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ORIGINAL ARTICLE

Risk factors and prevalence of asthma in schoolchildren in Castellon (Spain): a cross-sectional study

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KEYWORDS
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Abstract
Background: Research on potential risk factors of asthma can enhance our understanding of geographic differences and inform decisions on preventive strategies.
Methods: In 2002, a cross-sectional population-based study was carried out in the area of Castellon (Spain), following the International Study of Asthma and Allergies in Childhood (ISAAC) Phase III methodology. Asthma symptoms and related risk factor questionnaires were completed by parents of 6-7 year-old schoolchildren. Logistic regression was used in the analysis.
Results: Participation rate was 88% (4492 of 4872 schoolchildren). Prevalence of wheeze in the past year, asthma ever, and physician-diagnosed asthma were 8%, 7% and 6%, respectively. Risk factors independently associated with all three asthma case definitions were history of bronchitis or pneumonia, allergic rhinitis, family members with atopic disease, and residing in an industrialised area. Risk factors for asthma ever and physician-diagnosed asthma were male sex, atopic eczema and presence of a dog at home; exclusive breast-feeding and the presence of another animal (not a dog or cat) were protective factors. Maternal age was inversely related to physician-diagnosed asthma. Residence in an area of heavy truck traffic and the father smoking at home were associated with asthma ever. Risk factors for wheeze in the past year were low social class, history of sinusitis and the father smoking at home.
Conclusions: Environmental factors are related to the presence of asthma. Preventive measures should be directed to improving air pollution, promoting breast-feeding and reducing smoking in the home.

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Introduction

Asthma is an inflammatory respiratory disease following a chronic course, with an unclear etiology and marked geographic variations in its prevalence. Asthma symptoms in 6-7 year-old schoolchildren vary from 5% in Albania to 37% in Costa Rica[1]. While Spain has an intermediate position regarding asthma prevalence, important differences among Spanish areas have been described[2] and an increasing prevalence in 6-7 year-old Spanish schoolchildren was observed between 1994 and 2002[3].

In Castellon, the prevalence of asthma is low when compared to other Spanish areas[2,4] or other European countries[1]. Nevertheless, an increase in asthma was observed in 6-7 year-old schoolchildren between Phases I and III of the ISAAC study in Castellon[2]. Research on potential risk factors for asthma and knowledge on the impact of these factors in a low prevalence area can contribute to a better understanding of geographic differences and inform the implementation of preventive strategies.

Materials and Methods

In 2002, a cross-sectional population based study, following the ISAAC Phase III methodology[5], was carried out in the area of Castellon (Spain). This area, situated in the east of Spain on the Mediterranean coast, has a population of 267,000 and covers 388.7 km^2. First year primary school children of 6-7 years old were included as previously described[6]. The Asturias Ethics Committee (Spain) approved Phase III of the ISAAC study for all Spanish centres. After informed consent, the core ISAAC study questionnaire and an additional risk factor questionnaire were completed by the parents of the schoolchildren.

Three mutually non-exclusive asthma case definitions were defined by an affirmative answer to any one of the following questions: a) "Has your child had wheezing in the last 12 months?" b) "Has your child ever had asthma?" and c) "Has a physician ever diagnosed your child as suffering from asthma?" All children with an affirmative answer to question "a" were included in the "wheeze in past year" group; all children with an affirmative answer to question "b" in the "asthma ever" group; and all those with an affirmative answer to question "c" in the "physician-diagnosed asthma" group.

The study of risk factors comprised the following aspects: age; sex; residence; parents' social class[7]; parents' age; country of birth; duration of residence; history of allergic disease (asthma, allergic rhinitis and atopic dermatitis), both personal and in other family members; maternal age; number of siblings; exclusive breastfeeding; personal history of otitis, sinusitis, pneumonia, bronchitis; attending day care; exposure to smoke at home (mother, father and others smoking at home); presence of pets at home (dog, cat, and others); frequency of truck traffic in the street of residence; and service or industrial zone of residence. The industrial zone comprised the urban conurbation of Vila-real, L'Alcora, Almassora and El Grau with its ceramic tile and petrochemical industries.

Statistical methods

The prevalence of each asthma case definition was estimated by dividing the number of cases by the number of schoolchildren included. The odds ratios (OR) and their 95% confidence intervals (CI) were calculated for each risk factor with respect to each case definition; an approximate chi-squared test of homogeneity of odds and a test for linear trend of the log odds against the numerical code used for the categories of risk factors were estimated. Both of these tests were based on the score statistic and its variance. Logistic regression models were used to adjust for potential confounding variables. Logistic models included age and significant variables ($p < 0.05$). All model goodness of fit ($p > 0.05$) was estimated by the Hosmer-Lemeshow test. All analyses were performed with STATA, version 9.0.

Results

All 63 schools in the area of Castellon agreed to participate in the study. Parents of children attending the first year of primary education (ages 6-7 years) were contacted to take part in the survey, and the parents of 4292 (88.1%) out of 4872 children consented to participate in the study; 375 (8.7%) children were eight years old when the questionnaire was completed. Wheeze in the past year was reported by 8%, asthma ever by 7% and physician-diagnosed asthma by 6% (Table I).

Sex, age, social background and personal antecedents

Significant differences in prevalence were observed by sex for all three asthma case definitions: all were less frequent in females than in males (Table I). A significant trend was observed between social class and wheeze in the past year, with a prevalence of 5% in class I (higher) versus 11% in class V-VI (lower). History of atopic disease (eczema or allergic rhinitis) was strongly associated with any one of the asthma case definitions; this association was especially manifest with allergic rhinitis, in the presence of which the prevalence of asthma case definitions was 30% as opposed to 6% to 4% in its absence (Table I).

Some manifestations of respiratory infectious disease were significantly more frequent in children with any one of the asthma case definitions (Table II). Between 13 to 18% of children with previous episodes of pneumonia, bronchitis or sinusitis also referred to wheeze episodes in the past year, asthma ever or asthma diagnosed by a physician, compared to 2 to 7% of those who did not refer to any of those episodes. This association was especially strong for previous bronchitis episodes, in which case the odds of any one of the asthma related case definitions were 6 to 7 times those of children without previous bronchitis episodes (Table II).

Family and environmental factors

A history of atopic disease in other family members was reported in 26% of the children included in the study (Table III). Those children suffered a high risk of wheeze in the past year, asthma ever or physician-diagnosed asthma, compared to those with no family history of atopic disease (Table III). Maternal age showed a significant inverse trend with the prevalence of asthma, with a higher frequency of all case definitions in children of younger