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Asthma-like symptoms prevalence in five Turkish urban centers

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ABSTRACT

Background: Asthma, which is a chronic inflammatory disorder of the airways characterized by the infiltration of inflammatory cells, is a common cause of morbidity in adults. It is almost the third leading cause of preventable hospitalization in the developed countries and accounts for approximately millions of visits to emergency departments.

Methods: In this study, we aimed to determine asthma prevalence in five urban centers in Turkey. Three of the cities were located in the middle-west region of the Anatolia one of them as located across the Mediterranean cost and the last one was in the north part of the country. Data of totally 2353 participants was collected by the trained interviewers, who visited the households and administered the questionnaire to the household members at or over the age of 15 years.

Results: The prevalence of asthma was found to be 6.6 % and the difference of asthma prevalence between the urban centers was statistically non-significant (p = 0.059).

Key words: Asthma. Turkey. Prevalence.

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INTRODUCTION

Asthma is a chronic inflammatory disorder of the airways characterized by the infiltration of inflammatory cells, including mast cells, eosinophils, and lymphocytes[1,2].

There is an epidemic of asthma affecting approximately 4 % to 5 % of people in developed nations[3]. In United States, 20.1 million individuals are affected due to asthma and 6.3 million of them are children[2]. There are differences in the prevalence of asthma in different regions of the world, both between countries and between different regions within countries. There are many clinical studies in our country, but most of them are conducted in single city, in single center. For example in a study from Adana, the life long cumulative prevalence of asthma was found to be 4.2 % among parents of school-children[4]. Prevalence rates of asthma were found as 5.1 % in Kayseri, 2.1 % in Gaziantep in different studies using different methodologies[5,6].

Asthma mortality nearly doubled between 1980 and 1993 (17 and 32 asthma deaths per one million population, respectively. More than 5.500 people die from asthma every year[7]). The economic impact of asthma is enormous, approaching three billion US $ annually. This encompasses only direct costs, of approximately 47 %, which associated with hospitalization[8]. Asthma is the third leading cause of preventable hospitalization in the United States and accounts for approximately two million visits to emergency departments[7].

Prevention strategies should be prioritized for either reducing the prevalence of the disease or early

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diagnosis-treatment. At this point, cross-sectional studies in order to determine the prevalence of the disease play an important role for developing these kinds of strategies.

In this study, we aimed to determine asthma prevalence in five urban centers in Turkey.

Three of the cities were located in the middle-west region of the Anatolian; one of them located across the Mediterranean cost and the last one was in the north part of the country.

MATERIAL AND METHODS

The data of this study is a part of a representative sample of adult population of Turkey as a part of the first National Fluid and Food Consumption Survey. This community-based survey was intended to reveal the general health status of a representative Turkish population. Study population of this survey was selected by State Institute of Statistics through a multistage stratified clustered sampling. In the first stage of sampling 13 urban centers were systematically selected from 81 cities in five regions of Turkey, which were formed according to the ambient temperature, humidity and altitude of the cities. In the second stage of sampling, clusters of blocks were systematically selected in each city, from 3 groups, which were formed according to the socioeconomic status. In the third stage 3000 households were systematically selected from the blocks as the final sampling unit. Number of household from each urban center was determined according to the population of the urban center.

In this study, asthma prevalence was presented for five out of these 13 urban centers. In these five cities 930 households (with 2353 inhabitants), which were determined according to State Institute of Statistics sampling, were visited. The study will be extended to the rest of selected cities in recent future. Three of the cities were located in the middle part of the Anatolian region; the fourth city was in the northern Anatolian and the fifth one was in the south part of Turkey (fig. 1). Among these cities, air pollution is worst in Kütahya and smoking is highest in Eskişehir.

Data was collected under the supervision of field coordinators by the trained interviewers, who visited the households and administered the questionnaire to the household members at or over the age of 15 years. Two major research initiatives, the Eurpopean Community Respiratory Health Survey (ECRHS) and International Study of Asthma and Allergies in Childhood (ISAAC) have developed and executed standardized protocols for the assessment of disease prevalence. The questions of the questionnaire on respiratory and allergic symptoms were based on the questionnaire used in the ECRH[9]. It has included information on socio-demographic characteristics (age, sex, marital status, level of education, and income), smoking behavior (smoking status, age

Figure 1.—Five cities where the research was conducted (❖).

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Table I

Socio-demographic characteristics of the participants (Five urban centers, 2002)

	Kütahya n (%)	Eskişehir n (%)	Mersin n (%)	Aksaray n (%)	Sakarya n (%)	Total n (%)	p
Gender							0.370
Male	246 (47.6)	221 (45.1)	273 (50.5)	179 (44.6)	189 (46.8)	1108 (47.2)	
Female	271 (52.4)	269 (54.9)	268 (49.5)	222 (55.4)	215 (53.2)	1245 (52.8)	
Total	517	490	541	401	404	2353	
Age groups							0.000
15-19	57 (11.0)	44 (9.0)	78 (14.4)	46 (11.5)	41 (10.1)	266 (11.3)	
20-29	110 (21.3)	89 (18.2)	134 (24.8)	92 (22.9)	82 (20.3)	507 (21.5)	
30-39	85 (16.4)	89 (18.2)	114 (21.1)	85 (21.2)	84 (20.8)	457 (19.4)	
40-49	98 (19.0)	95 (19.4)	89 (16.5)	68 (17.0)	74 (18.3)	424 (18.0)	
50-59	67 (13.0)	76 (15.5)	78 (14.4)	46 (11.5)	41 (10.1)	308 (13.1)	
60-64	38 (7.4)	28 (5.7)	20 (3.7)	29 (7.2)	21 (5.2)	136 (5.8)	
65 and older	62 (12.0)	69 (14.1)	28 (5.2)	35 (8.7)	61 (15.1)	255 (10.8)	
Total	517	490	541	401	404	2353	
Mean (± ss)	*41.1 (± 17.8)*	*42.8 (± 17.6)*	*36.9 (± 15.7)*	*39.5 (± 19.6)*	*41.7 (± 17.9)*	*40.3 (± 17.3)*	
Median	40	42	34	37	39	38	
Min-max	15-92	15-88	15-91	15-90	15-82	15-92	
The last school graduated							0.000
Illiterate/literate	35 (6.8)	40 (8.2)	50 (9.3)	64 (16.1)	31 (7.7)	220 (9.4)	
Primary	270 (52.4)	225 (46.1)	237 (44.2)	181 (45.5)	213 (53.0)	1126 (48.1)	
Secondary and above	71 (13.8)	70 (14.3)	77 (14.4)	47 (11.8)	45 (11.2)	310 (13.3)	
High	105 (20.4)	111 (22.7)	140 (26.1)	79 (19.8)	86 (21.4)	521 (22.3)	
University	34 (6.6)	42 (8.6)	32 (6.0)	27 (6.8)	27 (6.7)	162 (6.9)	
Total	515	488	536	398	402	2339	
Marital status							0.074
Single	122 (23.7)	117 (23.9)	150 (27.7)	91 (22.7)	95 (23.5)	575 (24.5)	
Married	345 (67.1)	313 (63.9)	357 (66.0)	268 (66.8)	266 (65.8)	1549 (65.9)	
Divorced, widowed	47 (9.1)	60 (12.2)	34 (6.3)	42 (10.5)	43 (10.6)	226 (9.6)	
Total	514	490	541	401	404	2350	
Employment status							0.000
Yes	91 (17.6)	62 (12.7)	106 (19.6)	99 (24.7)	96 (23.8)	454 (19.3)	
No/home duties/student/retired	426 (82.4)	428 (87.3)	435 (80.4)	302 (75.3)	308 (76.2)	1899 (80.7)	
Total	517	490	541	401	404	2353	

at which smoking started, number of cigarettes smoked per day). If the household members could not be found at first visit, two more visits were completed at different time intervals. Households, which could not be contacted at the third attempt, were substituted according to a preformed list.

Current wheeze was defined as a report of wheezing or whistling sound breathing in the last 12 months. Diagnosis of asthma was defined as "Yes" response to the question: "Have you ever received the diagnosis of asthma by a physician?" The reliability and validity of the questions (with the same wording) on asthma was tested and found appropriate in a pilot study prior to the study performed in the students of Hacettepe University[10]. Copy of the questions used in the survey is provided in the Appendix 1.

Data entry and analysis was performed via statistical package of SPSS 11.0 version. Significance of results from basic tabulation was tested by means of the Chi square test.

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Table II

Some possible risk factors of asthma by region (Five urban centers, 2002)

	Kütahya n (%)	Eskişehir n (%)	Mersin n (%)	Aksaray n (%)	Sakarya n (%)	Total n (%)	p*
Smoking status							0.002
Current smoker	104 (24.9)	118 (32.2)	132 (35.0)	92 (29.3)	66 (24.8)	512 (29.4)	
Ex-smoker	275 (65.8)	209 (57.1)	206 (54.6)	204 (65.0)	182 (68.4)	1076 (61.8)	
Non-smoker	39 (9.3)	39 (10.7)	39 (10.3)	18 (5.7)	18 (6.8)	153 (8.8)	
Total	418	366	377	314	266	1741	
Smoking within the household during childhood							0.024
Yes	179 (53.4)	231 (64.5)	230 (62.3)	172 (57.3)	145 (57.1)	957 (59.2)	
No	156 (46.6)	127 (35.5)	139 (37.7)	128 (42.7)	109 (42.9)	659 (40.8)	
Total	335	358	369	300	254	1616	
Family atopy							0.005
Yes	69 (20.5)	78 (22.0)	66 (18.2)	78 (26.2)	35 (13.8)	326 (20.3)	
No	268 (79.5)	276 (78.0)	296 (81.8)	220 (73.8)	219 (86.2)	1279 (79.7)	
Total	337	354	362	298	254	1605	
Pet ownership							
Childhood	75 (23.7)	53 (15.1)	76 (20.9)	57 (19.4)	40 (16.3)	301 (19.2)	0.044
Current	28 (11.6)	65 (23.0)	58 (18.6)	27 (10.1)	54 (22.0)	232 (17.2)	0.000

*Chi square test value.

Multivariate analysis included analysis logistic regression modeling. The logistic regression model included "age", "gender", "city", "family atopy", "smoking status", "childhood pet-ownership", "current pet-ownership", and "hay fever". During analysis, other variables were adjusted for each. Age was included in the modeling as a continuous variable whereas other were categorical. "Being female", "living in Sakarya", "having no family atopy", "not smoking", "not having childhood pet-ownership history", "not having pet-ownership currently", and "not having hay-fever" were used as "reference" groups. Adjusted odds ratios with 95 % confidence intervals were reported and a p value ≤ 0.05 was considered as statistically significant.

RESULTS

In table I, some socio-demographic characteristics of the participants were shown. Almost half of the participants were male (47.2 %) and mean age of the group was 40.3 (± 17.3). Almost half of the participants were primary school graduates (48.1 %); 65.9 % of them were married. About one out of five participants stated that they were not employed (19.3 %). The characteristics of the participants from different cities were statistically significantly different in terms of age (p = 0.000), educational status (p = 0.000), and employment status (p = 0.000).

Possible risk factors affecting asthma are shown in table II. Ninety-one percent of the participants were either current or ex-smoker. The parents of 957 (59.2 %) participants were reported to smoke inside their houses. History of atopic heredity was reported in 20.3 % of participants. The frequency of pet ownership during childhood was 19.2 %, whereas current pet-ownership history was 17.2 %.

Prevalence of respiratory and allergic symptoms is presented in table III. "Current wheezing", "wheezing associated with shortness of breath", "current cough", and "hay fever" were reported by 24.9 %, 62.8 %, 30.2 % and 10.7 % of the participants, respectively. One hundred and seven participants (6.6 %) stated that they had diagnosis of asthma reported by a physician. The difference of asthma prevalence among these five urban centers was statistically non-significant (p = 0.059).

Results of the logistic modeling are presented in table IV. The odds of asthma (have/do not have) was 3.1 times higher among people who had a family

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Table III

Prevalence of allergic symptoms of asthma cases by region (five urban centers, 2002)

	Kütahya n (%)	Eskişehir n (%)	Mersin n (%)	Aksaray n (%)	Sakarya n (%)	Total n (%)	p
Current wheezing							0.002
Yes	104 (30.8)	100 (27.8)	86 (23.1)	73 (24.3)	42 (16.5)	405 (24.9)	
No	234 (69.2)	260 (72.2)	286 (76.9)	228 (75.7)	213 (83.5)	1221 (75.1)	
Total	338	360	372	301	255	1626	
Current wheezing + shortness of breath							0.022
Yes	66 (66.7)	54 (51.4)	52 (60.5)	53 (75.7)	26 (65.0)	251 (62.8)	
No	33 (33.3)	51 (48.6)	34 (39.5)	17 (24.3)	14 (35.0)	149 (37.2)	
Total	99	105	86	70	40	400	
Current wheezing without cold							0.567
Yes	53 (51.5)	46 (39.3)	45 (47.4)	43 (52.4)	21 (48.8)	208 (47.3)	
No	50 (48.5)	71 (60.7)	50 (52.6)	39 (47.6)	22 (51.2)	232 (52.7)	
Total	103	117	95	82	43	440	
Cough within the last 12 months (at night)							0.000
Yes	72 (21.6)	72 (20.6)	55 (15.0)	47 (15.9)	23 (9.0)	269 (16.8)	
No	261 (78.4)	277 (79.4)	311 (85.0)	249 (84.1)	233 (91.0)	1331 (83.2)	
Total	333	349	366	296	256	1600	
Current cough							0.100
Yes	99 (30.6)	110 (32.4)	92 (26.2)	98 (34.9)	65 (26.7)	464 (30.2)	
No	225 (69.4)	229 (67.6)	259 (73.8)	183 (65.1)	178 (73.3)	1074 (69.8)	
Total	324	339	351	281	243	1538	
Shortness of breath at night							0.011
Yes	55 (16.6)	70 (19.7)	60 (16.7)	61 (20.5)	27 (10.6)	273 (17.1)	
No	277 (83.4)	285 (80.3)	300 (83.3)	236 (79.5)	227 (89.4)	1325 (82.9)	
Total	332	355	360	297	254	1598	
Hay fever							0.008
Yes	36 (11.1)	46 (13.8)	43 (12.4)	28 (10.0)	11 (4.6)	172 (10.7)	
No	287 (88.9)	287 (86.2)	304 (87.6)	251 (90.0)	228 (95.4)	1439 (89.3)	
Total	323	333	347	279	239	1611	
Diagnosis of asthma							0.059
Yes	19 (5.6)	32 (9.0)	19 (5.2)	26 (8.7)	11 (4.3)	107 (6.6)	
No	318 (94.4)	325 (91.0)	346 (94.8)	274 (91.3)	244 (95.7)	1507 (93.4)	
Total	337	357	365	300	255	1614	

atopy history than the ones who did not (p = 0.000; 95 % CI = 1.9-5.0). The odds for the participants having "hay fever" was 4.2 times higher than it was for the ones who did not report to have hay fever (p = 0.000; 95 % CI = 2.4-7.3). Asthma prevalence was found to increase by age (OR = 1.03; CI = 1.02-1.05).

DISCUSSION

It has long been suspected that the prevalence of asthma has been increasing not only in industrialized countries, but also in developing countries[10]. However, this has been a particularly difficult issue to resolve because of the lack of systematic standardized

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studies measuring changes in asthma prevalence over time. Results of some studies have argued that the increase in reported prevalence might have been largely due to increase in awareness, labeling, and diagnosis of asthma symptoms[11]. In our study, the prevalence of the disease was 6.6 %. The prevalence of the disease was different among these five urban centers, but it was statistically non-significant (p = 0.059) (table III). Although air pollution is highest in Kütahya according to National Statistical Institute reports, asthma prevalance was 5.6 % and lower than other three cities. This result is concordant with the fact that the global pattern of asthma prevalence is consistent with the evidence that air pollution is not a major risk factor for development of asthma.

In other studies conducted in different cities of our country, prevalence rates of asthma were found 2.9 % in Kayseri and 4.1 % in Sivas (cities in central Anatolian region), %2.5 in Izmir (city in western region)[12-14]. But it is clear that to make valid international comparisons of asthma prevalence, standardized study methods are required. Our study is important representing the Turkish population because, it was community-based and standardized since it was conducted using the ECRHS questionnaire.

The prevalence of wheezing was 24.9 % in our study population. The ECRHS showed the variations in the prevalence of wheeze and wheeze with breathlessness. These ranged from 8.5 % (Pavia, Italy) to 32 % (Dublin), 1.4 % (Verona, Italy) to 16.3 % (Caerphilly, UK)[9]. In general, the highest prevalence of symptoms was found in English-speaking centers. Although Turkey is not an English-speaking country since our prevalence was closer to the prevalence in English speaking countries, we may presume that there was no problem in the translation of the questionnaire.

In our study, asthma prevalence was found to increase by age (OR = 1.03; CI = 1.02-1.05); by family atopy history (p = 0.000; 95 % CI = 1.9-5.0), and by having "hay fever" (p = 0.000; 95 % CI = 2.4-7.3) (table IV). Demir AU, et al has also reported higher percentage of family atopy among the subjects who reported any asthma symptom as compared to subjects who reported no asthma symptom[15].

In our logistic analysis smoking status was not found among the risk factors of asthma.It appears unlikely that the international prevalence patterns can be explained by difference in smoking. This is illustrated by the study of Chinese communities living in Southeast Asian region, in which the lowest prevalence of asthma was observed in the community living in aminland China, despite the highest level of cigarette consumption[16].

The results regarding the relationship between "current"/"childhood" pet ownership and asthma was quite surprising. However, we did not ask detailed questions about pet ownership such as "type of pet", "number of pet", "type of house", etc. which might have influenced the results. For example, having low potency allergenic pet animals (fish, caged-bird etc) might have been a cause of this unexpected result[17].

The increasing incidence and prevalence of asthma in many parts of the world continue to make it a global health concern and it also results in significant use of healthcare resources[18]. Once the risk groups can be identified with these population based studies, further studies can be performed to explore the strategies of primary prevention of the disease.

Table IV

Logistic model findings for the influencing factors of asthma cases (five urban centers, 2002) (%)

	Asthma prevalence*	Adjusted OR (95 % GA)**	p
Age (1 years of age increase)		1.03 (1.02-1.05)	0.000
Gender			0.79
Female	6.5	1 (0.5-1.6)	
Male	5.8	0.9	
City			
Sakarya	4.0	1.0	
Kütahya	5.3	0.6 (0.3-1.3)	0.177
Eskişehir	8.5	0.5 (0.2-1.1)	0.081
Mersin	4.9	1.1 (0.6-2.2)	0.689
Aksaray	8.1	0.7 (0.4-1.5)	0.431
Family atopy (n = 1595)			0.000
No	4.6	1.0 (1.9-5.0)	
Yes	12.5	3.1	
Smoking status			0.330
No	6.2	1.0	
Yes	7.5	1.3 (0.8-2.3)	
Childhood pet ownership			0.350
No	6.3	1.0	
Yes	6.1	1.2 (0.7-2.3)	
Current pet ownership			0.340
No	6.5	1.0	
Yes	5.3	1.3 (0.70-2.26)	
Hay fever			0.000
No	4.8	1.0 (2.4-7.3)	
Yes	17.7	4.2	

OR: Odds Ratio; CI: Confidence Interval.
*Unadjusted percent values.
**The logistic regression model included "age", "gender", "city", "family atopy", "smoking status", "childhood pet-ownership", "current pet-ownership", and "hay fever". During analysis, other variables are adjusted for each category.

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Appendix 1

Questions on respiratory and allergic symptoms, which were used in the survey

1. Have you had wheezing or whistling in your chest at any time in the last 12 months?

   IF "NO" GO TO QUESTION 2, IF "YES":

   1.1. Have you been at all breathless when the wheezing was present?
   1.2. Have you had this wheezing or whistling when you did not have a cold?

2. Have you woken up with a feeling of tightness in your chest at any time in the last 12 months?

3. Have you been woken up by an attack of shortness of breath at any time in the last 12 months?

4. Have you been woken up by an attack of coughing at any time in the last 12 months?

5. Do you have cough?

6. Have you had asthma diagnosis before the last 12 months?

   How old were you when it appeared?_____

7. Is there astma (recurrent bronchitis) skin eczema, seasonal allergic rhinitis or allergic rhinitis lasting for all the year in your parents or brothers or sisters?

   If yes, which disease in whom?_____

8. Do you have allergic rhinitis (hay fever) lasting for all the year or only in spring/summer?

9. Have you had pet animals at home during the last 12 months?

10. Did you have pet animals at home before the last 12 months or in your childhood? If yes, what?_____