n=39), peanut (14.57%, n=51), garlic (14.57%, n=51), fish (11.14%, n=39) and milk (11.14%, n=39).

Conclusions: There was a higher proportion of food allergy among the urban school students compared to the rural students. The food allergens also varied significantly in their influence on food allergy among the urban and rural areas.

Keywords: Food allergens, Bronchial asthma, School children, Urban and rural

INTRODUCTION

Allergy is an abnormal response of the immune system to a foreign substance. Neither all food substances act as foreigners to human body nor all human bodies are defensive hosts to allergens. Food allergy is mostly IgE-mediated which is estimated to affect 6% to 8% children and 3% to 4% adults the clinical and social impact of which takes a hard toll in early childhood.¹⁻⁴

Food allergy commonly presents as gastrointestinal disturbances or skin manifestations like acute urticaria, atopic dermatitis and sometimes life-threatening anaphylaxis. However, the role of food as a trigger factor

for asthma remains vastly unexplored. Food-induced symptoms occur in approximately 2% to 29% of children and about less than 1% of adults with asthma.⁵ Food sensitization in early infancy could lead to the development of respiratory allergy and is a significant risk factor for asthma in 10% to 53% of cases.⁶⁻⁸

Allergic rhinitis has also become a frequent respiratory manifestation affecting 20% of food allergic population.⁸⁻¹⁰ Thus food allergy stands as a patron in the pathogenesis of any atopy, especially asthma, the linkages of which are not understood clearly. The epidemiology of food allergy is influenced by genetic, cultural and geographical dietary influences. Severe and

fatal reactions can occur at any age but those at greatest risk are adolescents and young adults with asthma.

Mapping the food allergens associated with asthma would help in preventing asthma in this age group. This study was designed to get an idea of possible food allergens and prevalence of food allergy among the young children and adults to further explore the association of those potential food allergens with asthma.

METHODS

This cross-sectional study was conducted among 350 school going children, aged 5-10 years, attending to two private schools (n=192) and two government schools (n=158) in the urban and rural field practice areas respectively. Initially an ethics committee approval and permission from the school heads was taken prior to conduct of the study from December to February 2017.

All the schools in the urban and rural areas were listed and 4 schools were selected randomly. A prior intimation to the parents was passed on using the school information communication system and they were asked to accompany the students on the day of survey. Informed consent was taken from the parents.

A child with symptom of wheezing or whistling in chest in the past 12 months was taken as criteria for defining asthma.

A semi-structured proforma containing socio-demographic information regarding the age, gender, occupation of parents, socio-economic status and history regarding food allergens and frequency of consumption was used to collect the data.

Statistical analysis

The collected data was entered and analyzed by using SPSS (Statistical Package for Social Sciences) version 20.0 for windows. Data is presented as frequencies and percentages.

The association of food allergen with bronchial asthma and their significance was estimated using chi-square test. A p -value<0.05 was considered as statistically significant.

RESULTS

The study included 350 students attending to two private schools (n=192) and two government schools (n=158) in the field practice areas. Among the students (n=350), majority belonged to the 6-8 years age group (n=259, 74%).

There was no significant difference in gender distribution as males' students (n=183, 52.3%) were only a few numbers higher than the females (n=167, 47.7%).

Table 1: Socio-demographic characteristics of the study population (n=350).

Participant characteristics	Urban n=158 (45.1)	Rural n=192 (54.9)	Total N=350 (100)
Age (years)			
5-6 years	88 (55.7)	97 (50.5)	185 (52.9)
7-8 years	42 (26.6)	87 (45.3)	129 (36.9)
9-10 years	28 (17.7)	8 (4.2)	36 (10.3)
Gender			
Male	84 (53.2)	99 (51.6)	183 (52.3)
Female	74 (46.8)	93 (48.4)	167 (47.7)
Birth order			
1	83 (52.5)	96 (50)	179 (51.1)
2	49 (31)	79 (41.1)	128 (36.6)
3	20 (12.7)	23 (12)	43 (12.3)
Family history of asthma			
Present	15 (9.5)	13 (6.8)	28 (8)
absent	143 (90.5)	179 (93.2)	322 (92)

Table 2: Food allergens associated with bronchial asthma.

	Urban n=158 (45.1)	Rural n=192(54.9)	p-value
Frequency of wheeze			
1-2 times	31	20	0.75
3-4 times	28	11	
5-9 times	7	4	
>10 times	4	2	
Total	70	37	<0.001
Common food allergens			
Ice-cream	31 (19.6)	20 (10.4)	0.015
Prawn	28 (17.7)	11 (5.7)	<0.001
Peanut	31 (19.6)	20 (10.4)	0.015
Garlic	31 (19.6)	20 (10.4)	0.015
Fish	28 (17.7)	11 (5.7)	<0.001
milk	28 (17.7)	10 (5.2)	<0.001
Chocolate	14 (8.9)	20 (10.4)	0.62
Curd	7 (4.4)	4 (2.1)	0.21
Citrus fruits	7 (4.4)	4 (2.1)	0.21
Banana	4 (2.5)	2 (1.0)	0.04

Figures in (%) indicate percentages

The parents were interviewed about their child's unusual food consumption on the day of recent wheeze episode and ten common food items mentioned by them were listed by qualitative work-up and frequency estimated quantitatively (Table 2). Among the common food allergens, the students had higher allergies to Ice-cream (14.57%, n = 51), prawn (11.14%, n = 39), peanut (14.57%, n = 51), garlic (14.57%, n = 51), fish (11.14%, n = 39) and milk (11.14%, n = 39).

The above-mentioned allergens were significant (p <0.05) higher among the urban participants compared to the

rural students. The frequency of wheeze was also significantly higher among the urban students than the rural students.

DISCUSSION

In the present study food allergy was present in 14.57% (n=51) of the school children. The major symptom which was manifested was wheeze and itching when consumed the food known to cause the allergy. Kumar et al in their study reported that the history of food allergy was present 58.9% of the screened individuals which was higher than the present study.¹¹ Rice (6.2%) followed by black gram (5.9%), lentil (5.5%), citrus fruits (5.3%), pea (3.8%), maize (3.8%) and banana (3.6%) were common food allergens. In the present study, the students had higher allergies to Ice-cream (14.57%, n=51), prawn (11.14%, n=39), peanut (14.57%, n=51), garlic (14.57%, n=51), fish (11.14%, n=39) and milk (11.14%, n=39).

The previous study used skin prick-test (SPT) to identify the food allergens whereas present study used interview method which might be the reason for difference in food allergens from the former. In another study conducted by Wang et al, they reported that sensitivity to soy, wheat, peanut, fish and egg was significantly correlated with sensitization to some aeroallergens.⁹ The urban-rural comparison done in present study revealed that Ice-cream, peanut, garlic, fish, prawn were major urban food allergens whereas in rural schools Chocolates, peanuts, banana, fish were reported as allergens.

There was a significant difference ($p < 0.001$) in the proportion of wheeze symptoms between the urban (n=70, 44.3%) and rural areas (n=37, 19.3%). The higher incidence of allergy in urban compared to rural areas may be confounded by the effect of pollution in the environment which reconfirmed the findings of Wang et al documenting that food sensitization strongly correlated with aeroallergen sensitisation.⁹ Sharma et al reported egg whole, black gram and lemon as common food allergens in an adult peri-urban population which were common foods. Thus, the urban allergen profile is subject to environmental confounding which needs further exploration.¹²

CONCLUSION

The study estimated that there was a higher proportion of food allergy among the urban school students compared to the rural students. The food allergens also varied significantly in their influence on food allergy among the urban and rural areas. Further exploratory skin prick test oriented large-scale studies are needed to identify the food allergens and their pattern of affecting a particular geographical area.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Arokiaraj LA, Gobinaath TR. Prevalence and risk factors for bronchial asthma in an urban area of Puducherry: a cross-sectional study. *Int J Contemp Pediatr* 2018;5:2249-51.