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Prevalence of asthma symptoms in school children in Ankara, Turkey

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The aim of this study was to determine the prevalence of symptoms suggestive of asthma in children aged 7–14 years in Ankara, Turkey. For this purpose, the recently developed ISAAC (International Study for Asthma and Allergies in Childhood) questionnaire supplemented with six additional questions was issued to parents of 3154 primary school children from 12 schools. A separate page with questions regarding risk factors was also added to the questionnaire. The response rate was 88·3%. The cumulative and 12-month prevalence of wheezing were 14·4 and 4·7% respectively. The prevalence of physician-diagnosed asthma was 8·1%. A family history of atopy was found to be the strongest risk factor for having ever had wheezing (odds ratio (OR)=2·89, 95% confidence interval (CI)=2·32–3·60), wheezing in the past 12 months (OR=3·21, CI=2·21–4·67), and severe attack (OR=2·41, CI=1·36–4·25). Passive smoking was a risk only for having ever had wheezing (OR=1·33, CI=1·03–1·76). Increasing age was associated with a lower risk of current wheezing (OR=0·85, CI=0·81–0·90) and severe attack (OR=0·77, CI=0·67–0·88). Gender, socio-economic level and pet ownership did not appear to be risk factors for asthma-related symptoms.

This study, the first epidemiological survey in Ankara, Turkey, using the ISAAC protocol, clearly shows that symptoms suggestive of asthma, albeit lower than in most European countries, are quite common and constitute a major health problem in Turkey.

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Introduction

Bronchial asthma is the most common chronic disease of childhood (1). In recent years a consistent increase in the prevalence of asthma has been reported from various regions of the world (2–4). Concomitantly, the social and economic impact of the disease is also increasing (5).

Despite the fact that it is the second most populous country in Europe, the data concerning the prevalence of childhood asthma in Turkey are very limited (6–8). Furthermore, due to the lack of a common methodology, these studies do not allow within or inter-regional comparisons.

In order to enable international and temporal comparison of childhood asthma, a standardized written questionnaire, the ISAAC (International Study of Asthma and Allergies in Childhood) protocol (9) was developed, and results have already started to appear in the medical literature (10,11). Here, we report the results of a survey that estimates the prevalence of childhood asthma in a large sample (n=2784) in the Ankara region of Turkey using ISAAC questions. We also attempted to document the relationship between asthma-like symptoms and some potential risk factors, including age, gender, passive smoking, pet ownership, family history of atopy, and socio-economic status.

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Materials and Methods

STUDY POPULATION

The study was conducted in May 1996, in 12 primary schools in Ankara. Ankara is divided into eight administrative boroughs with a student population of 160 000 attending the first eight grades. One to three schools from each borough, and one class from each of the eight levels, were randomly selected to yield a final selected/total student ratio of approximately 2% within each borough. The parents of 3154 children received the questionnaire. The study population consisted of the 2784 children whose parents returned the questionnaire.

QUESTIONNAIRE

Turkish translation of the ISAAC protocol, similar to the one used previously for the Turkish population in

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TABLE 1. Age and gender distribution of the study population (Ankara, May 1996)

Age (years)	Boys *n* (% of total)	Girls *n* (% of total)	Total *n* (% of total)
7	162 (5·8)	142 (5·1)	304 (10·9)
8	164 (5·9)	170 (6·1)	334 (12·0)
9	179 (6·4)	174 (6·3)	353 (12·7)
10	176 (6·3)	170 (6·1)	346 (12·4)
11	192 (6·9)	181 (6·5)	373 (13·4)
12	195 (7·0)	190 (6·8)	385 (13·8)
13	184 (6·6)	190 (6·8)	374 (13·4)
14	182 (6·5)	133 (4·8)	315 (11·3)
Total	1350 (48·5)	1434 (51·5)	2784 (100·0)

Melbourne (4) was used. In this questionnaire, ISAAC questions are supplemented with six additional questions (see Appendix). As there is no equivalent for the word 'wheeze' in Turkish, parents of 20 children with known asthma were interviewed, and 'a whistling sound coming from the chest' was found to be the most appropriate one and used in the questionnaire. Asthma and allergic bronchitis were used synonymously.

As a separate page, questions regarding some potential risk factors for asthma-like symptoms, including passive smoking, pet ownership, family history of atopy, and socio-economic status, were added to the questionnaire. A family history of atopy was considered positive if at least one of the first-degree relatives had physician-diagnosed asthma, allergic rhino-conjunctivitis or atopic dermatitis.

For socio-economic status, a composite index was developed using the following criteria: parental education, monthly income per capita in the family, number of people per room, and heating system of the house (stove *vs.* central heating). This index is frequently used by the Department of Public Health of Hacettepe University in local surveys within the Ankara region. The total score had a minimum of 1 and a maximum of 16.

STATISTICAL ANALYSIS

Results are expressed as the percentage of positive responses to each question. Ninety-five percent confidence intervals (95% CI) were calculated using simple random sample methods. Backward logistic regression was used in multivariate analysis, simultaneously controlling for age, gender, passive smoking, pet ownership, family history of atopy, and socio-economic status. All analyses were done using the SPSS 6.0 package program.

Results

Of 3154 questionnaires that were issued, 2784 were returned with an overall response rate of 88·3%. Age and gender distribution of the study population are summarized in Table 1. The age range was 7–14 years. The number of girls was slightly higher, with a boy/girl ratio of 0·94. Cumulative and 12-month prevalence rates of asthma symptoms and risk factors reported by the parents of the children are summarized in Tables 2 and 3. The adjusted odds ratio (OR) and 95% confidence interval (CI) for the association between the putative risk factors (age, gender, passive smoking, pet ownership, family history of atopy, and socio-economic status) and cumulative prevalence of wheezing, 12 month prevalence of wheezing and severe attacks are as follows. Increasing age was associated with a lower risk of current wheezing (OR=0·85, CI=0·81–0·90), wheezing in past 12 months (OR=0·85, CI=0·78–0·92) and severe attack (OR=0·77, CI=0·67–0·88). A family history of atopy was found to be the strongest risk factor for having ever had wheezing (OR=2·89, CI=2·32–3·60), wheezing in the past 12 months (OR=3·21, CI=2·21–4·67) and severe attack (OR=2·41, CI=1·36–4·25). Passive smoking was a risk only for having ever had wheezing (OR=1·33, CI=1·03–1·76). Gender, socio-economic level and pet ownership did not appear to be risk factors for asthma-related symptoms (data not shown).

Discussion

The results of this survey provide an update and a standardized description of the extension and severity of asthma and related symptoms in primary school children living in Ankara, Turkey. The cumulative wheezing, cumulative asthma and current wheezing prevalence were 14·4, 8·1 and 4·7%, respectively. Of the children with current wheezing (within the past 12 months) one in three had severe episodes and half of them had sleep disturbance. The widespread impression that asthma is a major health problem among children in Turkey was confirmed.

The lack of a gold standard for diagnosis of asthma makes accurate assessment and comparison between surveys difficult. Therefore, standard respiratory questionnaires were developed, and recently the ISAAC questionnaire was found to be useful for estimating the prevalence of asthma in childhood. Our study is the first one using the ISAAC protocol in Ankara, Turkey. In two

TABLE 2. Responses of parents on their children's respiratory symptoms (Ankara, May 1996)*

	Boys (n=1350)	Girls (n=1434)	Total (n=2784)
Symptoms			
Wheezing (at any time)	15·5 (13·5–17·4)	13·4 (11·6–15·2)	14·4 (13·2–15·8)
Asthma (at any time)	9·5 (7·9–11·0)	6·8 (5·5–8·1)	8·1 (7·0–9·0)
Symptoms in past 12 months			
Wheezing	4·9 (3·8–6·1)	4·5 (3·4–5·6)	4·7 (3·9–5·5)
Number of episodes:			
<4	2·5 (1·6–3·3)	2·3 (1·5–3·1)	2·4 (1·8–3·0)
4–12	1·6 (0·9–2·3)	1·2 (0·6–1·7)	1·4 (1·0–1·8)
>12	0·8 (0·3–1·3)	0·6 (0·2–1·0)	0·7 (0·4–1·0)
Sleep disturbance	2·9 (2·0–3·8)	2·3 (1·5–3·1)	2·6 (2·0–3·2)
Severe episode	2·1 (1·3–2·8)	1·6 (0·9–2·2)	1·8 (1·3–2·3)
Exercise-induced wheezing	7·8 (6·4–9·3)	5·8 (4·6–7·0)	6·8 (6·0–7·8)
Night cough	25·6 (23·2–27·9)	23·3 (21·1–25·5)	24·4 (22·8–26·0)
Morning tightness	3·1 (2·2–4·0)	4·3 (3·2–5·3)	3·7 (3·0–4·4)
Morning mucus	13·2 (11·4–15·0)	12·4 (10·7–14·1)	12·8 (11·6–14·0)
Wheezing with allergens	1·9 (1·1–2·6)	2·3 (1·5–3·1)	2·1 (1·6–2·6)
Use of bronchodilators	4·9 (3·8–6·1)	5·0 (3·9–6·2)	5·0 (4·2–5·8)
Bronchitis			
At any time	21·7 (19·5–23·9)	18·1 (16·1–20·0)	19·8 (18·3–21·3)
Wheezing with cold or bronchitis	14·5 (13·0–16·7)	13·2 (11·5–15·0)	14·0 (12·7–15·3)

*Values are the percentage (95% confidence intervals) of boys/girls and total number of children completing a questionnaire and responding positively.

TABLE 3. Prevalences of risk factors (Ankara, May 1996)

	Girls n (% of girls)	Boys n (% of boys)	Total n (% of total)
Family atopy	445 (31·0%)	465 (34·4%)	910 (32·7%)
Pet ownership	291 (20·3%)	305 (22·6%)	596 (21·4%)
Parental smoking	950 (66·2%)	1024 (75·9%)	1974 (70·9%)
Socio-economic status			
Low (score 1–6)	723 (50·4%)	782 (57·9%)	1505 (54·1%)
Moderate (score 7–11)	486 (33·9%)	523 (38·7%)	1009 (36·2%)
High (score 12–16)	135 (9·4%)	126 (9·3%)	261 (9·4%)

previous surveys in Turkey (7,8) a similar modified version of the questionnaire compiled by the American Thoracic Society and the United States Heart and Lung Institute, was used (12). These studies reported the prevalence of asthma as 6·9% in Ankara and 10·2% in Samsun (a city on the Black Sea coast) in primary school children. It is not possible to compare these figures with the results obtained in our study as, in these studies, asthma was defined strictly as recurrent wheezing (at least three episodes) or diagnosis of asthma by a physician. The reported cumulative prevalence of physician-diagnosed asthma was 1·4% in Ankara, whereas it was 8·1% in our study. The most likely reason for this is that, in our questionnaire, 'allergic bronchitis' was used synonymously with the term 'asthma'. The reason for using these two terms interchangeably is that the experience in our allergy clinic strongly suggests that paediatricians and general practitioners generally tend to label asthma as allergic bronchitis before a confirmatory consultation with an allergy or chest clinic. Alternatively, the finding of a cumulative prevalence of asthma higher than two previous reports might be due to increased awareness of asthma by the physicians and the community. Another possible but less likely factor may be a true increase in the prevalence of asthma. However, a time lag of 4–5 yr between this study and the previous one is unlikely to cause a five-fold increase in the prevalence of asthma.

In another local survey in Ankara (6), the cumulative prevalence of physician-diagnosed asthma was found to be 17·4%. In this study, the population was recruited from one single school and is therefore far from being a

representative population of Ankara. Its results are not comparable to the results of our study.

Compared with the numbers reported in other countries, we have found a low prevalence in Ankara. The cumulative and 1-year prevalence of wheezing found in our survey (14·4 and 4·7% respectively) were much lower than those reported for Bochum (33 and 20%), West Sussex (48 and 29%), Wellington (44 and 28%), Adelaide (40 and 29%) and Sydney (45 and 30%) (10), but did agree with those reported from St Gallen (11). It may be speculated that language might cause the underestimation of the prevalences. The issue of language has often been raised as a confounding factor – especially for languages, including Turkish, which do not have a direct translation of the word 'wheeze'. We translated 'wheeze' as 'a whistling sound from the chest'. Our translation seems to be an appropriate one for the Turkish language as it has already been validated for the Turkish population in Melbourne (4). The low prevalence rates obtained in this study may be due in part to insufficient public awareness of asthma. However, this study does not allow definitive conclusions regarding this matter.

The figure obtained for bronchitis in this survey was quite high (19·8%). Although no official data exist for the prevalence of bronchitis in children in Ankara or Turkey, it is generally anticipated to be low in children. This view highlights the limitation of questionnaire-based methodology: its inability to distinguish between bronchitis and asthma. Another limitation of the protocol that we used may be that it offers an oversimplified list of, and an underestimation of, the role of allergens in asthma. In questioning wheezing with allergens, this protocol suggests only animals, feathers or dust as possible causative antigens. Of 130 children who have wheezed within the last year (4·7%), 58 (2·1%) were reported to have wheezed because of these allergens. This number may not reflect the actual role of the antigens in childhood asthma as allergenic stimulation is considered to be a major contributing factor in the pathogenesis of bronchial asthma (13,14). We think that, in future surveys, questioning seasonal exacerbations that may be associated with pollen sensitivity might reflect a better estimate of the role of allergens in asthma.

Our results give some information regarding plausible risk factors that may be important in formulating intervention strategies. As expected, the most important risk factor identified was atopy. There were highly significant associations between atopy and current wheezing, cumulative wheezing, severe episodes and asthma, with odds ratios ranging from 2·4 to 3·2. Our study also documented that passive smoking is one of the most widespread health problems in Ankara, as 70·9% of children are exposed to parental smoke. This was associated with an increased risk of wheezing. Socio-economic level, pet ownership or gender did not appear to be risk factors in our study.

The prevalence of cumulative wheezing decreased with increasing age. The most likely explanation for this paradoxical finding could be the failure to recall past episodes. As expected, the risk of having severe attacks and the prevalence of wheezing within the past 12 months decreased with increasing age.

Our study is the first survey in Ankara, Turkey, that used the ISAAC protocol. Further studies with the ISAAC protocol are needed to determine the prevalence in various regions of the country and to see whether regional differences exist. We think that this survey will be a suitable baseline for future trends concerning the prevalence, severity and medical care of asthmatic children in Ankara, Turkey.

Addendum

After acceptance of this work for publication, results of a survey conducted with ISAAC in Istanbul were published (Öneş Û, Sapan N, Somer A, Dişçi R, Salman N, Güler N, Yalçın I. Prevalence of childhood asthma in Istanbul, Turkey. *Allergy* 1997 **52:** 570–575. In this study, the prevalence of wheezing at any time, was found to be 15·1% and that for physician-diagnosed asthma 9·8%. Although some major differences exist with regard to environmental factors between the two cities, including humidity, climate, air pollution etc., these figures were quite similar.

Appendix: Respiratory Symptoms Questionnaire

1. Has your child ever had wheezing or whistling in the chest at any time in the past?
2. Has your child every been diagnosed as asthma or allergic bronchitis?

If yes to question 1 or question 2, then:

3. In the last 12 months, has your child had a wheezing or asthma attack?
4. In the last 12 months, how frequent were the wheezing or asthma attacks?
5. In the last 12 months, has any wheezing or asthma attack woken your child at night?
6. In the last 12 months, has any wheezing or asthma attack been severe enough to limit speech to only one or two words at a time?

Everyone to answer the following questions:

7. In the last 12 months, has your child sounded wheezy during or after exercise?
8. In the last 12 months, has your child had a dry cough at night (apart from a cough associated with a cold or chest infection)?
9. In the last 12 months, has your child usually brought up any phlegm or mucus from the chest, first thing in the morning?
10. In the last 12 months, has your child woken with a feeling of tightness in the chest first thing in the morning?
11. In the last 12 months, has your child had tightness in the chest or become short of breath when near animals, feathers or dust?

12. In the last 12 months, has your child been treated at any time with any of the following medications? (Ventolin, Salbutol, Salbulin, Bricanyl, Pulmicort, Flixotide, Becloforte, Becotide, Intal, Kromolin, Zaditen, Kofilin, Teo kap, Theo-dur, Aminokardol).

At any time in the past:

13. Has your child ever suffered from bronchitis?
14. Has your child ever suffered from wheezing with bronchitis or with a cold?

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