

Prevalence of childhood asthma, rhinitis, and eczema in the Ternopil region of Ukraine – results of BUPAS study

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ABSTRACT

Purpose: The aim of the study was to estimate the prevalence of allergic diseases and symptoms in children of the Ternopil Region (Ukraine) and to explore their familial and environmental correlates.

Material/Methods: A cross-sectional study based on parental answers to a respiratory questionnaire based on ISAAC that included 4871 urban and rural children aged 6-14 years. Association of physician-made diagnoses and symptoms with environmental factors was examined by means of multivariate logistic regression.

Results: Increased risk of asthma (1.7%) was associated with urban residence (OR=1.8; p=0.04) and high parental education (OR=1.8; p=0.02); spastic bronchitis (6.2%) with parental allergy (OR=1.3; p=0.03); atopic eczema (6.2%) with younger age (OR=1.3; p=0.03), high parental education (OR=1.3; p=0.03), parental allergy (OR=1.4; p=0.02), tobacco smoke at home (OR=0.7; p=0.01) and household density (OR=0.6; p=0.001); diagnosis of unspecified allergic sensitization (11.8%) was related to high parental education (OR=1.2; p=0.03), parental employment (OR=0.8; p=0.02) and pets at home (OR=1.2; p=0.06). Symptoms of chest wheezing (11.5%) were related to tobacco smoke at home (OR=0.8; p=0.06). Attacks of dyspnea (7.3%) were related to parental allergy (OR=1.4; p=0.007), and type of heating (OR=1.7; p=0.04). Hay fever symptoms (5.7%) were related to younger age (OR=1.3; p=0.01) and urban residence (OR=2.0; p<0.0001).

Conclusions: Except for asthma the prevalence of allergic diseases and symptoms as well as their correlates in children of Ternopil are similar to other estimates obtained in Eastern Europe. Low prevalence of asthma and relatively frequent occurrence of spastic bronchitis may suggest substantial underdiagnosis of childhood asthma.

Key words: asthma, allergic diseases, children, underdiagnosis

INTRODUCTION

Increase in the prevalence of asthma and other allergic diseases in children has been demonstrated worldwide thus making allergic diseases one of the most common chronic diseases in childhood [1,2]. Evidence provided by early ISAAC studies revealed a large between-country and between-region variation in the prevalence of common allergic disorders and

diseases, including asthma-like symptoms, allergic rhinitis and atopic eczema, still seen in subsequent phases of the program [2,3]. In Europe the estimated prevalence of allergic disease could be as large as 30%. However, the Phase One of the ISAAC studies showed a relatively low prevalence of allergic diseases specifically in Eastern Europe. Despite this, subsequent findings have documented an increase in the prevalence of childhood asthma and other allergic

diseases in some countries of that region such as Poland [3-6]. Despite epidemiological evolution, the East-West gradient in the occurrence of allergic diseases in Europe has not disappeared [7].

While the results of studies from different areas in Poland have been reported, less is known about the current epidemiology of childhood allergic diseases in different areas of Ukraine [4-6]. Based on the ISAAC Phase Three study in Kharkiv, an urban center located in Eastern Ukraine, the prevalence of chest wheezing in the past 12 months, symptoms of allergic conjunctivitis and of atopic eczema in Ukrainian children were 12.5%, 7.7% and 5.3%, respectively, and were similar to those obtained in Russia (11.4%, 4.7% and 6.6%, respectively) and lower than in Poland (13.6%, 13.0% and 11.5%, respectively) [2]. The prevalence of childhood allergic diseases can vary between the regions and between urban and rural environments [8,9]. The spatial variation could reflect the effects of ethnicity as well as the complex contribution from local environmental factors [9]. Differences in asthma prevalence could also occur because of differences in health care access or diagnostic patterns [10].

The lack of data pertinent to urban and rural children in the western part of Ukraine formed the rationale for the current study. Our objective was to estimate the prevalence of allergic diseases and symptoms in rural and urban children of the Ternopil Region (Western Ukraine) and to explore their familial and environmental correlates.

MATERIAL AND METHODS

Study design and population

This study was conducted in 2010 as a part of the Belarus Ukraine Poland Asthma Study (BUPAS). The subjects were children aged 6-14 years attending primary and secondary schools in the town of Ternopil and in the surrounding rural area. Using cluster sampling with a school as a sampling unit we selected 3000 children in urban and 3000 children in rural areas. Children from selected schools and their parents or legal guardians were invited to participate in the project. Questionnaires accompanied by a letter explaining the study objectives and an informed written consent were distributed to parents/guardians through the schools. Questionnaires were in Ukrainian language and were based on the ISAAC symptom questionnaire. The study protocol was approved by the local ethics committee at the State Medical University of Ternopil [No. 1 (b) from 07.04.2010].

Allergic diseases and respiratory outcomes

The list of allergic diseases included in the analyses was composed of ever physician-diagnosed asthma, spastic bronchitis, allergic rhinitis, atopic eczema, and unspecified hypersensitization. Apart from self-reported diagnoses, analyses involved a number of allergic symptoms. Current

chest wheezing was defined according to the answer to the question: "Has a child had chest wheezing during the last 12 months?". Current attacks of dyspnea were defined according to the answer to the question "Has a child had attacks of dyspnea during the last 12 months?" The symptoms of hayfever, symptoms of congested nose and of itchy, recurrent skin rash were also defined according to parental answers to standard questions based on ISAAC. Respiratory questioning also included assessment of spastic bronchitis reflecting a common respiratory diagnosis of the region [11].

Familial and environmental correlates

Independent variables of interest were based on questionnaire self-report. Subgroups of subjects defined by place of residence (urban/rural), gender (male/female), age group (<10 years old / >10 years old), parental education (less than high school/high school or above), parental employment (both unemployed/otherwise), any diagnosed parental allergy (at least one parent: yes/no), tobacco exposure at home – smoking adult at home (yes/no), housing (multi-storey house/otherwise), heating of house (coal or wood stove/otherwise), household density – defined as the ratio of persons living in the house to rooms in the house (≥ 1 person per room/otherwise), dampness in house defined as moisture stains or signs of mold on the inner surfaces in the house (yes/no), contact with pets inside the house (yes/no).

Statistical analysis

Statistical analysis was performed using Statistica 7.1 software. Descriptive analyses were used to examine the prevalence of each respiratory outcome with the personal and environmental characteristics of the study population. Statistical significance was assessed using chi² test. Multivariable logistic regression analyses with each respiratory outcome were used to examine the association with the personal and environmental characteristics and to account for potential confounding. For these analyses, outcomes were the diseases or symptoms of interest. The strength of association was based on the odds ratio (OR) and 95% confidence intervals (CI).

RESULTS

Parents of 4871 children returned completed questionnaires, yielding a participation rate of 81%. The study population was 50.8% female and 54.7% of children lived in an urban area. Those living in urban and rural areas were similar ($p < 0.05$) in terms of age (10.4 ± 2.0 years and 10.5 ± 2.0 years, respectively) and gender (51.0% and 50.5%, respectively were females). Descriptive characteristics of the study population by urban and rural status are presented in *Tab. 1*.

Overall, the prevalence of childhood asthma was 1.70%, spastic bronchitis was 6.26%, allergic rhinitis was 5.79%,

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