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Prevalence and Severity of Asthma Symptoms in Students of Tehran and Rasht: Phase III ISAAC Study

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ABSTRACT

Background: *This study is a part of the third phase of the "International Study of Asthma and Allergy in Childhood" (ISAAC) aiming to study the prevalence and severity of asthma symptoms among children of Rasht and Tehran.*

Materials and Methods: *This analytical cross-sectional study assessed Rasht and Tehran students in two age groups (6-7 and 13-14 years) during 2001-2002. After performing statistical analysis, prevalence of asthma symptoms was compared between the students form the two cities and was evaluated in both sexes and age groups by using the Chi-square test.*

Result: *A total of 12,214 students from both Rasht and Tehran participated in this study. History of wheezing and asthma were significantly higher among Rasht students. Prevalence of wheezing, speech limitation due to wheezing, wheezing during exercise and dry nocturnal cough were higher among 13-14 year olds in both cities. History of wheezing and exercise wheezing were higher in 6-7 year-old girls living in Tehran. However, prevalence of the aforementioned symptoms and prevalence of asthma were higher in total boys residing in Rasht. Also, prevalence of asthma, wheezing during exercise and dry nocturnal cough were higher in 13-14 year old boys in Rasht. No significant difference was found in this regard between Tehran girls and boys in this age group.*

Conclusion: *Prevalence of asthma and some of its symptoms was significantly higher among Rasht students compared to those residing in Tehran.* ***(Tanaffos 2008; 7(3): 31-36)***

Key word: *Asthma, Wheezing, Children, Prevalence, Rasht, Tehran*

INTRODUCTION

Prevalence of allergy and asthma has been increasing during the previous decades (1). Asthma is an important disease of childhood (2). During the last 3 decades, several studies in developed countries have emphasized the increasing prevalence of asthma (3) and no specific reason has yet been found for this trend (4). Increasing prevalence of this disease follows a rapid trend which is most probably due to environmental changes and less commonly due to genetic factors (5, 6). According to the results of studies with large sample sizes, a direct correlation between pediatric asthma and the following factors has been suggested: age, race, socio-economical status, geographic location, asthmatic parents, low birth weight, viral infections, childhood pulmonary diseases and environmental factors (7). Highest prevalence of asthma has been reported among

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children and adolescents, that is, 20-30% of children in some countries have asthma (3).

Asthma is one of the most common chronic diseases of childhood and also the most common cause of continuous or recurrent wheezing, dyspnea and cough in children (8). The onset of asthma in 80% of cases is by the 6th year and in 95% by the 9th year of age. Delay in diagnosis can increase the severity of disease as well as the related morbidity and mortality (9). There are still a significant number of undiagnosed cases that can result in increased severity of disease and the related morbidity and mortality due to late diagnosis. Therefore, screening children and adolescents for asthmatic symptoms can result in prompt and early diagnosis followed by efficient therapeutic interventions. ISAAC has performed a worldwide research with the aim of evaluating prevalence and severity of asthmatic symptoms, rhinitis and eczema among children and to compare results between countries. By using a uniform standard methods, this center has facilitated the conduction of research under its supervision all over the world. The ISAAC program comprises of 3 phases (so far). The first phase started in 1991 (3) and the 3rd phase with a pattern similar to that of the first started in 2001 with the aim of evaluating the alteration in trend, prevalence, and severity of asthma in different parts of the world (10). Using ISAAC protocol facilitates comparison of the prevalence of asthma in different locations and may help find factors responsible for increased prevalence of asthma (2).

Following the conduction of phase 1 in Rasht and Tehran in 1997, the 3rd phase of this program was performed in the same cities during 2001-2002 (11, 12). Tehran and Rasht both have temperate climates with one exception that Rasht, the center of Gilan province has a more humid climate due to the proximity of the Caspian Sea. Also, levels of environmental and air pollutants are higher in Tehran.

This study aims to compare the prevalence and severity of asthmatic symptoms between Tehran and Rasht students and is a part of phase 3 ISAAC study.

MATERIALS AND METHODS

This analytical cross-sectional study was performed, as a part of the international ISAAC study in Rasht and Tehran and in two age groups (6-7 and 13-14 year-olds). This study was performed completely in accordance with ISAAC guidelines and the study was conducted in coordination with the international ISAAC center in New Zealand and the National Research Institute of Tuberculosis and Lung Disease, Shahid Beheshti University, M.C.(Complete information regarding this project is available at: http://isaac. Auckland.ac.nz)

Under-study population: Rasht and Tehran students aged 6-7 (elementary students) and 13-14 years of age (middle-school students) were studied in 2001-2002. Sampling was randomized from 2 districts of Rasht and 22 districts of Tehran. Of all 6,074 selected students in Rasht, 3,065 were elementary and 3,009 were middle-school students. In Tehran, of a total of 6,140 students, 3,015 were elementary and 3,125 were middle-school students.

Measurements: Measurements were performed by using the ISAAC-suggested questionnaire. Eight questions in this questionnaire were related to asthmatic symptoms and their severity. Demographic characteristics of students were collected as well.

Also there were several questions regarding the history of wheezing as an important symptom of asthma, time and frequency of attacks. Severity of wheezing in the last year was evaluated by asking questions about the recurrence of attacks, sleep disorder due to asthma attacks, speech limitation, nocturnal cough and wheezing during exercise. Questionnaires of the elementary school students were filled out by their parents at home while the middle school students themselves filled out the questionnaires on-site.

Statistical analysis: The collected data were analyzed using SPSS software version 11.5. According to ISAAC standard, data was double entered by 2 different persons in 2 separate shifts. Comparison of the prevalence of asthma and its symptoms between the students of the 2 cities,

between both sexes and in the 2 age groups was performed using chi-square test. Statistical analyses were performed only for those who responded to the questions and chose one of the multiple choice answers. Those who gave a response other than the multiple choice responses and those with no response were excluded from the study.

RESULTS

A total of 12,214 students from Rasht and Tehran were enrolled in this study. Out of 6,074 Rasht students, 3,065 (50.5%) were 6-7 year-olds and 3,009 (49.5%) 13-14 year olds. There were 1,347 (44%) boys in the age group of 6-7 years and 1,546 (51.5%) boys in the age group of 13-14 years. In Tehran, of 6,140 students, 3,015 (49.1%) were in the age range of 6-7 years and 3125 were in the age group of 13-14 years (50.9%); 1647 students (54.6%) in the age group of 6-7 years and 1625 (52%) in the age group of 13-14 years were male.

In general, prevalence and history of wheezing and asthma among Rasht students were significantly higher compared to Tehran students ($p<0.001$). No significant difference was detected regarding the prevalence of nocturnal dry cough and wheezing during exercise between Tehran and Rasht students. History and prevalence of wheezing, asthma, wheezing during exercise and dry nocturnal cough were higher among Rasht elementary school students compared to those in Tehran and this difference was statistically significant ($p<0.001$). Also, history and prevalence of wheezing and asthma were significantly higher among Rasht middle school students compared to those in Tehran ($p<0.001$). However, no significant difference was found between Rasht and Tehran students in terms of wheezing during exercise and prevalence of dry nocturnal cough.

Prevalence of asthma and wheezing, symptoms indicating the severity of wheezing and asthma-like symptoms are shown in Table 1. Prevalence and history of wheezing, speech limitation due to wheezing, wheezing during exercise and dry nocturnal cough were higher in the 13-14 year olds compared to 6-7 year olds in both cities. But, history of asthma was more common among Rasht 6-7 year-olds compared to 13-14 year olds (Table 1).

Table 1. Prevalence of asthma and wheezing among 6-7 and 13-14 year-old students in Rasht and Tehran.

Symptoms	Prevalence %			
	6-7 year olds		13-14 year olds	
	Tehran N=3015	Rasht N=3065	Tehran N=3125	Rasht N=3009
History of wheezing	15.6%	23.2%	17.3%	25%
History of wheezing in the last 12 months	57.8%	19.6%	52.8%	24.2%
Speech limitation due to wheezing in the last 12 months	16.5%	3.2%	21.6%	8.3%
History of asthma	2.2%	7.1%	2.6%	4.7%
Wheezing due to exercise in the last 12 months	2.4%	4.5%	16%	14.4%
Nocturnal cough in the last 12 months	7.5%	10.3%	19.1%	19.2%

The frequency of wheezing attacks and related sleep disorder among Rasht and Tehran students are shown in Table 2. Prevalence of asthma and asthmatic symptoms are shown in Table 3. Prevalence and history of wheezing and wheezing during exercise were higher among 6-7 year-old Tehran girls compared to boys. However, this situation was reverse in Rasht and prevalence of asthma and related symptoms were higher in boys. Also, prevalence of recent wheezing, asthma, wheezing during exercise and dry nocturnal cough were higher among 13-14 year old male Rasht students. No significant difference was found between Tehran girls and boys in this age group (Table 3).

Table 2. Frequency of wheezing attack and related sleep disorder in Rasht and Tehran students

Symptoms	Times	6-7 years		13-14 years	
		Tehran	Rasht	Tehran	Rasht
		N=3015	N=3065	N=3125	N=3009
Frequency of wheezing attacks in the last 12 months	1-3 times	187 (69.5%)	370 (16.2%)	266 (61.3%)	447 (26.3%)
	4-12 times	33 (12.3%)	71 (3.1%)	45 (10.4%)	69 (4.1%)
	More than 12 times	10 (3.7%)	26 (1.1%)	23 (5.3%)	27 (1.6%)
Sleep disorder due to wheezing during a week	Less than once	71 (26.9%)	183 (8.3%)	82 (19.3%)	170 (10.6%)
	One or more	49 (18.6%)	61 (2.8%)	51 (12%)	97 (6.1%)

Table 3. Prevalence of asthma and wheezing based on sex in 2 cities of Rasht and Tehran

Symptoms	Prevalence %			
	6-7 years		13-14 years	
	Tehran	Rasht	Tehran	Rasht
	N=3015	N=3059	N=3123	N=3001
History of wheezing				
Male	13.6	25.5*	16.8	26.1
Female	18*	21.4	17.8	23.9
History of wheezing in the last 12 months				
Male	57.5	21.3	51.6	28.8**
Female	58.1	18.4	54.1	19.8
Speech limitation due to wheezing in the last 12 months				
Male	15.2	3.8	21.5	8.7
Female	17.7	2.8	21.9	7.9
History of asthma				
Male	1.7	9.1**	2.2	5.6*
Female	2.7	5.6	3	3.6
Wheezing due to exercise in the last 12 months				
Male	1.6	5.8*	15.8	18.2**
Female	3.4*	3.4	16.3	10.3
Nocturnal cough in the last 12 months				
Male	7.4	10	19.6	22.6**
Female	7.5	10.5	18.5	15.4

*p<0.01: Comparison of girls and boys in each city

**p<0.001: Comparison of girls and boys in each city

DISCUSSION

This study evaluated and compared the prevalence and severity of wheezing and asthma between Rasht and Tehran students. Prevalence of asthma and some of its symptoms were significantly higher among Rasht students.

At present, despite the advances in the diagnosis and treatment of asthma, its prevalence and related morbidity and mortality are increasing (8). Some believe that asthma is a disease of developed countries and several factors are responsible for its increasing prevalence such as inadequate ventilation of closed-environments, nutrition, increased tendency to in-door activities and games, higher exposure to closed-environment allergens, smoking (7) and use of broad spectrum antibiotics. Other factors responsible for allergy and asthma are pets, humidity and especially mites and dust (2). Recently, cockroaches are also considered as important factors responsible for development of asthma especially in the down-town metropolitan areas in the USA (13). According to another ISAAC study, prevalence of asthmatic symptoms had a reverse correlation with altitude, yearly temperature alterations and relative humidity of the environment (14). As mentioned earlier, Rasht is geographically located in a low-altitude region next to the Caspian Sea and is in a lower-altitude compared to Tehran which may justify the increased prevalence of asthma and asthmatic symptoms in Rasht compared to Tehran.

Prevalence of asthma and some asthmatic symptoms were significantly higher among Rasht students. In both cities, prevalence of wheezing and its symptoms were higher among middle school

students compared to elementary school students and this difference might be due to recall failure of parents; whereas, in the age group of 13-14 years, questionnaires were filled out by the students themselves and therefore, have a higher accuracy. But, prevalence of asthma among elementary school students of Rasht was higher than in middle school students. Prevalence of asthma, wheezing and asthmatic symptoms were higher among boys than girls in Rasht which is in accord with accredited studies (3, 8) which report that prevalence of asthma in under 15 year olds is higher in boys than girls (1.5 to 1) (15). But prevalence of asthma and its symptoms was higher among female elementary school students in Tehran. No specific reason was found for this difference and this is in contrast with accredited studies (8). However, such a difference was not detected among the older age group.

Prevalence of asthma and its related symptoms is increasing worldwide and in our country as well (6, 11). When comparing our study results with those of phase I ISAAC study, the increasing prevalence of asthma and asthmatic symptoms is more significantly seen in Rasht than Tehran. Prevalence of asthma in Rasht among the age group of 6-7 years has increased from 4.1% in 1997 to 4.7%; whereas, its prevalence did not change significantly among Tehran students during the same years (6).

There is a wide range of increasing risk factors for wheezing (the main symptom of asthma) and asthma prevalence. To find out why prevalence of asthma differs in different areas, its related risk factors must be evaluated. This study only evaluated the difference in prevalence of asthma and its symptoms in 2 cities of Tehran and Rasht and therefore, more research is required for comparative evaluation of social, economical, cultural and most importantly environmental status of children in Tehran and Rasht to find scientific and logical solutions for the higher prevalence of asthma among Rasht children compared to those in Tehran.

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