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Evaluation of the prevalence of atopic diseases by ISAAC surveys in the primary school children of Sivas

Sivas'ta ilköğretim çağı çocuklarında ISAAC anket çalışması ile atopik hastalık sıklığının araştırılması

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Abstract

Aim. During the past few decades, The International Study of Asthma and Allergies in Childhood (ISAAC) questionnaires have shown that the prevalence of childhood asthma and allergy is increasing worldwide. The aim of this cross-sectional study was to determine the change in prevalence and risk factors of asthma, allergic rhinitis, and eczema from two ISAAC questionnaire based surveys conducted on two groups of schoolchildren in Sivas, a central Anatolian city, during the years 1997 and 2005. **Methods.** The study populations of the two comparable cross-sectional surveys were comprised of schoolchildren aged 6-14. The sample size in 1997 and 2005 were 569 and 2978 children, respectively. **Results.** This study showed that the prevalence of asthma, allergic rhinitis and atopic eczema increased significantly from 9.7 % to 11.8%, 5.4% to 10.2%, and 3% to 10.1%, respectively. Risk factor analysis revealed that living with a dog or cat, body mass index (BMI), and family history of atopy were associated with higher risk of asthma ($p<0.05$). **Conclusion.** In the 8-year period from 1997 to 2005, the prevalence of asthma, allergic rhinitis, and eczema has increased significantly in our region. Further studies with larger number of patients are required to investigate the factors causing this increased local rate.

Keywords: Asthma, allergic rhinitis, eczema, children, ISAAC, prevalence, risk factor

Özet

Amaç. Son yılarda yapılan The International Study of Asthma and Allergies in Childhood (ISAAC) anket çalışmaları ile tüm dünyada çocukluk çağı astım ve allerjik hastalıklarında artış olduğu gösterilmiştir. Bu kesitsel çalışmanın amacı ISAAC anket çalışması ile Sivas ili ilköğretim çağı çocuklarında 1997 ve 2005 yıllarında allerjik hastalık sıklığındaki değişimi araştırmak ve risk faktörlerini saptamaktır. Yöntem. Çalışma 1997 ve 2005 yıllarında 6-14 yaş arası ilköğretim çağı çocuklarında yapılmış olup örneklem büyüklüğü sırası ile 569 ve 2978'dir. **Bulgular.** Bu çalışmada 8 yıllık sürede astım (%9,7 den %11,8'e), allerjik rinit (%5,4'ten %10,2'ye) ve atopik egzema (%3'ten %10,1'e) sıklığında önemli artış olduğu tespit edilmiştir, Kedi yada köpek ile yaşamak, artmış vücut kitle indeksi (VKİ) ve ailede atopi öyküsü astım için yüksek risk faktörleri olarak saptandı ($p<0,05$). **Sonuç.** Sivas ilinde ilköğretim çağı çocuklarında 8 yıllık periyotta allerjik hastalık sıklığında ciddi artış vardır. Bu artışa neden olan faktörlerin araştırılması için çok daha geniş kapsamlı araştırmalara ihtiyaç vardır

Anahtar sözcükler: Astım, Allerjik rinit, egzema, ISAAC, çocuk, prevalans, risk factor

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Introduction

The prevalence of asthma and other allergic diseases has been increasing over the last few decades in both industrialized and developing countries [1, 2]. Increased awareness of allergic diseases in the community might have contributed to such a dramatic increase in a short period. Considerable evidence indicates that regional variation exists in the prevalence of asthma and in the relative importance of risk factors [3, 4]. Understanding these variations is important both for local health-care providers and for gaining insight into the epidemiology of asthma. The International Study of Asthma and Allergies in Childhood (ISAAC) [3] was developed to provide a standardized tool and methodology to ascertain the prevalence of asthma and allergies in different regions. Knowledge of asthma prevalence in children has greatly increased, especially in the last decade, through the development of the ISAAC for children and adolescents. In the 1990s, the results of Phase One of the ISAAC survey involving about half a million schoolchildren internationally showed wide ranging differences (up to 20-fold) in the 12 month prevalence of wheeze between communities (1.6-36.8%) [4]. Asher et al. [3] evaluated results of the ISAAC Phase Three study and trends for symptoms of asthma, allergic rhinoconjunctivitis, and eczema. Their data had direct relevance for health-service delivery in the countries included in the study, as well as providing a basis for understanding these disorders. In almost all centers, there was a change in prevalence of one or more of the disorders over time. However, interest from centers in developing countries in collaborating in that study demonstrated that they were concerned that asthma and allergies in children were emerging as important public-health problems. Comparisons of prevalence rates across geographic regions and at different times may help to identify factors that contribute to the development of these conditions in individuals. It has been postulated that environmental factors in susceptible genetic backgrounds were responsible for these variations [4, 5]. Although some studies in Turkey reported the prevalence of allergic diseases in childhood [6-8], there is limited research to predict the time-trend changes in prevalence in the same region. The aim of this cross-sectional study was to determine the change in prevalence of asthma, allergic rhinitis, and eczema from two ISAAC questionnaire based surveys conducted on two groups of schoolchildren in Sivas, a central Anatolian city, in 1997 and 2005.

Materials and method

Study population

The target group of two surveys was schoolchildren aged between 6-14 years, in Sivas, a central Anatolian city. In March and April, the ISAAC questionnaires with a letter of explanation were distributed to the parents of these children. The questionnaire was completed by the parents of each child and returned to the school. In the 1997 survey, there were 569 children from 11 different schools, and in the 2005 survey, 2978 children from 11 different schools were evaluated. The enrolled schools were identical to those used in the 1997 survey. The non-Turkish ethnic group percentage was not over 5% in any of the schools that were used.

Questionnaires

Each subject was given an ISAAC Phase Three written questionnaire to complete. The written questionnaire was translated into Turkish following the ISAAC protocol as described previously [5]. ‘Current’ symptoms referred to symptoms in the past 12 months; ‘asthma ever’ was defined as having been diagnosed with asthma by a physician in the subject’s lifetime; ‘rhinoconjunctivitis’ was defined as sneezing or having a runny nose or blocked nose accompanied by itchy-watery eyes when the subject did not have an upper respiratory tract infection; ‘atopic eczema’ was defined as an itchy rash that was coming and going for at least 6 months affecting the folds of elbows, behind the knees, in front the ankles, under the buttocks or around the neck, ears or eyes. The study was conducted between March and April 2005, the same season as that of the Phase I study.

The study protocol was approved by the Ethics Committee of our school and informed consent was obtained from children's parents or guardians.

Statistical analysis

Subjects who still had erroneous data after recheck or omitted answers on all questions about symptoms were excluded. The final numbers of subjects included in the analyses were 569 and 2978 in 1997 and 2005, respectively. Lifetime prevalence rates of asthma, allergic rhinitis, and eczema symptoms were calculated by dividing positive responses to each question by the number of completed questionnaires. The χ^2 test was used to compare prevalence rates obtained from the two surveys and between subgroups of recruited subjects. Odds ratio (OR) and its 95% confidence interval (CI) were also estimated using age, sex, body mass index (BMI), passive smoking, living with a dog or cat, family income, family history of atopy, kinship marriage and breast feeding. A P-value of <0.05 was considered as significant.

Results

Demographic data

The surveys involved the same 11 schools, using schoolchildren aged between 6-14 years. In the 1997 survey, there were 569 children from 11 schools, and in the 2005 survey, there were 2978 children from the same 11 schools. The response rates were 90% in 1997 and 89% in 2005. In the 1997 survey, there were 50.3% girls and 49.7% boys and in the 2005 survey, there were 51.8% girls and 48.2% boys. The age and sex distributions were similar in these surveys. Table 1 shows the demographic characteristics of the respondents from the two surveys.

Table 1. Demographic characteristics data of recruited subjects in Phase I and Phase III.

	Phase I	Phase III
Number of schools	11	11
Number of subjects included in analysis	569	2978
Sex		
Girls	286 (50.3%)	1544 (51.8%)
Boys	283 (49.7%)	1434 (48.2%)
Number of children in age groups		
6-7 years	100 (17.5%)	386 (13%)
8-9 years	227 (39.9%)	794 (26.7%)
10-11 years	199 (35%)	839 (28.2%)
12-14 years	43 (7.6%)	959 (32.1%)
Response rate	87.5%	90%

Table 2 presents the responses to various questions on atopic symptoms in the two surveys. The prevalence rates of physician-diagnosed asthma were similar in 1997 and 2005 (2.8% and 3.6%, respectively). However, the lifetime prevalence of asthma increased significantly from 1997 (9.7%) to 2005 (11.8%). The lifetime prevalence of allergic rhinitis also increased significantly from 1997 (5.4%) to 2005 (10.2%). The lifetime prevalence of atopic eczema also increased significantly from 1997 (3%) to 2005 (10.1%). The cumulative prevalence of allergic diseases such as asthma, allergic rhinitis, and eczema was found to be 18.1% and 32.1% in 1997 and 2005 survey, respectively.

Analysis of risk factors

In both 1997 and 2005 surveys, age, gender, passive smoking, family economic condition, and lack of breastfeeding were not associated with an increased prevalence of asthma. Consanguinity marriage and BMI were associated with increased asthma symptoms in 2005 (OR, 1.249, 95% CI, 0.997-1.564 for consanguinity marriage; and OR, 2.239, 95% CI, 1.009-4.969 for BMI), but were not a risk factor for asthma in 1997.

Table 2. Prevalence comparison (%) of asthma and allergic disease in schoolchildren.

Frequency of symptoms of diseases (%)	1997 (n=569)	2005 (n=2978)	χ^2	p
Ever wheezing (%)	93 (16.3)	884 (29.7)	42.6	<0.001
Wheezing, last 12 months (%)	24 (4.2)	366 (12.3)	30.99	<0.001
Attacks of wheezing last 12 months, (%)			31.81	<0.001
1-3	19 (3.3)	279 (9.4)		
4-12	4 (0.7)	49 (1.6)		
>12	1 (0.2)	38 (1.3)		
Sleep disturbed by wheezing last 12 months (%)	15 (2.6)	91 (3.1)	0.16	0.68
Severe attack of wheezing limiting speech last 12 months (%)	9 (1.6)	142 (4.7)	11.13	0.001
Exercise-induced wheezing last 12 months (%)	28 (4.9)	220 (7.4)	4.47	0.03
Night cough attack last 12 months (%)	81 (14.2)	688 (23)	2.18	0.13
Diagnosis of asthma, ever (%)	55 (9.7)	352 (11.8)	0.59	0.44
Physician diagnosed asthma	16 (2.8)	106 (3.6)	12.51	<0.001
Ever had rhinitis	31 (5.4)	303 (10.2)	12.51	<0.001
Ever diagnosed with eczema	17 (3)	302 (10.1)	29.01	<0.001

We found that family history of atopy was associated with a higher risk for asthma, both in 1997 (OR, 1.087, 95% CI, 1.056-1.119) and 2005 (OR, 1.980, 95% CI, 1.582-2.477). Similarly, living with a dog or cat was associated with a higher risk for asthma, both in 1997 (OR, 1.068, 95% CI, 1.033-1.105) and 2005 (OR, 1.643, 95% CI, 1.311-2.060), (Table 3).

Table 3. Odds ratio (OR) and it's 95% confidence interval (CI) of potential risk factors for 12-month prevalence of wheezing by written questionnaire.

	OR (95%CI)	**OR (95%CI)**
Age	0.979 (0.953-1.005)	1.174 (0.965-1.430)
Sex		
Female	1.00	1.00
Male	0.918 (0.755-1.117)	1.012 (0.985-1.039)
Passive smoking		
No	1.00	1.00
Yes	1.018 (0.992-1.045)	1.165 (0.932-1.475)
Living with dog or cat	1.068 (1.033-1.105)	1.643 (1.311-2.060)
Body mass index	1.145 (0.955-1.372)	2.239 (1.009-4.969)
Height	1.021 (0.988-1.055)	1.157 (0.915-1.464)
Weight	1.024 (0.996-1.054)	1.267 (1.009-1.591)
Family income		
Low	1.00	1.00
Higher	0.879 (0.692-1.117)	0.987 (0.956-1.014)
Family history of atopy	1.087 (1.056-1.119)	1.980 (1.582-2.477)
Consanguinity marriage	0.966 (0.932-1.001)	1.249 (0.997-1.564)
Breast feeding	0.982 (0.922-1.046)	0.895 (0.705-1.137)

OR: odds ratio; 95%CI: 95% confidence interval.

Discussion

The International Study of Asthma and Allergies in Childhood (ISAAC) developed standardized methods for measuring the prevalence of asthma for international comparison and monitoring of time trends [4]. The prevalence of allergic diseases in children differs considerably among countries and even between regions in the same country [9-14]. Many studies have suggested an increasing prevalence of asthma and other allergic diseases in many countries within the past three decades [15-17]. Several studies have proven that these diseases are due to complex genetic and environmental factors that interact with several different risk markers [18-20]. Increasing urbanization

has been associated with an increasing prevalence of asthma and allergies. Combinations of many factors rather than just one or two are likely to be important in explaining the overall increase of asthma prevalence. The two cross-sectional surveys carried out in Turkish schoolchildren used the same ISAAC protocol. In the years 1997 and 2005, in the middle Anatolian city of Sivas, the study was performed using the same method at the same schools. Both of these studies determined that the prevalence of asthma, allergic rhinitis, and atopic eczema increased significantly from 9.7% to 11.8%, 5.4% to 10.2%, and 3% to 10.1%, respectively. The considerable increase in the prevalence of allergic diseases may suggest that environmental factors have a noticeable influence in this genetic background. Using the same ISAAC survey methods, large, sufficiently randomized samples were studied and the response rates were excellent due to the great interest shown in these surveys by parents and teachers. Since the studies were done at the same schools, racial, socioeconomic, and cultural differences of the groups were avoided. Using this written ISAAC survey method for both surveys eliminated the problems that could arise from a difference in methods. The prevalence of doctor-diagnosed asthma was 2.8% in 1997 and increased only to 3.6% in 2005 in this region. This demonstrates that the rate of doctor-diagnosed asthma did not increase considerably over an 8-year period in Turkey and thus is not a reason for the observed increase in the number of asthmatics diagnosed. In this region, when compared with the global prevalence rate, the prevalence rates of doctor-diagnosed asthma were below the worldwide average mean for both the 1997 and 2005 surveys. Doctor diagnosed asthma constitutes only about to 1/3 of the group of children with asthma. In contrast, the prevalence of doctor-diagnosed allergic rhinitis and eczema is higher than the prevalence of doctor-diagnosed asthma. This may indicate that doctors behave in a hesitant manner when it comes to making diagnosis of asthma. However, this hesitation does not seem to exist for diagnosing rhinitis or eczema. We think this hesitation can be overcome by educating doctors, patients, and families. BMI was found to be a risk factor for asthma in the 2005 survey, but not in the 1997 survey. Many studies have shown that there is a positive correlation between obesity or BMI and asthma [21-23]. Our findings agree with other studies, showing that BMI is going to be an important risk factor for asthma in Turkish children. Family history of atopic disease and living with a dog or cat were important risk factors for the development of asthma in both the 1997 and 2005 surveys. It is well known that asthma symptoms are triggered by animal allergens [21]. It has been observed that a family history of atopic disease constitutes an important factor in the genetic background. Environmental factors have been thought to be important in determining the subsequent development of asthma [24]. One of the most important extrinsic factors that influence children's health is passive smoking [25-27]. The association between passive smoking and asthma in childhood is well known. Smoking is a major public health problem in Turkey, as reflected by the high prevalence of passive smoking among children in both surveys (69% in 1997 and 54.8% in 2005). Even though passive smoking increases the risk of asthma by some amount (OR, 1.165), this increase is not statistically meaningful. Passive smoking in early life may increase a child's susceptibility to the development of atopic diseases and to a more severe expression of asthma in the child. This could be an important and possibly a preventable factor in asthma.

In conclusion, we have used the same standardized and validated ISAAC questionnaire to study the prevalence of asthma symptoms and other allergic diseases in Turkish schoolchildren in 1997 and 2005. The prevalence of asthma symptoms, allergic rhinitis, and eczema increased significantly in 2005 when compared with the previous survey. However, the doctor diagnosed asthma group make up only a very small percentage of the children who really have asthma. For this reason, there is a necessity for efforts for a campaign to inform doctors and the community on the subject of childhood asthma.

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