

A cross-sectional study of prevalence and risk factors for childhood asthma in Ahvaz city, Iran

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Abstract

Introduction: Childhood asthma is the main public health problem in world, and dramatically has increased in developed as well as developing countries.

Aim: To assess prevalence and risk factors for asthma based on ISAAC questionnaire.

Material and methods: It was a cross-sectional school population-based study which was carried out on 1803 school children aged 6–7 and 13–14 in Ahvaz city, Khuzestan, south west of Iran, in 2011. The International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire was used as a tool to identify prevalence of asthma. Chi-square (χ^2) test was then used to identify possible potential risk factors associated with asthma. Logistic regression analysis was then applied to determine the various potential risk factors associated with asthma. Data were entered and analyzed using SPSS (version 17) statistical analysis software. The significant level in this study was considered 0.05.

Results: The overall prevalence of asthma among school children was 4.9%, but in males it was 5.5% and in females – 4.3%. Also findings have demonstrated that prevalence of asthma was higher among 13–14 years age group (6.1%) as compared to children aged 6–7 (3.7%). The prevalence of wheeze in the last 12 months, wheeze after exercise and playing was 18.1%, 13.9%, and 8.4% respectively. Prevalence of dry cough at night was reported in 17.6%. Prevalence of asthma was highest in winter (2.6%).

Conclusions: Prevalence of asthma in children was higher in males than females and prevalence of allergic symptoms will be increased with high air pollution. Family history of asthma was a strong risk factor for childhood asthma.

Key words: prevalence, asthma, children, risk factors, Ahvaz.

Introduction

Asthma is a common chronic respiratory disease affecting children; it is a major health problem in both developed and developing countries [1–3]. The prevalence of childhood asthma and the morbidity related to asthma are both increasing, and occur in approximately 7–10% of the pediatric population and it is the leading cause of childhood morbidity [4–8]. This chronic disease of the airways may cause wheezing, breathlessness, chest tightness and nighttime or early morning coughing, it is often reversible either spontaneously or with treatment [2].

The International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire was used as a tool to compare prevalence, severity, risk factors, and secular

trend for asthma within and between countries. This study demonstrates the prevalence and severity of illness according to base data to assess future trends [8, 9]. The study was performed in 3 phases. The first phase was carried out on more than 70,000 children in two age groups (7–6 and 13–14 years) in 156 centers and 56 countries. The second phase was conducted in 36 centers and 22 countries to further explore the potential role of risk factors and protective factors that were observed indifferent countries of the first phase [10]. The third phase took place about 5 to 10 years after the first phase to assess the prevalence of asthma and allergies in areas where the first phase was implemented to provide testing hypotheses at the individual level according to the results of the first phase [11]. The ISAAC program was also

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launched in Iran in 1997 with the first phase carried out by the Institute of Tuberculosis and Lung Disease, then in 2000–2001, the third phase was conducted in Rasht and Tehran cities, Iran. Now, it is being conducted in different cities such as Shahr-e-Kord, Isfahan, Kashan, Zanjan, Birjand, Tabriz, Babol, but in a more limited form [1].

Ahvaz is one of the major Iranian cities, and has a high prevalence of asthma due to its hot and humid weather, overpopulation, industrial centers, and recently installed dust collectors.

Aim

Our study aimed to assess the prevalence of asthma and its associated risk factors based on the ISAAC questionnaire.

Material and methods

Method

This was a cross-sectional school population-based study in which parents of school children aged 6–7 and 13–14 years old in Ahvaz city were administered an ISAAC questionnaire and an additional set of questions that captured the presence of potential risk factors known to be associated with asthma during the school year 2011–2012.

Study population

In Ahvaz city, there are four educational regions. Then, 16 schools were randomly selected as the cluster. Totally, 1803 school children participated in this study, 929 and 874 school children were among 6–7 years old and 13–14 years old groups, respectively, their age was confirmed as per school records. The study was approved by the local independent ethics committee before the start of the study.

Prior permissions from educational authorities, school principals, and class teachers were obtained, and then written informed consent was taken from parents' children between the ages of 6–7 and 13–14, and objectives of this study were explained.

Research tools

The International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire was used as a tool to identify prevalence of asthma. This tool has been validated worldwide and within the country and has been used to determine asthma prevalence. An additional set of questions providing information on potential risk factors associated with asthma was also added. The questionnaire included questions about environmental exposures; parental smoking, presence or absence of separate kitchen, ventilation at home, presence of cockroaches and pets at home, presence of preterm birth, type of

delivery, breastfeeding during the first 6 months of life, number of family members, number of siblings, snoring during sleep, parental education, and parental occupation. Asthma in the study population was defined as per the ISAAC study criteria, namely, "presence of wheezing or whistling in the chest, chest sounding wheezy during or after exercise, and dry cough at night; apart from a cough associated with a cold or chest infection" during the past 12 months, or if they answered "yes" to the question "has your child ever had asthma?".

The original draft of parents' information sheet, consent form and validated questionnaire were made in English and translated into the local language (Persian) by an expert on this subject. The Persian translation was subsequently back translated into English, which has been done by three different categories of people (a professional doctor, a qualified non-medical graduate and a lay person).

The questionnaire was completed by parents of school children aged 6–7, and school children aged 13–14 themselves, supervised by trained interviewers. If the parents were illiterate or unfamiliar in Farsi, trained interviewers had been used.

Statistical analysis

A sample size of 1803 was calculated based on the results of another study conducted by Shakurnia *et al.* [4], on 2401 school children in Ahvaz city.

All the data collected from the returned questionnaires were double-entered by data input clerks into Epi-info. The data set was then validated and consolidated by a single data manager. Prevalence of asthma in the study population was calculated as a percentage of children having defined asthma symptoms based on sex and age. Chi-square (χ^2) test was then used to identify possible potential risk factors associated with asthma. Logistic regression analysis was then applied to determine the various potential risk factors associated with asthma. The impact of the risk factors was described in terms of the odds ratio. The analysis of data was performed by the SPSS (version 19.0, SPSS, Inc., Chicago, IL, USA) software package. The significant level in this study was considered 0.05.

Results

In this study, 1803 questionnaires were distributed so that 929 and 874 questionnaires were respectively completed by parents in the age groups 6–7 years and by school children aged 13–14 themselves. In our research, 51.5% were aged 6–7, and 48.5% aged 13–14. Almost half of participants (50.1%) were boy children, and 49.8% of them were girl children.

The overall prevalence of asthma among school children was 4.9%, and in males it was 5.5% and in females – 4.3%. Also the findings have demonstrated that preva-

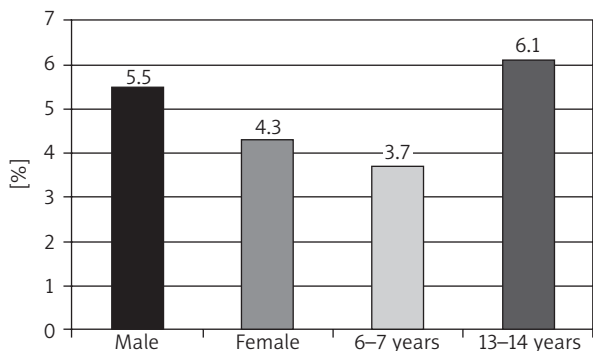


Figure 1. Overall prevalence of childhood asthma in Ahvaz city

Prevalence of asthma was higher in the 13–14 years age group (6.1%) as compared to children aged 6–7 (3.7%) (Figure 1). The prevalence of wheeze in the last 12 months, wheeze after exercise and playing was 18.1%, 13.9%, and 8.4%, respectively. Prevalence of dry cough at night was reported in 17.6%. Prevalence of asthma was highest in winter (2.6%). The prevalence of family history of asthma in parents of children was 5% in the father’s family and 5.1% in the maternal family. Prevalence of asthma symptoms was higher in boys than girls (Table 1, Figure 2). Prevalence of asthma symptoms according to age-wise is shown in Figure 3.

As to risk factors associated with asthma, results indicated that the frequency of birth weight of less than 2500 g was 17.2% in boys and 15.4% in girls. Asthma was more common for boys in autumn and for girls in winter. In other words, 30.6% of boy children and 38% of girl children reported asthma in autumn and winter, respectively. The age of onset of asthma was more than 5 years in boys and 1–5 years in girls. Approximately 40% of boy children suffered from asthma. Results from the logistic regression model according to sex-wise have demonstrated that in male asthmatic school children, there was an association between allergy symptoms, including cough, headache, runny nose and runny eyes and increase in air pollution ($p < 0.0001$, $OR = 0.23$; $p = 0.015$, $OR = 0.22$; $p = 0.012$, $OR = 0.074$), but a significant association was not seen in female asthmatic school children. As seen in Table 2, most of children (55.2%) aged 6–7 were born through Cesarean delivery, and 63.2% of participants aged 13–14 had natural childbirth. 10.7% of them in the 6–7 years age group and 24.5% in the 13–14 years age group had birth weight of less than 2500 g.

No association was observed between age groups, blood groups, type of delivery, age at onset of asthma, breastfeeding conditions, maternal family history of asthma, presence of a separate kitchen, presence of cockroaches or pets at home, presence of wall damp-

Table 1. Odds ratio of respiratory symptoms in childhood asthma sex-wise

Variable	Gender	%	OR (95% CI)	Value of p
Ever wheeze	Male	20.7	9.78 (5.56–17.86)	< 0.001
	Female	16	1.33 (0.57–3.11)	
Wheeze during the last 12 months	Male	0.8	8.85 (5.11–15.33)	< 0.001
	Female	12.4	1.28 (0.48–3.38)	
Wheeze limiting breath	Male	3.8	6.60 (3.00–14.55)	< 0.001
	Female	4	0.67 (0.09–5.04)	
Ever asthma	Male	5.5	622.5 (198.49– 1952.27)	< 0.001
	Female	3.4	0.629 (0.084–4.71)	
Wheeze after exercises	Male	8.9	8.39 (4.67–15.06)	< 0.001
	Female	8.7	0.30 (0.04–0.23)	
Dry cough	Male	18	4.62 (2.69–7.93)	< 0.001
	Female	17.9	0.27 (0.064–1.13)	
Family history of asthma in the father	Male	5.3	5.32 (2.53–11.17)	< 0.001
	Female	5.6	0.72 (0.06–3.71)	
Family history of asthma in the mother	Male	5.8	2.61 (1.11–6.13)	< 0.05
	Female	5.7	0.52 (0.07–3.93)	
Father’s smoking	Male	26.8	0.76 (0.4–1.43)	0.45
	Female	18.5	1.27 (0.57–0.85)	
Mother’s smoking	Male	1.3	2.97 (0.63–14.08)	0.18
	Female	6.0	1.04 (1.03–1.05)	

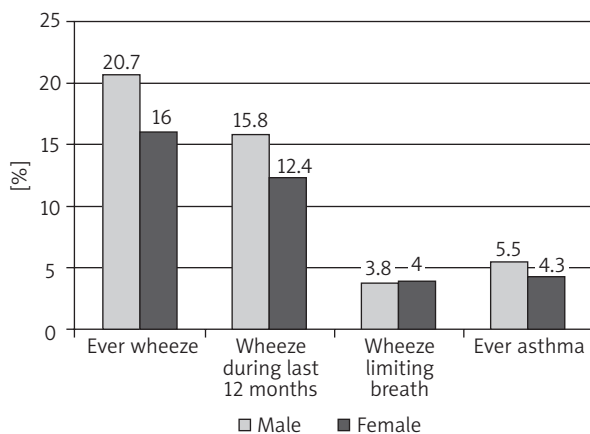


Figure 2. Prevalence of respiratory symptoms in childhood asthma between males and females

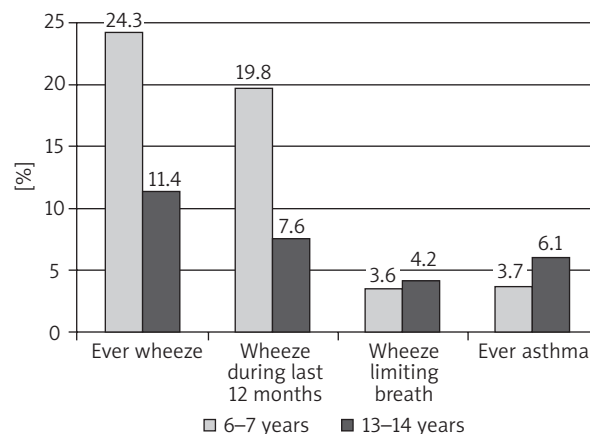


Figure 3. Prevalence of respiratory symptoms in childhood asthma in children aged 6–7 and 13–14 years old

ness, time spent on cooking at home, weight at birth, birth order in the group aged 6–7, type of delivery, type of family (nuclear or extended), mother's age at birth, presence of preterm birth, breastfeeding during the first 6 months of life, injecting DTP and BCG vaccines, number of family members, history of and years of parents' smoking, father's education in the 7–6 years age group, maternal education, and food allergies and sensitivities in the 13–14 years age group during high pollution, and the disease.

Results of the logistic regression model according to age-wise had shown that in children among 6–7-year-olds there was an association between allergy symptoms such as cough, and significant relation was seen in children aged 13–14 between gender and asthma ($p = 0.003$, $OR = 2.58$).

Discussion

The prevalence of "ever asthma" among children aged 7–6 years and 14–13 years old has decreased as compared to the previous study in Ahvaz city from 6.8% to 3.7% and from 9.8% to 6.1%, respectively. This level is different in other Iranian cities from 2.1% to 7.1% [12–15]. This may be due to lack of parental awareness of their child's illness or imprecision of physicians in the diagnosis of asthma in children while this rate in children aged 6–7 has significantly increased from 11.1% to 24.2%, which can be considered as a warning to health policy. The frequency of severe asthma symptoms such as disrupting breathing and sleep among 7–6-year-olds has declined as compared to the previous study in Ahvaz (from 8% to 3.6% and from 10.7% to 4.2%, respectively), but a slight increase in sleep disorders in individuals aged 13–14 years (from 9.6% to 9.9%) and reduction in breathing disorders (from 10.7% to 9.9%) were observed. This can be due to better access to appropriate treatment after diagnosis.

In this study there was a significant association between asthma and a history of smoking among other family members for participants aged 13–14. Different studies indicated that passive smokers have more sensitive bronchi, and are vulnerable to asthma and relapse of wheezing in children [16–19]. In our study, no relation between a history of parental smoking in school children aged 6–7 and the disease was found because of a low percentage of mothers who spend many hours at home with their children and smoke.

The finding of this study has shown that prevalence of asthma, ever wheezing, sleep disorders due to asthma, and wheezing after play and exercise is higher in boys than girls. This issue may be due to hormonal changes in women and smaller airways of boys than girls [20].

In the present study, no significant association was observed between consumption of a particular food and asthma, but prevalence of allergic was high in Khuzestan, due to more use of spices. Lack of a significant relation between consumption of a particular food in the ISAAC study and asthma indifferent parts of our country can be due to different dietary habits in various cultures [21].

In our study, 4.8% of participants answered "yes" to the question "has your child ever had asthma?" while prevalence of asthma according to three questions was 5.4%. It seems that 0.6% of children's parents were unaware of their child's asthma. This means that they have not taken any medication to treat and prevent asthma attacks.

The limitation of this study was a small sample size. If the sample size is increased, or the study was designed as a cohort or case-control one, non-significant associations between asthma and related risk factors, may be significant. Prevalence of asthma was based on data from the ISAAC questionnaire with focus on symptoms or previous diagnosis of asthma.

Table 2. Odds ratio of respiratory symptoms in childhood asthma age-wise

Variable	Age	%	OR (95% CI)	Value of p	
Gender	Male	6-7	48.6	1.21 (0.67-2.18)	0.55
	Female				
	Male	13-14	51.1	2.58 (1.37-4.86)	< 0.01
	Female				
Ever wheeze	6-7	24.3	5.01 (2.74-9.17)	< 0.001	
	13-14	11.4	6.27 (3.39-11.59)	< 0.001	
Wheeze during the last 12 months	6-7	19.8	5.08 (2.76-9.35)	< 0.001	
	13-14	7.6	6.75 (3.44-13.22)	0.061	
Wheeze limiting breath	6-7	3.6	5.70 (2.34-13.95)	< 0.001	
	13-14	4.2	2.06 (0.70-6.06)	< 0.001	
Ever Asthma	6-7	3.7	47.19 (21.49-103.63)	< 0.001	
	13-14	6.1	20.02 (12.49-32.09)	< 0.05	
Wheeze after exercises	6-7	5.3	6.73 (3.17-14.27)	< 0.001	
	13-14	12.5	2.75 (1.41-5.39)	0.13	
Dry cough	6-7	16.2	2.08 (1.53-5.40)	0.84	
	13-14	19.8	1.72 (0.90-3.29)	< 0.05	
Family history of asthma in the father	6-7	5.5	2.37 (0.88-6.34)	0.69	
	13-14	5.5	39.3 (1.42-8.08)	0.14	
Family history of asthma in the mother	6-7	4.6	1.17 (0.27-5.06)	0.34	
	13-14	6.9	1.98 (0.80-4.80)		
Father's smoking	6-7	18.5	0.63 (0.26-1.51)	0.50	
	13-14	27.1	1.24 (0.66-2.33)	0.60	
Mother's smoking	6-7	0.6	1.06 (1.04-1.07)	0.08	
	13-14	4.4	0.87 (0.66-1.15)		
Other member at home smoking	6-7	4.4	0.52 (0.07-3.38)	0.52	
	13-14	5.9	3.88 (1.69-8.87)	0.001	
Sneezing and coughing after rising air pollution	6-7	63.13		0.001	
	13-14	52.42		0.29	
Food allergy	6-7	13.45		< 0.01	
	13-14	39.51		0.08	

Conclusions

Prevalence of asthma in children was higher in males than females and prevalence of allergic symptoms will increase with high air pollution. Family history of asthma was a strong risk factor for childhood asthma.

Acknowledgments

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Conflict of interest

The authors declare no conflict of interest.

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