

The Prevalence of Allergic Rhinitis, Eczema and Asthma in Students of Guidance Schools in Mazandaran Province, Iran

Daniel Zamanfar¹, Javad Ghaffari¹, Salar Behzadnia¹, Jamshid Yazdani-charati², Sahar Tavakoli¹

¹*Infectious Disease Research Center with Focus on Nosocomial Infection, Department of Pediatrics, Mazandaran University of Medical Sciences, Sari, Iran;* ²*Biostatistics Department, Health Science Research Center, Faculty of Health, Mazandaran University of Medical Sciences, Sari, Iran*

Abstract

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***Correspondence:** Javad Ghaffari, Mazandaran University of Medical Sciences, Pediatrics, Sari, Iran. E-mail: javadneg@yahoo.com

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BACKGROUND: Eczema, allergic rhinitis and asthma are common chronic allergic disorders in childhood.

AIM: The aim of this study was to determine the prevalence of common allergic disorders among Iranian guidance schools students in Mazandaran Province, northern Iran.

METHODS: This analytical cross-sectional study was performed on 3000 children aged 11-14 years old during 2012-13 according to ISAAC study. Of 3000 recruited children 1576 (52.54%) were female and 1424 (47.46%) were male. Data gathered by ISAAC first phase questionnaire analysed by SPSS software 20.

RESULTS: The prevalence of wheezing, allergic rhinitis symptoms (sneezing and pruritus) and atopic dermatitis symptoms (pruritus skin lesion) were 30.5%, 30% and 15% respectively. History of pets contact and smoking was positive 6.6% and 36 % respectively. About 52% was born with caesarian section. There was wheezing in 32.5% during sport. The diagnosis of asthma, allergic rhinitis and eczema were 12.2%, 28.5% and 15% respectively. Eczema, asthma and allergic rhinitis were significantly more common in boys students ($p < 0.05$).

CONCLUSIONS: The results of this study showed that asthma, allergic rhinitis and eczema have a high prevalence and they are more common in boys.

Introduction

Asthma, allergic rhinitis (AR) and eczema or atopic dermatitis (AD) are the most common chronic diseases in childhood [1]. Allergic disorders are encountered with variable prevalence in different parts of the world. The prevalence of childhood asthma and other atopic disorders has been increased in recent decades [2]. In Previous epidemiological studies, the prevalence of asthma among elementary and guidance schools students in this region was reported 12-17% [3, 4] but in a meta-analysis, the prevalence of asthma in Iranian children was 7.6% and 10.7% in elementary and guidance school students respectively [1]. Another study estimated that asthma affects 2.7 to 35.4% of children (in average 13.4%) in Iran [5]. More than 300 million people in the world currently have

asthma [5].

Clinical manifestations of AR include rhinorrhea, pruritus; sneezing and congestion and the disease is more common among children. The pooled prevalence of AR in children 6-7 years of age was 11.9% and in children aged 13-14 was 21.2 % [6].

AD is the most common chronic dermatologic disease in children associated with pruritus and marked by remissions and exacerbations. In a meta-analysis study, the prevalence of eczema in children aged 6-7 years and 13-14 years was 5.98% and 6.52%, respectively [7].

Allergic disorders pose the heavy social-economic burden on family and society. Asthma is the most common disease that observed in emergency rooms, hospital admission and abstinence of school. It

has a high economic burden on patients, their family, society and healthcare resources in different countries [5].

Although the exact etiologies of allergic diseases are unknown, both genetic and environmental factors have been included [8]. In children with asthma, environmental factors especially viral infection (24-34%), indoor and outdoor includes; air pollutants, cold, tobacco smoking, moulds and pets are main trigger factors [9].

The aim of this study was to determine the prevalence of common allergic disorders including asthma, allergic rhinitis and eczema and also to evaluate a few environmental factors such as BMI, smoking and delivery among students of guidance school in the region of northern Iran.

Material and Methods

We conducted an analytic cross-sectional prospective study which has been carried out on urban guidance students (11-14 years old) in the north of Iran from September 2012 to march 2013. The children who could not complete the questionnaire were excluded. Each school was considered as a cluster, and 20 guidance schools were selected randomly. Standard ISAAC core questions for wheezing, rhinitis, and eczema was used [10]. From 3250 students, 3050 questionnaires were obtained. The questionnaire return rate was 93.84%. Finally, 3000 questionnaires (1576 for girls and 1424 for boys) were collected and analysed. Students from guidance school answered the questionnaire associated with their parents. Written informed consent was obtained from participants and schools managers. Our study approved by local ethics committee of Mazandaran University of Medical sciences.

The boys and girls were matched for body mass index (BMI) [11]. Also, data were collected about kitchen design (open and closed), any passive smoking at the home or non-passive smoking; delivery based on normal delivery (NVD) and cesarian section(c/s) and animal contact based on indoor or outdoor contact and without animal contact from our participants. The family numbers, room numbers including bedroom and living room and housing characteristics were considered.

Data were analysed with SPSS 20 and statistical analysis tests such as Chi-Square test and odds ratio was calculated. We used logistic regression to find the effect of explanatory variables on asthma. P- Value less than 0.05 was statistically significant.

Results

The weight of the participants was between 25-92 kg (Mean 48.42 kg) and the height of the children was 120-182 (mean155.99) cm. The BMI, family and room numbers were 9.26-43.79 (mean 19.88), 2-9 (mean 4) and 1-4 (mean 2) person respectively. Table 1 showed analysis of kitchen, smoking exposure, kind of delivery and animal contact.

Table 1: Prevalence of allergic rhinitis, eczema and asthma in students of guidance schools

Disease	Total sample	Number of patients	Prevalence (%)	95% Confidence Interval	
				Lower	Upper
Allergic Rhinitis	2979	847	28.32	26.82	30.09
Eczema	2962	359	12.12	10.96	13.35
Asthma	2969	362	12.2	11.04	13.42

Children who have passive smoking are 1.8 times more likely to develop asthma (PV <0.001) (OR=2.88 with CI= 2.13-3.88). Room number leads to an increase of asthma in about 44 % (PV < 0.001) (OR = 0.694, CI = 0.570-0.844).

Out of total asthma patients (362; 12.2%), 222 (15.9%) were boys and 140 (8.9%) were girls. The prevalence of asthma was more common in boys than girls (PV=0.0001) in our study. Table 2 has shown asthma symptoms based on ISAAC questionnaire.

Table 2: Prevalence of allergic rhinitis, eczema and asthma in students of guidance schools by gender

Disease	Gender	Total sample	Number of patients	Prevalence (%)	p-value
Allergic Rhinitis	Boys	1003	406	40.47	<0.001
	Girls	1976	441	22.31	
Eczema	Boys	982	168	17.10	<0.001
	Girls	1980	191	9.64	
Asthma	Boys	984	144	14.63	0.006
	Girls	1985	218	10.98	

We use logistic regression to find the effect of explanatory variables on asthma. Overweight and obesity were more common in non-asthmatic patients' 47% and 15% respectively verse 39% and 9% in asthmatic patients respectively (PV = 0.002).

Association between a family number and asthma was not significant using logistic regression. (P-Value=0.45). The relationship between asthma and BMI in all students has shown in Table 3.

Table 3: Evaluation of environment factors in asthma prevalence using multivariate logistic regression

environment factors	B(regression coefficient)	S.E.*	P-Value.	Odds Ratio	95% Confidence Interval	
					Lower	Upper
Open kitchen (Yes/NO)	-0.111	0.151	NS*	0.895	0.666	1.202
Family. Number (NO)	0.142	0.087	NS	1.153	0.973	1.366
Room. Number (NO)	-0.494	0.111	0.000	0.610	0.491	0.759
Animal Contact(Yes/NO)	0.051	0.387	NS	1.052	0.493	2.245
Secondary Smoker (Yes/NO)	0.609	0.130	0.000	1.839	1.425	2.373
Born (Cesarean/Normal)	-0.12	0.143	NS	0.88	0.67	1.17

* Standard Error of Mean; **. Not Significant.

Allergic rhinitis

Sneezing and rhinorrhea were seen in 29.8% of our allergic rhinitis patients in 12 last months but ever sneezing and rhinorrhea was seen in 22.4%. Nasal pruritus and eye involvement such as redness, Lacrimation was observed in 35.6% (Table 4).

Table 4: Asthma symptoms according ISSAC questionnaire in guidance school students

Asthma symptoms	Boys (%)	Girls (%)	Total (%)	P-value
Ever Wheeze				
Yes	596 (20)	153 (5)	749 (25)	< 0.001
No	803 (27)	1420 (48)	1503 (75)	
Total	1399 (47)	1573 (53)	2972 (100)	
Current Wheeze				
Yes	812 (27)	102 (4)	914 (31)	< 0.001
No	586 (20)	146 (49)	2053 (69)	
Total	1398 (47)	1570 (53)	2968 (100)	
Sleep disturbance related				
Wheeze				
Yes	847 (29)	70 (3)	917 (32)	< 0.001
No	548 (18)	1490 (50)	2038 (68)	
Total	1395 (47)	1560 (53)	2955 (100)	
Speech Disorder				
Yes	286 (10)	151 (5)	437 (15)	< 0.001
No	1113 (37)	1415 (48)	2528 (85)	
Total	1399 (47)	1566 (53)	2965 (100)	
Ever asthma				
Yes	222 (8)	140 (5)	362 (13)	< 0.001
No	1176 (39)	1431 (48)	2607 (87)	
Total	1398 (47)	1571 (53)	2969 (100)	
Exercise related Wheeze				
Yes	837 (29)	139 (5)	976 (34)	< 0.001
No	558 (18)	1425 (48)	1983 (66)	
Total	1395 (47)	1564 (53)	2959 (100)	
Dry cough at night				
Yes	542 (18)	308 (11)	850 (29)	< 0.001
No	855 (29)	1254 (42)	2109 (71)	
Total	1397 (47)	1562 (53)	2959 (100)	

The prevalence of allergic rhinitis was more common in boys (n = 736, 51.7%: vs.; n = 174, 11%), PV = 0.0001. Association between using an open kitchen and allergic rhinitis was significant and persons who had open Kitchen had odds ratio 1.868 times more than others to have allergic rhinitis (P < 0.001).

Association between smoking and allergic rhinitis was significant and secondary smoker had odds ratio 3.11 times more than others to have allergic rhinitis (P < 0.001). There was no significant relationship between others explanatory variables and allergic rhinitis.

Eczema

There was no relationship between BMI and prevalence of eczema (PV = 0.052). Association between smoking and eczema was significant and secondary smoker had 2.96 times more odds than others to have eczema using logistic regression (P < 0.001). There were no significant association between others explanatory variables and Eczema.

Discussion

Asthma

Asthma is the most common chronic disease

in the pediatric population [12]. The prevalence of asthma has doubled over the past several decades [13]. In the present study, the prevalence of asthma was more common among boys than girls (2:1 ratio) similar other studies [1, 3, 4]. Also, in the present study, the prevalence of asthma was higher than the other studies such as Thailand [13]. The prevalence of asthma was more variations between countries than within countries (15). The higher prevalence of asthma was reported in United Kingdom, New Zealand, and Australia but the lowest asthma prevalence reported from several eastern European countries, China, and some other countries in Southeast Asia. Generally, asthma was more common in affluent countries than in more developing countries [16].

Although the prevalence of asthma in some studies was different between urban and rural areas [17, 18, 19] but the results of our study in the same region in the north of Iran and the results reported by others were similar between the two areas [4, 20]. The prevalence of asthma in guidance school was 29.9% in rural area in this region [20]. Therefore there is no significant difference between rural and urban in asthma prevalence in our region that was similar the study by Gunner et al [21]. Urban and rural areas in our region are not substantially different climate. Environmental factors such as allergens, viral infections, pollutants, lifestyle, socioeconomic status, geographical area, diet, have been similar between two areas in this region.

Our study showed that the prevalence of wheezing in a 12 months period was 30.5%, so about one-fourth of our children had probability asthma. Our study showed that ever and current wheezing prevalence decreased with increasing age. Asthma diagnosis was 12.2 percent in our study. It has moderate prevalent in Iran and Middle East. In another study by Ghaffari et al., 12% of elementary school students had asthma with predominantly in boys [22]. Based on the previous studies in this region, the prevalence of asthma is more common in guidance school children than in elementary school students.

The prevalence of asthma is an average of 9 and 13 percent in Iran [1]). The average prevalence rate of asthma in the Middle East is 10.7% (11% in Oman and Palestine and around 17% in Kuwait) [1]. The prevalence of asthma in the north of Iran is more common than other regions of Iran and also it is more common or the same as some other countries such as United Kingdom (14.9%) and Malaysia (13 %) and less than other countries such as Austria (32%), United States of America (24.4%), and Singapore (27.4%) [1]. There is evidence that overweight and obesity are associated with children asthma [23]. It has been suggested that obesity results more severe, increased exacerbation, and poorer control asthma. Obesity rates have increased significantly in children in the world. A study showed that the risk of obese

children having asthma was two times higher than for children with normal body weight. But our study showed that overweight and obesity were lower in asthmatic or in patients with wheezing ($p = 0.002$) [23]. Also, Alvarez Zallo et al study showed no relationship between obesity and asthma in the guidance school children group [24]. There is more conflict in a relation between overweight and obesity with asthma in children. More studies are needed in children and adolescents to confirm the relation between overweight and obesity with asthma and better understand how body fat distribution impacts the obesity-asthma relationship.

Sleep disturbance related wheeze, speech disorder, exercise related wheeze and dry cough at night were more common in boys than girls ($p < 0.001$). The asthma prevalence was more common in boys than girls in our study (significantly, $PV = 0.0001$). Susceptibility to developing asthma among passive smoking guidance school children were 2.8 times more common than the non-passive smokers children ($CI, 95\% = 2.13-3.88$) ($PV = 0.001$). Therefore, exposure to passive smoking is a significant risk factor for developing asthma. Of course, reversely, also for a room asthma leads to an increase of about 44% ($P < 0.001$). ($OR = 0.694, CI = 0.570-0.844$). In our study, kind of kitchen, type of delivery and contact with pets could not find any association with children asthma.

Allergic rhinitis

The prevalence of allergic rhinitis was 30% in our study. Based on a meta-analysis study in Iran, the prevalence of allergic rhinitis in children of aged 13-14 was 21.2%. Therefore AR is more common in the north of Iran with high humidity and warm weather. In another study in this region, the prevalence of allergic rhinitis in guidance school was 18.1% and 21.7% in rural and urban areas in this region respectively [6, 20]. Prevalence of AR is not more common in urban than the rural area.

In this study, the prevalence of rhinitis symptoms in the both age groups was higher than children in Croatia, city of Zagreb and is lower than in children in Thailand [20]. Wide variations in the prevalence of rhinitis were observed across centres with a higher prevalence in Austria, Madrid, Cartagena and Bilbao, lower prevalences were reported from Barcelona, Castellon and Pamplona [20]. Our results showed that 12-month and lifetime prevalence rates of allergic nasal symptoms and hay fever, particularly in the older age group was even higher. One study in the global ISAAC Phase reported more than fourfold worldwide variation in the prevalence of allergic nasal symptoms in both age groups [17]. However, we believe that 12-month prevalence of nasal symptoms (not the combination of nasal symptoms) in a great majority of children living

in our region is sensitised to house dust mite. It may be expected that many of them have perennial allergic rhinitis without associated significant conjunctival symptoms [18]. The incidence of allergic rhinitis has been increasing for the last few decades in the world [20]. AR is a major risk factor for developing asthma. Our study showed the similar results. AR and asthma have had significant effects on quality of life and other numerous complications.

We found no significant relationship between BMI and guidance school children with or without AR in our study (Table 4), $P = 0.281$). In another study, there was evidence that overweight and obesity was not associated with children AR [23]. Our research showed that prevalence of AR was more common (significantly, $P = 0.0001$) in boys than girls. We found that kind of kitchen, type of delivery and contact with pets could not find any association with children AR.

Eczema

Atopic dermatitis (AD) is an increasingly chronic dermatologic disease. Fifteen percent of our cases have had eczema. The pooled prevalence of eczema in children in guidance school age was 6.52% (range 4.1 to 24.3%) in Iran [7].

The prevalence of eczema in our study is much higher than the average in our country. A previous study in this region showed that the prevalence of eczema was 5.5% among rural guidance school children [20]. But in another study in urban guidance school children the prevalence of eczema was 8.2% in this region [6]. Our results related to the eczema symptoms in both age groups are higher than previously reported study in former socialist Europe and lower than that in Scandinavia and the United Kingdom [20].

Similar to our study, Hogewoning et al.'s in Ghana, Gabon and Rwanda and also Guner et al in Turkey reported that the prevalence of eczema had no significant difference in urban and rural areas [21, 25]. Our study showed no significant relation between BMI and guidance school students with or without eczema. There is evidence that overweight and obesity are associated with children eczema [23]. In addition, our study revealed that the eczema prevalence was more common in guidance school's boys than girls ($P = 0.0001$). We found that kind of kitchen, type of delivery and contact with pets had any association with children eczema.

In conclusion, it can be concluded that the prevalence of asthma, allergic rhinitis, and eczema symptoms (except a dry cough at night) in boys were higher than in girls. This study also shows that asthma, allergic rhinitis, and eczema in guidance schools children from the capital of Mazandaran province northern Iran are more common than an average of our country. A major possible limitation of

the study is parental reporting on disorder symptoms (asthma, AR and eczema) could be influenced in data analysis.

Authors` contributions

SB participated in the conception of the study and acquisition of the data. ST contributed to acquisition of the data and distribution of questionnaires. DZ contributed to conception, design, acquisition of the data, and distribution of questionnaires. JY contributed to analysis, interpretation of data and drafting, and JGH contributed in conception, design, drafting and final approval.

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