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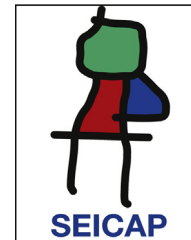
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ORIGINAL ARTICLE

Prevalence of asthma and associated factors in adolescents living in Belem (Amazon region), Para, Brazil

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Abstract

Background: The prevalence of asthma in the Brazilian Amazon region is unknown. We studied the prevalence of asthma and associated factors in adolescents (13–14 years old) living in Belem, a large urban centre in this region.

Methods: 3725 adolescents were evaluated according to the International Study of Asthma and Allergies in Childhood (ISAAC) protocol and a random sample of them (126 asthmatics and 254 non-asthmatics) were assessed for possible risk factors by a supplementary questionnaire (ISAAC Phase II) and skin prick tests with aeroallergens. The association between asthma and associated factors was determined by logistic regression analysis.

Results: 3708 adolescents were enrolled, 48% were male. The prevalence of asthma in the last 12 months (identified as asthmatics) and the medical diagnosis of asthma were 20.7% and 29.3%, respectively. Risk factors significantly associated with asthma were: previous diagnosis of tuberculosis (odds ratio [OR] = 38.9; 95% confidence interval [95% CI]: 4.6–328.0) and measles (OR = 4.7; 95% CI: 2.3–9.8), breastfeeding for any length of time (OR = 4.2; 95% CI: 1.1–15.2), current rhinitis (OR = 3.2; 95% CI: 1.8–5.9), exposure to smokers (OR = 2.4; 95% CI: 1.2–4.5), moisture in home (OR = 1.8; 95% CI: 1.1–3.2) and rhinitis diagnosed by physician (OR = 1.7; 95% CI: 1.2–2.9). Sensitisation to at least one aeroallergen was significantly higher among asthmatic adolescents (86.5% vs. 32.4%; *p* < 0.0001).

Conclusions: The prevalence of asthma was similar to that observed in other Brazilian centres. Physician-diagnosed asthma was more frequent than the presence of symptoms suggestive of asthma. Infectious diseases, nutritional and environmental factors, as well as concomitant allergic rhinitis, were the main risk factors associated with the development of asthma in these adolescents.

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Introduction

Respiratory allergies such as asthma and allergic rhinitis are highly prevalent diseases worldwide in both developed and emerging countries. In recent decades, studies have confirmed an overall increase in their prevalence, although on a smaller scale than previously thought, showing a greater increase in the poorest countries, mainly from Africa, Latin America and parts of Asia.[1,2]

This fact suggests that genetic predisposition alone is not the only indicator of susceptibility to these diseases, and that the gene–environment interaction probably plays a greater role. Therefore, environmental; nutritional; infectious diseases; and psychological factors can act as risk or protection factors in a genetically predisposed individual, depending mainly on the time of exposure (prenatal, perinatal or postnatal).[3,4]

The first data on the prevalence of allergic diseases in Latin America emerged with the International Study of Asthma and Allergy in Childhood (ISAAC) Phase I and showed high prevalence levels, similar to those in developed countries.[5] However, only at the end of ISAAC Phase III in Latin America was there confirmation of the upward trend in asthma prevalence between these two moments of analysis (average of +0.32% per year), with a very large annual average variability between some of the centres involved (−1.06% per year in Peru to +0.88% per year in Panama).[1]

In Brazil, 58,144 adolescents, aged from 13 to 14 years, were enrolled in ISAAC Phase III. For this age group the mean prevalence rates were: 19.0% for active asthma, 4.7% for severe asthma, and 13.6% for physician-diagnosed asthma.[6] There was an inverse relationship between the prevalence of asthma and latitude, with high rates in the north and northeast regions.[6]

The Amazon region has a peculiar climate. It is crossed in its entirety by the Equator and has high temperature and humidity which can both directly influence the incidence and severity of allergic diseases, mainly respiratory ones.[7] Epidemiological data about asthma and allergic diseases are scarce in this region. Prestes et al. applied the ISAAC protocol in adolescents living in Belem, and observed a prevalence rate of 22.1% for physician-diagnosed asthma and 26.4% for current asthma (wheezing in the last year).[8]

The aim of this study was to assess the prevalence of asthma and identify associated factors for the development of asthma in adolescents (13–14 years old) living in the city of Belem, the second largest city in the Amazon region, with 1,393,399 inhabitants and a high miscegenation pattern, particularly with native Indians (65%), living in urban areas, but with a poverty level around 40.6%.[9,10]

Methods

Between August 2008 and December 2009, 3725 adolescents (13–14 years old) living in Belem (capital of the state of Para; Amazon region) were enrolled in this cross-sectional study using the ISAAC asthma core written questionnaire (WQ, Phase I), previously validated to the Brazilian culture.[11] Data from schoolchildren who participated in the study were provided by the State of Para and City of Belem Education

Secretaries official records, and were randomised by convenience sampling. All adolescents answered the ISAAC asthma core WQ by themselves after being authorised by their parents or legal guardians (signed informed consent). The data obtained were transcribed to a database (Microsoft Office Excel® 2007 Inc.). The frequency of affirmative answers to each question was analysed according to gender.

In addition to the WQ, a supplementary questionnaire (CQ; ISAAC Phase II) was applied to a subgroup of the subjects and contained 33 questions including: subject demographics, environmental exposure to infectious agents, allergens, and dietary habits, to be completed by the individual's parents or legal guardians.[12] The individuals were classified as asthmatics (wheezing in the last year) and non-asthmatics (no wheezing ever and in the last year) and to calculate each subgroup we used the software SPSS® version 10. For a case-control study, we selected two controls for each case, assuming that the prevalence for each risk factor related to asthma was 20% in the control group, with odds ratio (OR) of 1.5, alpha error of 5% and test power of 85%. Thus, the necessary sample size was defined as 120 cases (asthmatics) and 240 controls (non-asthmatics). The subjects would undergo skin prick test (SPT) using a standard battery of allergenic extracts comprising: positive (histamine 10 mg/mL) and negative controls (0.5% phenolate solution and glycerinated solution), _Dermatophagoides pteronyssinus_ (Dpt), _Blomia tropicalis_ (Bt), _Periplaneta americana_ (Pa), _Blatella germanica_ (Bg), dog dander, cat dander, fungi, and grass pollen mix extracts (FDA Allergenic®, Rio de Janeiro, Brazil). SPT was considered positive to a specific allergen if the mean wheal diameter was equal or higher than 3 mm in the presence of a negative control equal to zero and positive control of at least 3 mm.[13] Adolescents who had a positive test to at least one of the allergens evaluated were considered sensitised.

Statistical analysis

Comparisons between the prevalence of asthma and related symptoms according to gender, as well as SPT results and CQ data between asthmatic and non-asthmatic adolescents were performed by univariate analysis. Factors with p-value lower than 0.2 were included in the binary logistic regression analysis (Backward stepwise). p-Values of less than 0.05 were considered statistically significant. SPSS® 15.0 software (Chicago, IL, USA) was used to obtain odds ratios (OR), 95% confidence intervals (95% CI), as well as to conduct univariate and multivariate analyses.

The study was approved by the Ethics Committee in Research of Sao Paulo Federal University.

Results

Seventeen adolescents were excluded from the initial sample due to inadequacy of the WQ. Of the 3708 remaining, 52% were females. Except for having had more than four asthma attacks, speech problem, and having had asthma diagnosed by a physician, the prevalence of asthma was significantly higher among the females in comparison to the males (Table 1). The mean prevalences were 20.7%, 6.0%, and 29.3% for active asthma, severe asthma and