

Prevalence of Asthma, Asthma-Like and Allergic Symptoms in the Urban and Rural Adult Population in Eastern Turkey

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In spite of a better understanding of the pathophysiology of asthma as well as the emergence of new and more successful therapeutic modalities, the recent studies have shown that prevalence, mortality and morbidity of asthma are gradually increasing worldwide.¹⁻³ The prevalence of asthma may not only vary among countries but also among different regions of any particular country.^{2,4}

Asthma is one of the major problems of public health in Turkey as it is all over the world. There is considerably more research done on children than on adults in Turkey. Of these studies, which have focused on adult groups, most have been conducted in the Central and Western regions of the country. Virtually no research has been done in Eastern Turkey.⁵ The aim of this study was to determine the prevalence rates for asthma, asthma-like and allergic symptoms, in adults who live in the urban and rural areas of Elazig Region in Eastern Turkey.

MATERIALS AND METHODS

The study was conducted in adults who lived in the urban and rural areas of the Elazig Region in Eastern Turkey. The rural and urban populations of this city were approximately 80,000 and 250,000,

SUMMARY There is no study assessing the prevalence rates for asthma, asthma-like symptoms, and allergic symptoms in Eastern Turkey. In this study, we investigated these rates in the urban and rural adult population of Elazig Region in Eastern Turkey. A questionnaire was prepared based on the standard inquiry form of the European Community Respiratory Health Survey. The survey included 3,591 consented adults who were randomly selected. Each questionnaire was interviewed face-to-face by a physician. It was found that the cumulative prevalence rates of asthma and asthma-like symptoms of the rural and the urban respondent groups were 29.6% and 25.8%, respectively. The periodic prevalence rates of the same symptoms were 27.3% and 19.3%, respectively. The percentages of the patients living in rural and urban areas diagnosed as asthma by a physician were 5.5% and 3.1%, respectively. The proportions of patients with a history of at least one allergic disorder were 36.4% and 23.7% in the rural and urban groups, respectively. Asthma and asthma-like symptoms in patients with allergic rhinoconjunctivitis were significantly higher than those without ($p < 0.01$). The cumulative rates of a previous diagnosis of asthma among respondents with a history of asthma-like symptoms were 18.4% in the rural and 11.2% in the urban groups ($p < 0.05$). Among those who had had periodic asthma-like symptoms, the rural and urban rates of previous asthma diagnosis were 18.6% and 14.3%, respectively ($p < 0.01$). Unexpectedly, the prevalence rates for asthma, asthma-like and allergic symptoms in adults living in the rural areas of Elazig Region in Eastern Turkey were significantly higher than the rates in the urban population.

respectively. A study population of 3,800 adults (1,200 from the rural, 2,600 from the urban regions) was randomly selected from the archives of 35 primary health care centers. Of these 3,800, 3,591 individuals (2,469 urban and 1,122 rural) were enrolled in the study after having consented to participate in the research.

A questionnaire was prepared by using the standard "European Community Respiratory Health Survey"⁶ as a model, and adding questions about socio-economic status and smoking habits. Each in-

dividual was interviewed face-to-face by a general practitioner (the physicians working at the primary health care centers of the Region Health Authority), who was previously trained concerning the questionnaire. The overall response rate was 94.5% (94.96% in the urban group and 93.5% in the rural group).

Among the questions in the context, wheezing, and/or dyspnea were accepted as "asthma-like symp-

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toms".⁷ Some specific epidemiological definitions were used for this research. "Cumulative prevalence" refers to the percentage of individuals who reported having had asthma-like symptoms at least once in their lifetime. "Periodic prevalence" in our study refers to the number of the persons who had asthma-like symptoms at least once in the last 12 months.

The data were analysed by using the statistical software program SPSS 8.0 for Windows. In the rural and urban groupings, each parameter was analysed for the overall group, and for the male and female respondents separately. The χ^2 test was used for comparisons, and $p < 0.05$ was considered to indicate statistical significance.

RESULTS

For this research, we successfully contacted and interviewed 2,469 (94.5%) of the selected 2,600 urban individuals and 1,122 (93.5%) of the selected 1,200 rural individuals. The urban group consisted of 1,374 (56%) females (aged 36.28 ± 12.26 years), and 1,095 (44%) males (aged 40.36 ± 12.1 years). The rural group consisted of 555 (49%) females

(37.31 ± 15.37) and 567 (51%) males (37.82 ± 13.63). Wheezing and dyspnea were accepted as asthma-like symptoms. This cumulative prevalence was 25.8% in the urban and 29.6% in the rural respondent groups. The periodic prevalence of these symptoms was 19.3% in the urban and 27.3% in the rural respondent groups. A proportion of 12.6% of the urban and 19.8% of the rural group reported that they developed wheezing without a common cold, and 15.7% of urban and 22.7% of rural respondents reported that they developed both wheezing and dyspnea. The cumulative prevalence for asthma-like symptoms was significantly higher in the rural than the urban group ($p < 0.05$). When the groups were divided according to sex, the rural males had a significantly higher rate of asthma and asthma-like symptoms than the urban males ($p < 0.01$). However, the prevalence rates in urban and rural females were similar ($p > 0.05$). Regarding periodic prevalence, the analysis of the geographic groups and of females and males deliberately showed significantly higher rates of these symptoms in the rural respondents in comparison with the urban respondents ($p < 0.001$) (Tables 1).

The findings for nocturnal attacks that awoke the individual (i.e., a sense of compression in the chest, dyspnea, coughing) showed that the rural respondents were affected significantly more frequently than those in the urban group ($p < 0.05$). The rates for those having an asthma attacks within 12 months prior to the survey, using asthma drugs and previously diagnosed for asthma by a physician were all significantly higher in the rural group as a whole, as well as males and females in rural compared to their urban counterparts ($p < 0.05$) (Table 2).

The cumulative prevalence of allergic symptoms in their medical histories was significantly higher in the rural than the urban group ($p < 0.05$). The specific symptoms of allergic rhinoconjunctivitis and rashes were approximately twice as frequent in rural individuals, and were the most common symptoms described by both the urban and rural respondents (Table 3).

Examining familial data we found that the proportions of respondents with close (first-degree) relatives who had any type of aller-

Table 1 The cumulative and periodic prevalence findings for asthma and asthma-like symptoms

	Location		Female		Male		Total	
	n	%	n	%	n	%	n	%
Cumulative prevalence	Rural		172	31.0	160	28.2	332	29.6
	Urban		393	28.6	243	22.2	636	25.8
χ^2 test			$p = 0.296$		$p = 0.006$		$p = 0.016$	
Periodic prevalence	Rural		163	29.4	143	25.2	306	27.3
	Urban		282	20.5	194	17.7	476	19.3
χ^2 test			$p = 0.0001$		$p = 0.0001$		$p = 0.0001$	
Wheezing without a cold*	Rural		114	20.5	108	19.0	222	19.8
	Urban		183	13.3	127	11.6	310	12.6
χ^2 test			$p = 0.0001$		$p = 0.0001$		$p = 0.0001$	
Wheezing + dyspnea*	Rural		135	24.3	120	21.2	255	22.7
	Urban		248	18.0	140	12.8	388	15.7
χ^2 test			$p = 0.0018$		$p = 0.0001$		$p = 0.0001$	

*The periodic prevalence findings for wheezing and features related to wheezing

Table 2 Some clinical features of the subjects who had asthma and asthma-like symptoms

	Location		Female		Male		Total	
	Rural	Urban	n	%	n	%	n	%
Chest tightness	Rural	Urban	134	24.1	108	19.1	242	21.6
			270	19.7	175	16.0	445	18.0
χ^2 test			$p = 0.028$		$p = 0.115$		$p = 0.012$	
Nocturnal dyspnea	Rural	Urban	120	21.6	108	19.0	228	20.3
			209	15.2	135	12.3	344	13.9
χ^2 test			$p = 0.0007$		$p = 0.0002$		$p = 0.0001$	
Nocturnal coughing	Rural	Urban	179	32.3	164	28.9	343	30.6
			378	27.5	252	23.0	630	25.5
χ^2 test			$p = 0.0375$		$p = 0.0084$		$p = 0.0016$	
Asthma attack in the last 12 months	Rural	Urban	26	4.7	27	4.8	53	4.7
			37	2.7	16	1.5	53	2.1
χ^2 test			$p = 0.0259$		$p = 0.0001$		$p = 0.0001$	
Use of asthma drugs	Rural	Urban	42	7.6	40	7.1	82	7.3
			48	3.5	29	2.6	77	3.1
χ^2 test			$p = 0.0001$		$p = 0.0001$		$p = 0.0001$	
Previously diagnosed asthma	Rural	Urban	37	6.7	25	4.4	62	5.5
			47	3.4	30	2.7	77	3.1
χ^2 test			$p = 0.0016$		$p = 0.0713$		$p = 0.0005$	

Table 3 Allergy-related findings in the respondents

	Female				Male				Total			
	Rural		Urban		Rural		Urban		Rural		Urban	
	n	%	n	%	n	%	n	%	n	%	n	%
Any kind of allergy	213	38.4	353	25.7	195	34.4	232	21.2	408	36.4	585	23.7
Allergic rhinoconjunctivitis	105	18.9	121	8.8	85	15.0	84	7.7	190	16.9	205	8.3
Perennial catarrh	32	5.8	54	3.9	30	5.3	43	3.9	62	5.5	97	3.9
Rashes	55	9.9	91	6.6	65	11.5	73	6.7	120	10.7	164	6.6
Eczema	32	5.8	69	5.0	29	5.1	54	4.9	61	5.4	123	5.0
Bee-sting allergies	46	8.3	53	3.9	45	7.9	46	4.2	91	8.1	99	4.0
Allergies from foods	57	10.3	110	8.0	49	8.6	49	4.5	106	9.4	159	6.4
Allergies from drugs	50	9.0	77	5.6	32	5.6	31	2.8	82	7.3	108	4.4

gy were 10.3% in the urban and 8.9% in the rural group. The same proportions for second-degree relatives were 0.4% and 0%, respectively. In the subjects who had close relatives (first-degree) with any type of allergies, the relatives (urban and rural) the most often affected were their children (Table 4).

Table 5 shows the cumula-

tive and periodic prevalence rates for asthma and asthma-like symptoms in both urban and rural smokers and non-smokers. In the urban women, the rates of asthma and asthma-like symptoms, cumulative and periodic, in smokers were significantly higher than the rates in non-smokers ($p < 0.01$). On the other hand, the opposite results were obtained for the rural women ($p < 0.01$). In the males there were

no significant differences between the cumulative and periodic rates observed in smokers and non-smokers in either environment ($p > 0.05$). Considering the study group as a whole, we found no significant differences in the cumulative and periodic prevalence rates both between the urban smokers and non-smokers and between the rural smokers and non-smokers (for the each party: $p > 0.05$).

Table 4 Allergy findings listed according to relationships

Relationship	Research group											
	Female				Male				Total			
	Rural		Urban		Rural		Urban		Rural	Urban		
	n	%	n	%	n	%	n	%	n	%		
Mother	15	2.7	42	3.1	17	3.0	37	3.4	32	2.9	79	3.2
Father	14	2.5	38	2.8	14	2.5	19	1.7	28	2.5	57	2.3
Child	22	4.0	81	5.9	12	2.1	51	4.7	34	3.0	132	5.3
Sibling	3	0.5	31	2.3	10	1.8	14	1.3	13	1.2	45	1.8
Allergic first relative	48	8.6	159	11.6	52	9.2	96	8.8	100	8.9	255	10.3
Allergic second relative	0	0.0	4	0.3	0	0.0	6	0.5	0	0.0	10	0.4

Table 5 Smoking and asthma-like symptoms

Smoking	Cumulative prevalence						Periodic prevalence						
	Female		Male		Total		Female		Male		Total		
	n	%	n	%	n	%	n	%	n	%	n	%	
Urban	Smokers	126	34.1	154	21.0	280	25.4	93	25.2	122	16.6	215	19.5
	Non-smokers	267	26.6	89	24.6	356	26.0	189	18.8	72	19.9	261	19.1
Rural	Smokers	31	23.7	96	28.7	127	27.3	28	21.4	86	25.7	114	24.5
	Non-smokers	141	33.3	64	27.6	205	31.3	135	31.8	57	24.6	192	29.3

When the urban group was classified according to monthly income levels, the results showed that the income level did not cause significant differences in the cumulative and periodic prevalence rates for asthma and asthma-like symptoms in the females, males, or the group as a whole (for the each group: $p > 0.05$). However, since it was not possible to determine the monthly income levels in the rural respondents due to unpredictability of the income, we were unable to classify this group for analysis.

Compared to those having not any type of allergy history, respondents with allergy history had significantly higher cumulative and periodic prevalence rates for asthma-like symptoms. This was true for

urban and rural females, males, and in the study population as a whole (for each of them: $p < 0.001$). The prevalence of cumulative and periodic asthma and asthma-like symptoms were also significantly higher in both rural and urban population with allergic rhinoconjunctivitis ($p < 0.01$)

Table 6 shows the rates of previous asthma diagnosis in the subjects who had asthma-like symptoms in different periods (cumulative or periodic). In either sex and as a whole in the rural and urban groups, the rates of previous asthma diagnosis were statistically higher in those who had asthma-like symptoms as both cumulative and periodic (for each of them: $p < 0.001$).

DISCUSSION

It is known that the prevalence of asthma is higher in children than in adults. In addition, the prevalence of asthma is increasing in all age groups worldwide. This increase was documented in many countries such as the United States, New Zealand, the Scandinavian countries, Finland, France, Tahiti, the Czech Republic, Australia, Spain and the United Kingdom among other regions.^{3,8} The studies that investigated the prevalence of asthma-like symptoms in various countries revealed extremely wide variations by country and geography. Differences in living conditions, air and other types of environmental pollution, smoking, diet, and as-yet-unidentified genetic fac-

Table 6 The frequency of previous asthma diagnosis in respondents with asthma-like symptoms

	Previously diagnosed with Asthma														
	Female					Male					Total				
	Rural		Urban		χ^2 test	Rural		Urban		χ^2 test	Rural		Urban		χ^2 test
	n	%	n	%		n	%	n	%		n	%	n	%	
Cumulative prevalence	36	20.9	42	10.7	$p = 0.0012$	25	15.6	29	11.9	$p = 0.2872$	61	18.4	71	11.2	$p = 0.0019$
Periodic prevalence	33	20.2	40	14.2	$p = 0.0962$	24	16.8	28	14.4	$p = 0.5550$	57	18.6	68	14.3	$p = 0.1059$

tors may all contribute to these discrepancies.^{2,4,5}

Data from 1994 indicate that the prevalence of asthma in American adults is 5-6%. The European Community Respiratory Health Survey, which investigated asthma in 1995, reported the prevalence rates of periodic asthma in young and middle-aged adults as 4.2% in Algeria, 8.5% in Italy, 29.8% in the United Kingdom, 32% in the Republic of Ireland, 28.8% in Australia, 27.3% in New Zealand, and 27.5% in the American state of Oregon.^{2,4} Most epidemiological investigations on asthma done in Turkey are recent, and have focused mainly on children. The majority of the studies on Turkish adults has been conducted in Central and West Turkey.⁵ The present study is the first to report on asthma in adults in Eastern Turkey.

The first of the asthma prevalence studies done on Turks was conducted on Turkish immigrants in Stockholm, Sweden in 1990. It is noteworthy that, although the cumulative prevalence based on the information submitted by subjects on the survey form was 6.4%, the rate in the same group as determined by the physician after a personal interview was 15.5%. These researchers have emphasized that filling in the survey form after

imparting necessary information in a face-to-face interview is the method that should be preferred to achieve more accurate results. According to this method, the pre- and post-interview values of rhinoconjunctivitis, eczema and rashes varied from 15.4% to 22.5%, 13.8% to 26.8% and 3.9% to 16.8%, respectively.⁹

In an investigation done in Turkey in 1991 and 1992, Kalyoncu *et al.*¹⁰ determined that asthmatics living in the coastal regions had twice the mite sensitivity level observed in asthmatics living in the central or eastern regions. They also found that asthmatic individuals in Eastern Turkey had a significantly lower pollen sensitivity than asthmatics in all other regions of the country.

In 1992, Vermeire and colleagues¹¹ studied the prevalence of asthma in immigrant Turks in Belgium. The reported rates were 5.8% in males and 14.5% in females, which are significantly higher than the rates in native Belgians. Interestingly, the authors also stated that the frequency of asthma in immigrant Turks who had lived in Belgium for 18 years or more was 15.11%, while the rate in those who had lived there for less than 18 years was 5.8% ($p < 0.001$).

A study in 1999 done on 9- to 11-year-old Turkish children living in Germany revealed the prevalence rates of asthma (5.3%), atopy (24.7%) and bronchial hyperresponsiveness (3.9%) which were significantly lower than the rates in German children.¹²

In 1994 and 1995, Kalyoncu and co-workers¹³ reported that the prevalence rates of wheezing as well as simultaneous wheezing and dyspnea in newly registered students (mean age 18.5 ± 2.1 years) at Hacettepe University were 4.8% and 2.2%, respectively. They also found the rate of smoking in this study group to be 5.5%. Another research done in Turkey's capital city (Ankara) in 1994 revealed that the cumulative and current prevalence rates of wheezing were 39.1% and 21.7%, respectively.¹⁴

Examining the situation in Istanbul in 1995, Erkan *et al.*¹⁵ reported prevalence rates for wheezing and for awakening due to shortness of breath as 6.8% and 21.7%, respectively. One more recent research has revealed current wheezing rates of 22.7% for university students in Kocaeli (in Western Turkey) and 16.21% for 1,388 housewives in Sivas (in Central Turkey), with a 4.1% frequency of previous asthma diagnosis in the latter group.⁵

A study conducted in the year 2000 on 300 asthma patients in Ankara showed that atopy was diagnosed in 85%, 57%, 56%, and 10% of those with mild-intermittent, mild-persistent, moderate, and severe disease, respectively.¹⁶ The authors also recorded the sensitivity to analgesics to be 7%, 10%, 6%, and 31% in the same respective groups. Another investigation on first year students at the university in Eskisehir (a city in West Anatolia) in 2000 revealed prevalence rates for asthma-like symptoms, rhinoconjunctivitis, and dermatitis of 17.0%, 10.0%, and 5.9%, respectively.¹⁷ This article also noted that asthma and asthma-like symptoms were significantly more prevalent in the students who smoke.

In the present study, it was found that the periodic prevalence for asthma and asthma-like symptoms was significantly lower in the people living in the urban areas than in the rural residents in both gender groups and as a whole. The cumulative prevalence rates for asthma and asthma-like symptoms were significantly higher in the rural than in the urban male and in the rural group as a whole but did not differ between the rural and urban female.

It is known that air pollution is a triggering factor of asthma and asthma-like symptoms. However, rural areas of Elazig Region have a relatively clean environment and free of pollution. In spite of this advantage, we believe that the higher prevalence of asthma and asthma-like symptoms in this area is due to the inconvenient living conditions such as poor labour conditions in hard climate, necessity of living in inconvenient shelters and genetic tendency for atopy. Moreover, the prevalence rates for atopy and atopic symptoms are significantly higher in rural areas than the urban areas. The prevalence rates

for previously diagnosed asthma was also higher (nearly double) in the rural group compared to the urban group. Thus, a genetic tendency for atopy may also play a role for this discrepancy. These data indicate that the rates of the rural areas are concordant.

The frequency of previously diagnosed asthma was 3.1% in urban and 5.5% in rural population. These values, in spite of being higher in rural population, are similar to the general rates for the whole Turkish population. The prevalence for previously diagnosed asthma of subjects with positive history of asthmatic symptoms was significantly higher than that of the general population. Therefore, real frequency of asthma might be even higher.

Children constitute the highest part of the relatives suffering from allergic symptoms both in the rural and the urban groups. This may be a reflection for an increase of prevalence rates for atopic symptoms in the young generation.

Our data did not support the general belief that smoking increases asthma and asthma-like symptoms except for female urban smokers. However, we note that some asthmatics in the general population may be passive smokers. It is known that passive smoking may affect a wide range of the population due to the widely popular cafe-habit of the population in the region.

Some argue that an increase in income is directly proportional to an increase in asthmatic symptom frequency. But according to our results, we found no significant correlations between income level and cumulative or periodic prevalence rates for asthma-like symptoms.

The periodic and cumulative prevalences for asthma and asthma-like symptoms were significantly higher in allergic subjects than in non-allergic ones, both in the rural and urban populations. The same argument was also true for allergic rhinoconjunctivitis.

Although the role of heredity is denoted for asthma and atopy, environmental factors are known to be the main determinants for clinical symptoms. It is widely accepted that the prevalence of asthma is higher in urban environments than in rural regions.¹⁸ Whereas, our results interestingly showed that the rates of a previous asthma diagnosis by a doctor as well as allergic symptoms were significantly higher in the rural area of the Elazig Region in Eastern Turkey.

ACKNOWLEDGEMENTS

The authors would like to thank the Elazig Health Authority both for the financial support and providing the physicians participating in the study, and Prof. Dr. A. Fuat Kalyoncu (Hacettepe University; Medical School-Department of Chest Diseases) for his valuable support.

REFERENCES

1. Gautier V, Redier H, Pujol JL, *et al.* Comparison of an expert system with other clinical scores for the evaluation of severity of asthma. *Eur Res J* 1996; 9: 58-64.
2. Wiesch DG, Samet JM. Epidemiology and natural history of asthma. In Middleton E, Reed CE, Ellis EF, Adkinson F, Yunginger JW, Busse WW. eds. *Allergy: Principles and Practice*. USA, Mosby, 1998: 799-815.
3. Sly RM. Changing prevalence of allergic rhinitis and asthma. *Ann Allergy Asthma Immunol* 1999; 82: 233-52.
4. European Community Respiratory Health Survey. Variations in the prevalence of respiratory symptoms, self-reported asthma attacks, and use of asthma medication in the European Community Respiratory Health Survey (ECRHS). *Eur Respir J* 1996; 9: 687-95.

5. Kalyoncu AF, Selcuk ZT, Cöplü L. Epidemiologic studies of adult bronchial asthma in Turkey. *Respir Med* 1997; 91: 461-3.
6. Burney PGJ, Luczynska C, Chinn S, Jarvis D. The European Community Respiratory Health Survey. *Eur Respir J* 1994; 7: 954-80.
7. Global Strategy for Asthma Management and Prevention. NHLBI/WHO Workshop Report. 1995.
8. Vondra V, Reisova M. The prevalence of bronchial asthma is increasing and mortality varies. *Cas Lek Cesk*. 1996; 135: 471-6.
9. Kalyoncu AF, Stalenheim G. Survey on the allergic status in a Turkish population in Sweden. *Allergol Immunopathol* 1993; 21: 11-4.
10. Kalyoncu AF, Coplu L, Emri AS, *et al*. Survey of the allergic status of patients with bronchial asthma in Turkey: A multicenter study. *Allergy* 1995; 50: 451-5.
11. Vermeire P, van Hoof K, Willeman M, *et al*. Duration since immigration and reporting of asthma symptoms among young adults of Turkish nationality in Antwerp. European Respiratory Society Annual Congress, Neice, France. 1994. *Eur Respir J* 1994; (Suppl 18): 377.
12. Kabesch M, Schaal W, Nicolai T, von Mutius E. Lower prevalence of asthma and atopy in Turkish children living in Germany. *Eur Respir J* 1999; 13: 577-82.
13. Kalyoncu AF, Karakoca Y, Demir AU, *et al*. Prevalence of asthma and allergic disease in Turkish university students in Ankara. XVI. European Congress of Allergology and Clinical Immunology. Madrid, Spain, 1995. *Allergy* 1995; 50: 161.
14. Saraclar Y, Cetinkaya F, Tuncer A. The prevalence of self-reported asthma and respiratory symptoms in Ankara-Turkey. *Respir Med* 1997; 91: 461-3.
15. Erkan F, Dortbudak Z. Asthma and asthma-like symptoms prevalence in Istanbul, Turkey. *Eur Respir J* 1996; 9: 354-5.
16. Bavbek S, Celik G, Ediger D, Mungan D, Sin B, Demirel YS, Misirligil Z. Severity and associated risk factors in adult asthma patients in Turkey. *Ann Allergy Asthma Immunol* 2000; 85: 134-9.
17. Ozdemir N, Ucgun I, Metintas S, Kolsuz M, Metintas M. The prevalence of asthma and allergy among university freshmen in Eskischir, Turkey. *Respir Med* 2000; 94: 536-41.
18. Burney P. Epidemiology of asthma. *Allergy* 1993; 48: 17-21.