

Prevalence of asthma and allergic diseases in primary school children in Ankara, Turkey: Two cross-sectional studies, five years apart

Kalyoncu AF, Selçuk ZT, Enünlü T, Demir AU, Çöplü L, Şahin AA, Artvinli M. Prevalence of asthma and allergic diseases in primary school children in Ankara, Turkey: Two cross-sectional studies, five years apart. *Pediatr Allergy Immunol* 1999; 10: 261–265. © Munksgaard, 1999

The prevalence of allergic diseases is reported to have increased worldwide. Two questionnaire surveys, five years apart, were conducted to evaluate the trend of prevalence rates and possible risk factors among primary school children in Ankara, Turkey. A previous survey in 1992 revealed the lifetime prevalences of asthma, wheezing, allergic rhinitis and atopic dermatitis were 17.4%, 23.3%, 28% and 6.1%, and the prevalences for the last 12 months were 8.3%, 11.9%, 15.4% and 4%, respectively. The survey was repeated with the same questionnaire in the same age group (6–13 years) of the same school in May 1997. The parents of 358 boys and 380 girls completed the questionnaire. The lifetime and last 12 months' prevalences of asthma, wheezing, rhinitis and atopic dermatitis were 16.8%, 22.5%, 18.7%, 6.5%, and 9.8%, 13.3%, 14.1%, 4.3%, respectively. There was a significant change only for the lifetime prevalence of rhinitis ($p < 0.001$). The rate of indoor smoking had declined from 73.9% to 64%, and pet ownership had risen from 7.9% to 22.9% ($p < 0.001$ for both). Atopic family history was the most prominent risk factor for all types of allergic disorders. Male gender was a significant risk factor for current asthma and wheezing [odds ratio (OR) = 1.80 and 1.59; 95% confidence intervals (CI) = 1.09–2.98 and 1.01–2.48, respectively], and passive smoking affected the occurrence of allergic rhinitis (OR = 1.84; CI = 1.13–3.00). The prevalence rates of allergic diseases among primary school children in Ankara stabilized during a 5-year period for all diseases other than allergic rhinitis. However, there are changing behavior patterns, i.e. indoor smoking and keeping pet animals, which that may have affected these rates.

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Key words: prevalence; asthma; wheezing; allergic rhinitis; Turkey; allergic diseases; epidemiology

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Accepted: 27 April 1999

Recent reports from various countries have revealed significant worldwide increases in the prevalence of asthma and other allergic diseases (1–5). Separate studies using different methodologies have rendered direct comparison of prevalence figures difficult. The increasing prevalence is partly explained by a western-type lifestyle that includes environmental pollution, changing dietary habits, passive smoking, reduction of breast feeding and childhood infections, change of outdoor flora and increasing professional and public awareness of asthma and other allergic diseases (6–11).

A number of epidemiologic studies on allergic diseases have recently been conducted in different parts of Turkey. The reported cumulative prevalence ranges from 4.9% to 9.4% for asthma; 18.9% to 23.3% for wheezing; 6.3% to 15.4% for allergic rhinitis; and 2.6% to 13.6% for atopic dermatitis (12–15). The current prevalence of the same conditions, using the same methodology, in Ankara and Edirne were 5.6–8.3%; 5.8–11.9%; 4.5–15.4%; and 0.9–4.0%, respectively (16,17).

Ankara, the capital of Turkey, is located in central Anatolia, and it is the second most crowded city in the country. The climate is

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characteristically dry, with hot temperatures in summer and a snowy winter. The flora is relatively scarce compared with western and northern Turkey. Air pollution is usually caused by indoor heating and motor vehicle exhaust fumes during winter, and has dramatically declined with natural gas usage since 1993.

In order to evaluate the present prevalence of asthma and related allergic diseases, thus estimating the relative trend, we repeated the questionnaire survey in 1997 in all of the children attending the same primary school in which the 1992 study was conducted (16). Thus, this study is complementary to the previous report, and the second of a cross-sectional epidemiological survey in children. To our knowledge, there is as yet no other study comparing the trend of prevalence of allergic diseases on a time scale using the same methodology in Turkey.

Methods

A questionnaire was distributed to 864 children aged 6–13 years in the first five grades of a primary school in Ankara. All children in the same school that had been randomly selected and surveyed in 1992 (16) were enrolled for the present study. Because the pupils studied in 1992 had graduated by 1997, the study populations included different school children. The present study was completed in May 1997. An identical questionnaire to the one employed in 1992 in Ankara and in 1994 in Edirne was employed (16,17). The reliability and validity of the questionnaire was tested and found appropriate in a pilot study using 56 children of the same age group via exercise-induced broncho-spasm, prior to the study in Edirne in 1994. It was distributed to all school children, to be completed by one of their parents (see Appendix I). The questionnaire included questions to establish the following points: whether the child had ever been diagnosed as having asthma or atopic dermatitis by a physician either during the last months or before; whether seasonal or perennial rhinoconjunctivitis or wheezing had been observed by the parents; the presence of pet animals at home; presence and duration of breast feeding; presence of atopic family history; smoking at home; and health insurance coverage. The presence of allergic symptoms in a first-degree relative was regarded as positive family history.

The sample size was calculated with the assumptions of 5% type I error and 5% margin of error, and prevalence rates of 10%, 15%, 20%, 25% were 138, 196, 246, 288, respectively. The survey population allowed the comparison of

different groups with the risk factors investigated. Statistical analysis was performed via statistical software package SPSS for Windows version 6.1. Comparisons were made by Chi-squared test, and 95% confidence intervals were calculated for the differences where appropriate. Adjusted odd ratios and 95% confidence limits for risk factors were calculated with coefficients and standard errors obtained from multiple logistic regression models for each of the allergic diseases, as well as the presence of any type of allergic manifestation (18). *p*-values below 0.05 were considered significant.

Results

Of the 864 children, 738 (85.4%) returned the questionnaires, which formed the study group. Among these 738 children, 358 (48.5%) were boys and 380 (51.5%) were girls. The demographic data of the study groups and risk factors affecting the prevalence of allergic diseases are shown in Table 1 for 1992 and 1997. The pupils were children of middle-class families. The families of 520 children declared coverage by health insurance (70.4%). The cumulative and current (last 12 months') prevalence of allergic diseases in comparison with 1992 are depicted in Table 2.

The families of 169 children (22.9%) had pet animals at home, birds still being the most common (135 families, 18.3%). Twenty-six families had fish, 12 had cats, eight had dogs, and two had rabbits. Twenty-five families owned more than one pet. There were more families keeping fish or birds in 1997 compared with 1992

Table 1. Demographic data and risk factors affecting prevalence

	Study in 1992		Study in 1997	
	n: 1036	%	n: 738	%
<i>Age (years)</i>				
6	6	0.6	8	1.1
7	145	14.0	108	14.6
8	188	18.2	134	18.2
9	219	21.1	152	20.6
10	198	19.1	156	21.1
11	204	19.7	136	18.4
12	76	7.3	42	5.7
13	—	—	2	0.3
<i>Sex</i>				
Male	502	48.5	358	48.5
Female	534	51.5	380	51.5
<i>Risk factors</i>				
Atopic family history	212	20.5	170	23.0
Breast feeding	988	95.4	687	93.1
Passive smoking	766	73.9	472	64.0 *
Pet animals at home	82	7.9	169	22.9 *
Health insurance	754	72.8	520	70.4

**p* < 0.0001

Table 2. Cumulative and current (last 12 months) prevalences of asthma and other allergic diseases in Ankara in 1992 and 1997

	Study in 1992			Study in 1997		
	n: 1036	%	(95% CI)	n: 738	%	(95% CI)
<i>Cumulative prevalence</i>						
Asthma	180	17.4	(15.1–19.8)	124	16.8	(14.2–19.7)
Wheezing	241	23.3	(20.7–26.0)	166	22.5	(19.5–25.7)
Rhinitis	290	28.0	(25.3–30.8)	138	18.7	(16.0–21.7)*
Atopic dermatitis	63	6.1	(4.7–7.7)	48	6.5	(4.8–8.5)
<i>Prevalence in last 12 months</i>						
Asthma	86	8.3	(6.7–10.2)	72	9.8	(7.7–12.1)
Wheezing	123	11.9	(10.0–14.0)	97	13.3	(10.8–15.8)
Rhinitis	159	15.4	(13.1–17.7)	104	14.1	(11.7–16.8)
Atopic dermatitis	41	4.0	(2.9–5.3)	32	4.3	(3.0–6.1)

* $p < 0.0001$

($p < 0.05$ for fish and $p < 0.00001$ for birds). There were 687 children (93.1%) who had been breast fed during infancy or early childhood. Of these, 222 children (32.7%) had been breast fed for less than 7 months, and 465 (67.7%) for 7 months or more. The mean duration of breast feeding was 11.6 ± 7.9 months (the longest duration 60 months and geometric mean 8.8 months).

The parents of 472 children (64%) were reported to smoke at home. The rate of indoor smoking was significantly lower than the figure in 1992 (73.9%, $p < 0.001$). There was only one smoker at home for 302 children, two smokers for 155, and three or more for the remaining 15. The mean number of smokers at home was 1.4 ± 0.6 persons (range 1–6 persons, geometric mean of 1.3).

History of atopic heredity was reported in 170 families (23%), and was the most outstanding and consistent risk factor for all allergic conditions [odds ratio (OR) = 2.38; 95% confidence intervals (CI) = 1.42–3.99 for asthma; OR = 3.42 and CI = 2.17–5.39 for wheeze; OR = 2.90 and CI = 1.86–4.51 for rhinitis; OR = 2.43 and CI = 1.16–5.10 for eczema; OR = 3.19 and CI = 2.19–4.65 for any type of allergy during the last 12 months]. Only male gender was a significant risk factor for current asthma and wheeze (OR = 1.80 and 1.59, and CI = 1.09–2.98 and 1.01–2.48, respectively). The occurrence of any type of allergic manifestation during the last 12 months was associated with presence of breast feeding and passive smoking (OR = 5.16 and 1.74, and CI = 1.56–17.08 and 1.18–2.56, respectively).

In this study group, 183 children (24.8%) were reported to have manifestations of asthma and/or other allergic diseases during the last 12 months. This figure is not significantly different from the current prevalence of allergic diseases reported in

1992 (23.2%). Allergic disorders were manifested in 259 pupils (35.1%) at any point during their lifetime, and 61 (23.6%) were reported to have symptoms during the last 12 months. Thus, the remission rate of lifetime allergic disorders was 76.4%. However, the recurrence rate was 29.2%. Furthermore, the last 12 months' prevalence of wheezing, rhinitis and atopic dermatitis was significantly higher among the children who had a past diagnosis of asthma and remission than that found in the general population (34.2%, 31.7% and 9.8%, respectively; $p < 0.05$ for all). The mean ages of onset for asthma and wheeze were 3.4 ± 2.8 and 4.5 ± 3.2 years (geometric means 2.2 and 3.0 years), respectively. The mean durations of asthma and wheezing were 2.9 ± 2.3 and 2.4 ± 2.2 years (geometric means 2.2 and 1.6 years), respectively, for those with remission. The duration of breast feeding for asthmatic children who experienced the disease for less than one year was also significantly longer than those with asthma for more than one year (13.3 ± 7.1 vs. 11.7 ± 8.8 months, respectively; $p < 0.05$).

Discussion

The prevalence of allergic diseases differs among countries and even between different regions of the same country. There are relatively few studies allowing comparison owing to differences in study groups and methodologies. However, a number of studies have documented increasing prevalence of asthma and other allergic diseases in countries other than Turkey (1–5).

The present study allows comparison of prevalence figures for allergic diseases by two cross-sectional studies, five years apart, in independent populations of children attending the same primary school. The number of pupils has decreased slightly during the last two years owing to an educational policy change of the government. However, the response rate was still high (85.4%), and identical methodology allowed the comparison of prevalence figures five years apart. Another set of data was also provided by the epidemiological survey of primary school children by the same questionnaire in rural and urban Edirne in 1994 (17). All three surveys are based on questionnaire information, and further investigations were not carried out.

The results reveal that the current prevalence of allergic diseases has slightly increased, although the differences are insignificant (Table 2). The only significant change of prevalence has occurred for a decreased cumulative prevalence of allergic rhinitis. The rates of indoor passive smoking and pet ownership have changed

significantly, yet neither of these factors was influential for cumulative prevalence of allergic rhinitis. Furthermore, the current prevalence of the diseases has not changed during the last five years. The public awareness for allergic diseases may have caused better discrimination of allergic rhinitis from other causes of nasal complaints. The time period between these two studies may be also too short to observe significant changes in the prevalence and distribution of determinants of allergic diseases.

The demographic features of the pupils surveyed in 1992 and 1997 reveal that the presence of atopic family history and pet ownership has increased, and the rate of exposure to indoor smoking has decreased. This decline in passive smoking in pupils is favorable and deserves attention in face of the increase in smoking rates of adults nationwide (19). This behavioral change may be due to better notification of parents and also to recent legal restrictions on indoor smoking, in operation since 1996. The increase in the number of pupils having pets at home is the result of adaptation of a western lifestyle although this increase is particularly in keeping birds and fish. The same lifestyle trend may have also resulted in an insignificant decline in the rate of breast feeding.

In accordance with the previous studies in Turkey, the presence of atopic family history is the most important risk factor for all allergic conditions in childhood (12,13,16,17,20). The occurrences of allergic manifestations were similar for both sexes in 1992, yet male gender presented as a risk factor for the current occurrence of either asthma or wheezing (16). These results are compatible with those reported in Edirne (17). The rate of exposure to pet animals has increased over time; it was reported as 7.9% and 9.6% in two separate studies in Ankara in 1992; 25.9% in Istanbul in 1995; and 21.4% in Ankara in 1996 via the ISAAC questionnaire (13–16). Yet, it had not affected the recent occurrence of any of the allergic disorders in the same studies. This insignificance may be related to the increase in low potency allergenic pet animals, such as caged birds or fish (7). Even though it appears to be a risk factor in the occurrence of any type of allergy, the duration of breast feeding was inversely related to the duration of bronchial asthma in childhood.

Conclusions

The prevalence of allergic diseases has not changed significantly among primary school children in Ankara, Turkey, within a five-year

period. The only significant change towards a decrease in cumulative allergic rhinitis may be attributed to increasing public awareness. The change in lifestyle towards a more western type of living is evident. Further cross-sectional studies may help to elucidate the changing trends in living and their influence on the prevalence of allergic diseases in childhood.

References

1. BURR ML, BUTLAND BK, KING S, VAUGHAN-WILLIAMS E. Changes in asthma prevalence: two surveys 15 years apart. *Arch Dis Child* 1989; 64: 1452–6.
2. BURNEY PGJ, CHINN S, RONA RJ. Has the prevalence of asthma increased in children? Evidence from the national study of health and growth 1973–86. *BMJ* 1990; 300: 1306–10.
3. NINAN TK, RUSSEL G. Respiratory symptoms and atopy in Aberdeen school children: evidence from two surveys 15 years apart. *BMJ* 1992; 304: 873–5.
4. LENNEY W, WELLS NEJ, O'NEILL BA. The burden of paediatric asthma. *Eur Respir Rev* 1994; 4: 49–62.
5. GOREN IA, HELMANN S. Changing prevalence of asthma among school children in Israel. *Eur Respir J* 1997; 10: 2279–84.
6. KALYONCU AF. Possible explanation for the different trends of asthma and allergy in East and West Germany and immigrants. *Clin Exp Allergy* 1996; 26: 1220.
7. KJELLMAN B, PETTERSON R. The problem of furred pets in childhood atopic disease. *Allergy* 1983; 38: 65–73.
8. BRABACK L, KALVESTEN L. Urban living as a risk factor for atopic sensitization in Swedish school children. *Pediatr Allergy Immunol* 1991; 2: 14–9.
9. HODGE L, PEAT JK, SALOME C. Increased consumption of polyunsaturated oils may be a cause of increased prevalence of childhood asthma. *Aust NZ J Med* 1994; 24: 727.
10. CUNNINGHAM J, O'CONNOR GT, DOCKERY DW, SPEIZER E. Environmental tobacco smoke, wheezing and asthma in children in 24 communities. *Am J Respir Crit Care Med* 1996; 153: 218–24.
11. SOUTAR A, SEATON A, BROWN K. Bronchial reactivity and dietary antioxidants. *Thorax* 1997; 52: 166–70.
12. SAPAN N. Prevalence of allergic diseases in school children in Bursa. *Uludağ Univ Tıp Fak Derg* 1994; 21: 165–9 (in Turkish).
13. SARAÇLAR Y, YİĞİT Ş, ADALIOĞLU G, TUNCER A, TUNÇBILEK E. Prevalence of allergic diseases and influencing factors in primary-school children in the Ankara region of Turkey. *J Asthma* 1997; 34: 23–30.
14. KARAMAN Ö, TÜRKMEN M, UZUNER N. Allergic disease prevalence in Izmir. *Allergy* 1997; 52: 689–90.
15. ONES Ü, SAPAN N, SOMER A, DIŞCI R, SALMAN N, GÜLER N, YALÇIN I. Prevalence of childhood asthma in Istanbul, Turkey. *Allergy* 1997; 52: 570–5.
16. KALYONCU AF, SELÇUK ZT, KARAKOCA Y, EMRİ AS, ŞAHİN AA, BARIŞ YI. Prevalence of childhood asthma and allergic diseases in Ankara, Turkey. *Allergy* 1994; 49: 485–8.
17. SELÇUK ZT, ÇAĞLAR T, ENÜNLÜ T, TOPAL T. The prevalence of allergic diseases in primary school children in Edirne, Turkey. *Clin Exp Allergy* 1997; 27: 262–9.

18. SCHLESSELMAN JJ. Case control studies. New York: Oxford University Press, 1982. pp. 227–92.
19. FIRAT D. Tobacco and cancer in Turkey. J Environ Pathol Toxicol Oncol 1996; 15: 155–60.
20. OZKARAGÖZ K, ÇAKIN F. Atopic children in Turkey. Ann Allergy 1969; 27: 13–7.

Appendix I. Questionnaire

Name and sex:

Born (year, month, day):

School, grade:

Has your child ever had:	No	Yes	Age of onset	Age of last symptoms	Symptoms during last 12 months
Asthma diagnosed by a physician?	___	___	___	___	___
Eczema diagnosed by a physician?	___	___	___	___	___
Wheezing (observed by parents)?	___	___	___	___	___
Perennial/seasonal rhinoconjunctivitis (observed by parents)?	___	___	___	___	___
Do you have pets/animals at home?			No	Yes	
If yes, which animals: _____					
Had your child been breast fed after delivery?			No	Yes	
If yes, the duration is ___ months					
Are there any smokers at home?			No	Yes	
If yes, the number of smokers is ___					
Has any other family member ever had allergic symptoms? (asthma or wheezy bronchitis, eczema, perennial/seasonal rhinoconjunctivitis)			No	Yes	
			mother ___		
			father ___		
			sibling ___		

If yes:

Date of completing questionnaire:

Parent's signature:
