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ORIGINAL ARTICLE

Sensitisation to aeroallergens among asthmatic and non-asthmatic adolescents living in a poor region in the Northeast of Brazil

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Cat

Abstract

Objectives: To assess the kind and frequency of sensitisation to aeroallergens (skin prick test - SPT) of asthmatic and non-asthmatic adolescents (13–14 years old) living in the city of Caruaru, Northeast of Brazil, and to analyse their exposure to some environmental factors.

Method: A case-control study was conducted with asthmatic (50) and non-asthmatic (150) adolescents diagnosed by the International Study of Asthma and Allergies in Childhood (ISAAC) written questionnaire. All were submitted to SPT with aeroallergens (house dust mites, cat and dog epithelium, cockroaches, moulds and grass) and completed a questionnaire to evaluate their environmental exposure.

Results: There were no significant differences between groups regarding gender, age, number of siblings and environmental exposure. Asthmatic subjects exhibited a higher frequency of positive SPTs than non-asthmatic subjects (54.0% vs 33.3%, $p=0.009$) mainly due to *Periplaneta americana* (34.0% vs 12.7%, $p=0.0007$ respectively) and *Canis familiaris* (20.0% vs 8.7%, $p=0.029$).

Conclusion: Although sensitisation to aeroallergens was high among non-asthmatic adolescents, asthma was associated with parental history of atopic disease and sensitisation to *P. americana* and *Canis familiaris* but not to *D. pteronyssinus* showing that local studies are mandatory for the tailoring of appropriate management of allergic diseases.

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Introduction

Asthma is the most prevalent chronic respiratory disease in children and constitutes a public health problem, particularly in industrialised nations.¹ It is a multiple triggering agent illness and its frequency and severity has been increasing in several parts of the world in recent years.² Observations from former East and West Germany revealed that allergies were more frequent in the developed West side.³ Since then, the hygiene hypothesis has attempted to explain the high prevalence of allergic diseases in developed countries.⁴ Developing countries have also experienced an increase in the prevalence of allergic diseases in recent years.⁵ Different environmental exposures, including parasites, diet, hygiene, infections, exposure to airborne allergens and air pollution, in combination with genetic factors may be related to this occurrence.⁶

Differences between urban and rural areas regarding the prevalence of diseases have been observed in various parts of the world. Several hypotheses try to explain it. A British cross-sectional study evaluating skin prick test (SPT) to aeroallergens in asthmatic children showed a higher frequency of sensitisation to house dust mite and cat dander in individuals living in urban than those living in rural areas.⁷ Similarly, a case-control study with children (6 to 13 years) from rural and urban areas in eastern Finland to assess the relation between environment and allergy found that rural living was associated with a reduction in allergen sensitisation and allergic diseases prevalence.⁸

In a previous study to evaluate asthma prevalence and related symptoms among adolescents living in Caruaru, in the poor and semi-arid region of Northeast Brazil, we observed higher prevalence among those living in the urban area in comparison to those living in the rural area.⁹ Reasons for this result were not addressed in that study. Thus, the aim of the present study was to evaluate the relation between environmental exposure and frequency and kind of sensitisation to aeroallergens among adolescents, asthmatics and non-asthmatics, living in the city of Caruaru (urban and rural areas).

Patients and methods

We studied adolescents (13–14 years old) regularly enrolled in public and private schools in the city of Caruaru, a poor countryside city in the state of Pernambuco, Northeast of Brazil. The country has 253,634,000 inhabitants (85.6% urban) living in a total area of 928.08 km². Caruaru's latitude is 8°17'00" S and longitude 35°58'34" W. Gr, and it is at an altitude of 555m above sea level. Climate is hot semi-arid, low humidity (less than 30%) and with a mean annual temperature of 24°C (range 22°C to 30°C). Data collection occurred between February to June 2005. School selection was done by random cluster sampling between those which had students in the targeted age range, following a proportion of 70% students from public and 30% from private schools in the urban area. Assuming a 30% prevalence of positive SPTs in non-asthmatics, a sample size of 108 controls for 36 cases (3:1) was calculated to be able to find a 25% difference between groups with alpha and beta errors of 5% and 80% respectively.¹⁰

We chose to study 150 and 50 individuals in non-asthmatic and asthmatic groups. Asthmatic adolescents were defined as those who answered "yes" to the question "Have you had wheezing episodes in the last 12 months?" on the ISAAC (International Study of Asthma and Allergies in Childhood) asthma core written questionnaire (WQ) translated and validated for Portuguese (Brazil).¹¹ Non-asthmatic subjects were defined as those who answered "no" to all questions regarding the ISAAC asthma, rhinitis and eczema core WQ. The study was IRB approved and only those adolescents presenting a signed informed consent by their respective guardians were involved in the study.

All selected individuals were submitted to SPT as previously described^{12–14} with standardised allergens (*Dermatophagoides pteronyssinus*, *Periplaneta americana*, *Blattella germanica*, dog and cat epithelia, and a fungal and grass mix) along with positive (10 mg/ml histamine) and negative control (0.5% phenol and glycerin solution). The extracts were provided by Diater (distributed by ALC-Alergia Clínica Laboratorial e Comércio Ltda-São Paulo-Brazil). A positive SPT was defined as a wheal size equal to or greater than 3 mm above the negative control.^{12–14}

Environmental exposure to some risk factors and/or aeroallergens was assessed through a questionnaire comprising questions on personal (gender), family (only child, atopic father/mother) and environmental information (pets, moulds, passive smoking, wood/coal cooking).¹⁵ School-children who were using any medications which could affect the outcome of SPT and patients undergoing an asthmatic crisis were excluded from the study. The association between sensitisation to the allergens tested and asthma in both groups was evaluated by bivariate analysis. It would have been appropriate if sensitisations were co-related with disease severity but it was not possible because we studied a general population sample. The strength of this association was assessed by the Odds Ratio (OR) and 95% confidence interval (95%CI). The Chi-square test with Yates' correction was employed to determine statistical significance. The Mantel-Haenszel Chi-square test was performed to compare the place of living: urban or rural.

Results

Except for having an atopic parent there were no significant differences between asthmatic and non-asthmatic adolescents regarding gender, age or number of siblings and environmental exposure (Table 1).

The frequency of positive SPT to at least one aeroallergen was significantly higher among asthmatic adolescents in comparison to non-asthmatics (Table 2). The frequency of sensitisation to the different allergens was similar in both groups except for *Periplaneta americana* and *Canis familiaris* which were significantly higher among the asthmatic adolescents. Sensitisation to *Periplaneta americana* was higher in the rural area.

Discussion

The association between being asthmatic and having atopic parents has been widely demonstrated, and the positive history of familial allergy has been pointed out as a

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