

The Prevalence of Asthma among Secondary School Students in Afyon, Turkey

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The difference in the prevalence of asthma in various parts of the world cannot entirely be explained by differences in methodology. Studies in children rather suggest a high prevalence of asthma in the UK, Australia and New Zealand compared with moderate prevalence rates in most Western European countries^{1,2} and low prevalence rates in Eastern Europe³⁻⁵ and developing countries.⁶ Moreover, the prevalence of asthma varies not only between countries but also between centers within the same country.⁷

In spite of intensive research, our understanding of the reason remains sparse.⁸ Airway hypersensitivity and allergy are features closely associated with asthma, and may thus be helpful as early markers of development of disease in symptomless subjects. In addition, a clear relationship between tobacco smoking, a well-described and highly preventable risk factor for pulmonary and other diseases, and the development of asthma-like symptoms has been demonstrated.⁹⁻¹¹ The aim of this

SUMMARY Ethnic origin has been reported to affect the prevalence of atopic diseases in several studies in different parts of the world. The aim of this study was to determine the current and cumulative prevalence of asthma, allergic rhinitis, atopic dermatitis and reactivities to allergen skin prick tests (SPT) among secondary school students in Afyon, Turkey. The data of the first stage were collated through the application of the European Community Respiratory Health Survey Questionnaire on 1,400 students (1,366 were properly completed) registering at various schools in Afyon-Turkey, in the academic year 2000-2001. At the second stage, a physical examination and SPT were performed on 121 students. Of the students within the study group, 53 (3.9%) had experienced an asthma attack within the previous 12 months, 49 (3.6%) had a past history of asthma attacks and 167 (12.2%) reported wheezing attacks within the previous 12 months. The cumulative prevalence of asthma, rhinoconjunctivitis and dermatitis were found to be 7.46%, 8.10% and 3.5%, respectively. A positive SPT reaction to at least one allergen was found in 15.7% of the students. SPT positivity was 11.13% in symptomless students and 20.3% in asthmatic students. In analysis of logistic regression, a history of atopy, as determined in the questionnaire, was seen to be significantly correlated with SPT positivity. The prevalence of self-reported asthma and/or asthma-like symptoms was shown to be lower in students living in Afyon than other countries. Asthma and asthma-like symptoms were found to be significantly more prevalent among students who smoked.

study was to evaluate the prevalence of asthma and atopic diseases in students living in Afyon (central region of Turkey) and to study the relationship of associated risk factors.

MATERIALS AND METHODS

Study design

This was a cross-sectional

study using a two-step approach. In stage I the screening questionnaire standardized by the European Community Respiratory Health Survey (ECRHS-Stage I) was applied. Of 1,400 questionnaires administered,

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1,366 were properly completed (94.5%), in the academic year 2000-2001, in Afyon.

Questionnaire

The Turkish translation of the ECRHS protocol, consisting of two sections, was used to collect data for the first stage. The first section contained a series of questions soliciting information concerning the student's sociodemographic background. It also contained questions concerning the smoking patterns of the student. The second section of the questionnaire obtained information about asthma and asthma-like symptoms using the ECRHS Stage I form.¹² Additionally, this section solicited information concerning allergies of the student and family members.

Screening questionnaire

Q1: Have you had wheezing in your chest at any time last year?

Q1-1: Have you been at all breathless when the wheezing noise was present?

Q1-2: Have you had this wheezing or whistling when you did not have a cold?

Q2: Have you woken up with a feeling of tightness in your chest at any time in the last year?

Q3: Have you been woken by an attack of shortness of breath at any time in the last year?

Q4: Have you been woken by an attack of coughing at any time in the last year?

Q5: Have you had an attack of asthma in the last year?

Q6: Have you had an attack of asthma at any time in your life?

Q7: Are you currently taking any medicine (inhalers, aerosols or tablets) for asthma?

Q8: Do you have any nasal allergies including hay fever?

Q9: Do you have any itching dermatitis and/or eczema?

Q10: Do you have any allergic diseases and/or symptoms at first degree relatives (asthma and/or hay fever and/or eczema)?

Explanations

Current asthma: Subjects answered "Yes" to either question Q5 or Q7.

Cumulative asthma: Subjects answered "Yes" to question Q6.

Asthma-like symptoms: Subject answered "Yes" to question either Q1 and/or Q2 and/or Q3 and/or Q4.

Non-infectious rhinitis: Subjects answered "Yes" to question Q8.

Itching dermatitis and/or eczema: Subjects answered "Yes" to question Q9.

Family histories of atopy: Subjects answered "Yes" to question Q10.

In the second stage, 121 students (8.9%) were selected at random sampling from three different regions of Afyon, representing high, middle, and low socioeconomic proportions. Students experienced a physical examination and skin prick test.

Skin testing

Skin prick test (SPT) was performed with 6 grass pollens, 6 tree pollens, 5 weed pollens, 4 cereals pollens, 3 animal danders and 2 house dust mites. Histamine, 10 mg/ml, and saline solution were used as positive and negative controls. These were applied using the prick method of Pepys.¹³ The skin was pricked with a Stallerpoint needle (Stallergenes, France). SPT wheals were recorded after 20 min-

utes and a resulting wheal with a mean diameter of 5 mm or more was taken as a positive reaction.

Statistical analysis

Statistical analyses were done using the Statistical Package for the Social Sciences (SPSS, 9.0 version). Results are expressed as the percentage of positive responses to each question. The Chi-square test was used to detect differences between groups and a *p* value of less than 0.05 was considered significant. The data were further evaluated by multivariate analysis, using a logistic regression model. Odds ratios and 95% confidence levels were calculated.¹⁴

RESULTS

Of the 1,366 students, aged 13-18 years, who participated in the study, 50.3% (687) were male (mean age 15.6 ± 1.63 years) and 49.7% (679) were female (mean age 15.32 ± 1.57 years). The prevalences of wheezing (Q1), wheezing associated with shortness of breath (Q1-1), wheezing without cold (Q1-2), nocturnal awaking with tightness of chest (Q2), nocturnal awaking with shortness of breath (Q3), nocturnal awaking with cough (Q4) and asthma attack in the last year (Q6) are shown in Table 1.

The cumulative prevalence of the questionnaire-based asthma was 7.46%. The last 12 month prevalence of asthma was 3.9%. The cumulative prevalences of rhinoconjunctivitis and atopic dermatitis were 8.1% and 3.5%, respectively. During the last two weeks 23 students (16 male, 7 female) had received anti-asthmatic treatment. A family history of allergic diseases was found in 11.7%. The

smoking rate was 19.4% in all students, 26.6% in boys and 12.1% in girls. The association of asthma and asthma-like symptoms with the smoking status is shown in Table 2.

Asthma and asthma-like symptoms were found to be significantly more prevalent among students who smoked. In the second stage of the study SPT and physical

examination were done on 121 students. A positive SPT reaction to at least one allergen was found in 15.7% of the students. Cereal and grass pollens positivity were found

Table 1 The prevalence of asthma-like symptoms and asthma attack

	Boys (%)	Girls (%)	CI (95%)
Q1	105 (15.3)	62 (9.1)	0.941-2.832
Q1-1	62 (9.0)	36 (5.3)	0.503-1.905
Q1-2	49 (7.1)	23 (3.4)	0.815-3.152
Q2	60 (8.8)	46 (6.8)	0.783-1.890
Q3	42 (6.1)	45 (6.6)	0.436-1.160
Q4	146 (21.3)	137 (20.2)	0.666-1.185
Q6	28 (4.1)	25 (3.7)	0.878-3.423

Table 2 The prevalence of asthma attack and asthma-like symptoms and odds ratios with 95% confidence intervals of smokers and non-smokers

	Smoker (%)	Non-smoker (%)	OR	CI (95%)	p
Q1	75 (28.3)	92 (8.4)	2.816	1.584-4.985	0.0004*
Q1-1	52 (19.1)	46 (4.6)	2.0159	1.033-3.931	0.039*
Q1-2	30 (11.4)	42 (3.8)	0.684	0.343-1.362	0.279
Q2	38 (14.4)	68 (6.2)	1.385	0.843-2.227	0.198
Q3	37 (14.0)	50 (4.6)	1.843	1.145-3.261	0.013*
Q4	80 (30.2)	203 (18.5)	1.110	0.779-1.583	0.561
Q6	7(2.7)	15 (1.4)	1.569	0.768-3.205	0.215

*p < 0.05, significant difference between smoker and non-smoker students

Table 3 Multiple regression models for positive SPT

Covariables	Positive SPT for at least one allergen		
	Regression coefficient	SE	p value
Smokers	0.3011	0.2807	0.2
Atopy	0.9063	0.2589	0.01

Table 4 Prevalence (%) of positive replies to asthma questionnaires at different centers*

Centers	Q1	Q1-1	Q1-2	Q3	Q4	Q4	Q7	Q8
Afyon, Turkey	12.2	7.2	5.3	6.4	20.8	3.9	3.6	8.1
Mumbai, India	4.1	3.0	2.0	6.8	6.8	2.6	2.8	10.1
Göteborg, Sweden	23.2	12.3	13.5	7.1	28.2	3.1	4.8	10.1
Hamburg, Germany	21.1	8.0	13.5	5.0	25.8	3.0	3.4	23.0
Cambridge, UK	25.2	13.9	17.7	8.4	27.4	5.7	6.8	29.2
Paris, France	14.2	9.3	9.0	4.7	26.0	4.3	3.2	30.3
Barcelona, Spain	19.2	5.6	11.0	4.6	28.2	2.1	2.1	13.1
Athens, Greece	16.0	9.4	9.8	17.8	17.8	2.4	2.2	18.4
Wellington, N. Zealand	27.3	16.0	18.0	10.4	31.2	8.6	9.8	36.6
Melbourne, Australia	28.8	16.1	20.7	20.7	28.5	9.7	9.3	40.9
Portland, USA	25.7	10.5	14.9	7.7	32.5	5.8	4.8	39.4
Algiers, Algeria	4.2	3.3	2.8	4.4	6.0	2.4	2.5	9.5

*Adapted from reference 23

most common at 35.3% and 29.4% in our study. Skin prick test positivity against house dust mite and mixture of feather were found at 23.5% and 11.7%. SPT positivity was 11.1% in symptomless students, 20.3% in asthmatic students. Eleven (9.1%) students reported either rhinoconjunctivitis, rhinitis or both. Six (54.5%) of eleven students were sensitized to at least one allergen.

In analysis of logistic regression, a history of atopy, as ascertained in the questionnaire, was seen to be significantly correlated with SPT positivity ($p = 0.012$) (Table 3).

DISCUSSION

Genetic and environmental factors may account for the difference in the prevalence of asthma and other atopic diseases between ethnic groups. Atopic sensitization becomes increasingly frequent with the length of stay in a new envi-

ronment.^{15,16} Potential risk factors were evaluated, which had shown an association with childhood asthma and other atopic diseases in previous studies: a positive family history of atopy,¹⁷ fewer siblings,¹⁸ exposure to environmental tobacco smoke, low socioeconomic status,¹⁹ poor housing conditions,²⁰ pet ownership²¹ and low birth-weight.²² In the present study, we found that atopy and tobacco smoking were independent risk factors for symptom development. Comparisons of our results with those of other selected European Community Respiratory Health Survey (ECRHS) centers are shown in Table 4.

Comparison of our results with the prevalence of asthma symptoms in other centers shows that the prevalence of some asthma symptoms are higher in Afyon than India²³ and Algeria, whereas they were lower in the remaining centers.

Most studies that have de-

termined the prevalence of asthma symptoms by using the same methodology in the same community at different times have reported that asthma prevalence has increased in recent decades.^{24,25} In 1996, a study conducted by the International Study of Asthma and Allergy in Childhood (ISAAC) method reported the cumulative asthma prevalence as 12.9%, in Afyon. This is higher than our results. The discrepancy may be due to the difference in methodology of the studies.

A nation-wide epidemiological study including an ISAAC-based questionnaire was conducted among 46,812 children aged 0-17 years residing in 27 provinces in Turkey in 1996, and the lifetime and current (within the last 12 months) prevalence of asthma were 14.7 and 2.8%, respectively.²⁶ In 951 students from Trabzon (coastal city) aged 6-14 years in 1995 the ECRHS was used to screen these students. Prevalence of asthma, physician diagnosis asthma and

cumulative prevalence of asthma were 7.5%, 4.1 and 8.5%, respectively. Atopic family history was reported by 64%, and skin reactivity to house dust mite was found in 48.2%.²⁷ Cereal and grass pollens were found most common at 35.3% and 29.4% in our study.

Air pollution in urban areas, a low rate of indoor contact with pet animals and changing dietary habits might be partially responsible for the different prevalence rates reported in various studies. The house dust mite fauna is also variable in different regions, with the highest rate reported in samples from northern Turkey which may play a role in promoting allergic disorders.²⁸ A multicenter nationwide survey among adult asthmatics revealed that mite sensitivity with skin prick testing was also two-fold higher in patients living in coastal areas than in those living inland.²⁹ The rate of SPT positivity against mites were found to be significantly lower in Afyon than the rate of SPT positivity in Trabzon. Our finding may be due to the high altitude (1,012 m) of Afyon city, resulting in a low level of humidity.

In another study in Ankara, 1,056 subjects were screened in a two staged study according to the ECRHS protocol. The prevalence of current asthma was found 3% in the first step, and increased to 7% in the second step after the clinical examination.³⁰ When bronchial asthma prevalence was compared among cities in Turkey, the prevalence in Afyon was lower than Ankara,³⁰ and higher than Adana³¹ and region of Aegean.³²

In conclusion, in our study, the rate of self-reported asthma

and/or asthma-like symptoms was found to be lower than in other countries.

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