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Prevalence of asthma and allergic diseases and associated risk factors among primary school children in the Malatya region

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■ MAIN POINTS

- Among 6–7-year-old children in Malatya, the prevalence of physician-diagnosed asthma was 4.2%, while 18.6% experienced wheezing in the past year.
- Allergic rhinitis symptoms affected 29.9% of participants and showed a strong association with a positive family history.
- Atopic dermatitis was reported in 7.9% of children, significantly linked to parental history of atopic dermatitis.
- Prematurity, together with family history of allergic diseases, emerged as the most consistent risk factors.
- This study provides updated regional epidemiological data that may guide preventive strategies and healthcare planning.

■ ABSTRACT

Aim: In recent years, a significant increase has been observed in the prevalence of allergic diseases during childhood. This study aims to determine the prevalence of asthma, allergic rhinitis, and atopic dermatitis among children aged 6–7 living in the city center of Malatya, as well as to analyze potential environmental and familial risk factors associated with these conditions.

Materials and Methods: The study was conducted between December 2023 and January 2024 in primary schools located in central Malatya, using the International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire protocol. A total of 431 children were included. Participants were evaluated based on demographic characteristics, environmental exposures, family history, and symptoms related to asthma, allergic rhinitis, and atopic dermatitis. The collected data were analyzed statistically.

Results: Lifetime wheezing was reported in 20% of the children, while 18.6% reported wheezing within the past 12 months. The prevalence of physician-diagnosed asthma was 4.2%. Allergic rhinitis symptoms were reported in 32.7% of the children throughout their lifetime and in 29.9% during the last year, while the rate of physician-diagnosed allergic rhinitis was 6.7%. The lifetime prevalence of atopic dermatitis was 8.8%, and the physician-diagnosed rate was 2.6%. Family history of asthma, allergic rhinitis, atopic dermatitis, and premature birth were identified as significant risk factors ($p < 0.05$). No statistically significant association was found with gender, exposure to tobacco smoke, pet ownership, mode of delivery, parental consanguinity, or the presence of mold in the home.

Conclusion: These findings confirm that allergic diseases represent a significant public health burden among children in Malatya. The results specifically highlight family history and perinatal factors as major determinants of disease prevalence in this population.

Keywords: Hypersensitivity, Asthma, Prevalence, Risk factors, Population based study

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■ INTRODUCTION

Asthma and other allergic diseases are among the most common chronic conditions in childhood, with an increasing prevalence observed both in Türkiye and worldwide [1,2]. The frequency of these diseases can vary significantly between countries and even across different regions within the same country [3–7]. In addition to genetic predisposition, environmental factors are also known to play a significant role in the development of allergic diseases [8].

Understanding the prevalence of allergic diseases in a given region is of great importance for planning healthcare services, implementing preventive measures, and assessing the potential economic burden on society. With this aim, the International Study of Asthma and Allergies in Childhood (ISAAC) group was established in the early 1990s, which has led to large-scale epidemiological studies in various countries and regions. These studies employed standardized questionnaires and objective assessment tools with global validity [9].

Following ISAAC Phase I, which primarily utilized questionnaires, Phase II incorporated advanced diagnostic methods such as skin prick testing, pulmonary function testing, bronchial provocation testing, complete blood counts, and serum total IgE measurements [10]. Approximately five years later, ISAAC Phase III reassessed changes in allergic disease prevalence through renewed, questionnaire-based surveys [11].

The present study aimed to determine the prevalence of allergic diseases, including asthma, allergic rhinitis, and atopic dermatitis, among children aged 6-7 years living in the central district of Malatya, and to comprehensively evaluate the environmental and familial risk factors associated with these conditions.

■ MATERIALS AND METHODS

This cross-sectional study included children aged between 6 and 7 years who were residing in the city center of Malatya between December 2023 and January 2024. According to data from the Turkish Statistical Institute, approximately 24,700 children are in this age group in the Malatya city center.

The study protocol was approved by the Local Ethics Committee of İnönü University Faculty of Medicine (Approval No: 2023/4503). Written informed consent was obtained from the parents of all participating children.

Power analysis

The minimum required sample size for the study was calculated using G*Power version 3.1 software. Based on previous regional studies reporting a prevalence of respiratory allergies ranging between 15% and 25%, a 95% confidence level, a statistical power of 80%, and a 5% margin of error were assumed. According to these parameters, the minimum required number of participants was determined as 354. Ultimately, 431 children were included in the study, ensuring adequate statistical power for all primary comparisons.

To ensure representation of different socioeconomic levels, the city center was divided into four regions, and one primary

school was randomly selected from each region. The Turkish-adapted version of the International Study of Asthma and Allergies in Childhood (ISAAC) questionnaire was used for data collection. Questionnaires were distributed by teachers and completed by parents. To improve comprehension, medical terms were explained in the classroom before distribution. A total of 500 students were reached, and 431 questionnaires (86.2%) were fully completed and included in the final analysis. The definitions of asthma, allergic rhinitis, and atopic dermatitis were based on the ISAAC criteria, incorporating both symptom-based history and physician diagnosis.

Statistical analysis

Statistical analyses were performed using IBM SPSS Statistics, version 26.0 (IBM Corp., Armonk, NY, USA). Categorical variables were presented as frequencies and percentages. Depending on the test assumptions, Pearson’s chi-square test or continuity-corrected chi-square test was applied for statistical comparisons. A two-tailed p-value of less than 0.05 was considered statistically significant.

■ RESULTS

The mean age of the 431 children included in the study was 6.22 ± 0.41 years. Of these, 232 (53.8%) were girls and 199 (46.2%) were boys. Passive exposure to tobacco smoke at home was reported in 175 children (40.6%), while 30 children (7%) had mothers who smoked during pregnancy, and 27 (6.3%) were born prematurely. Regarding the mode of delivery, 231 children (53.6%) were delivered by cesarean section and 200 (46.4%) by vaginal birth. Parental consanguinity was present in 88 cases (20.4%). Mold growth in the household was reported by 50 participants (11.6%), and 72 (16.7%) reported having pets at home. A family history of asthma was noted in 83 children (19.3%), allergy in 95 (22%), allergic rhinitis in 64 (14.8%), and atopic dermatitis in 62 (14.4%) (Table 1).

Detailed analyses of risk factors for each allergic condition are presented separately in Table 3A (asthma), Table 3B (allergic rhinitis), and Table 3C (atopic dermatitis).

Wheezing episodes / Asthma and associated risk factors

Regarding symptoms associated with asthma, 20% of children reported experiencing wheezing at least once in their lifetime, and 18.6% reported having this symptom within the past 12 months. In the same period, 3.7% had more than three episodes, 13.2% experienced wheezing severe enough to disturb sleep at night, and 4.4% reported symptoms severe enough to impair speech. Exercise-induced wheezing was observed in 5.3%, while 15.8% experienced night awakenings due to cough. The prevalence of physician-diagnosed asthma was 4.2% (Table 2).

Analysis of risk factors revealed a significant association between a history of wheezing at any time and a family history of

Table 1. Demographic characteristics.

	n (%)
Gender (Female)	232 (53.8)
Passive Exposure to Cigarette Smoke	175 (40.6)
Maternal Smoking During Pregnancy	30 (7.0)
Preterm Birth	27 (6.3)
Mode of Delivery, Cesarean Section	231 (53.6)
Consanguineous Marriage	88 (20.4)
Presence of Mold in the Home	50 (11.6)
Keeping Pets at Home	72 (16.7)
Family History of Asthma	83 (19.3)
Family History of Allergy	95 (22.0)
Family History of Allergic Rhinitis	64 (14.8)

Descriptive data are presented as frequencies and percentages.

Table 2. Prevalence of asthma-related symptoms.

Wheezing / Coughing Symptoms	n (%)
Wheezing at any time in life	86 (20)
Wheezing in the past 12 months	80 (18.6)
Number of wheezing attacks in the past 12 months	
1-3 times	66 (15.3)
4-12 times	15 (3.5)
≥12 times	1 (0.2)
Sleep disturbance due to wheezing in the past 12 months	
Never awakened	374 (86.8)
< 1 night/week	42 (9.7)
> 1 night/week	15 (3.5)
Difficulty speaking due to severe wheezing in the past 12 months	19 (4.4)
Wheezing during or after exercise in the past 12 months	23 (5.3)
Night waking due to coughing in the past 12 months	68 (15.8)
Physician-diagnosed asthma	18 (4.2)

Descriptive data are presented as frequencies and percentages.

asthma, allergic disease, atopic dermatitis, and allergic rhinitis ($p<0.05$). Premature birth was also found to be associated with the development of wheezing ($p=0.022$). In contrast, sex, maternal smoking during pregnancy, household smoking exposure, pet ownership, mode of delivery, parental consanguinity, and presence of household mold showed no statistically significant association with wheezing symptoms (Table 3A).

Allergic rhinitis and associated risk factors

For allergic rhinitis, lifetime symptoms were reported by 32.7% of participants, and symptoms within the past 12 months were reported by 29.9%. During the same period, conjunctivitis symptoms were reported in 13% of children, and 56.5% experienced symptoms that affected daily activities more than moderately. The prevalence of physician-diagnosed allergic rhinitis was 6.7% (Table 4).

Allergic rhinitis symptoms were significantly associated with a family history of asthma, allergy, atopic dermatitis, and allergic rhinitis ($p<0.05$). However, sex, maternal smoking during pregnancy, household smoking exposure, mode of delivery, birth timing, pet ownership, parental consanguinity, and the presence of household mold were not significantly associated (Table 3B).

Atopic dermatitis and associated risk factors

With respect to atopic dermatitis, 8.8% of children reported having itchy rashes at some point in their lifetime, and 7.9% reported experiencing them within the past 12 months. Night awakenings due to itching during this period were observed in 26.3% of cases, while the prevalence of physician-diagnosed atopic dermatitis was 2.6% (Table 5).

For itchy rashes lasting six months or more, significant associations were observed with a family history of asthma, allergy, atopic dermatitis, and allergic rhinitis ($p<0.05$). No statis-

tically significant associations were found with other factors (Table 3C).

■ DISCUSSION

This study aimed to determine the prevalence of asthma, allergic rhinitis, and atopic dermatitis among primary school children aged six to seven years living in the city center of Malatya, and to evaluate potential risk factors associated with these conditions. According to our findings, the prevalence of asthma in Malatya was 18.6%, allergic rhinitis was 29.9%, and atopic dermatitis was 7.9%. Among the risk factors examined, a history of premature birth was identified as a risk factor for asthma, while a family history of asthma, allergy, atopic dermatitis, or allergic rhinitis was found to be a risk factor for all three conditions.

In our study, lifetime wheezing prevalence was 20%, wheezing within the past year was 18.6%, and physician-diagnosed asthma was 4.2%. In a previous study conducted in Malatya by Topal et al. in 2015 involving 413 children aged six to seven years, lifetime wheezing prevalence was reported as 20.3%, past-year wheezing prevalence as 12.3%, and physician-diagnosed asthma as 9% [12]. Similarly, studies conducted in different regions by Akçay et al. in Denizli in 2003 among six- to seven-year-olds [5], Çetemen et al. in Aydın in 2009 among six- to seven-year-olds [13], Gürkan et al. in Diyarbakır in 2000 among six- to fifteen-year-olds [14], Arslan et al. in Sivas in 2008 among seven- to fifteen-year-olds [15], Talay et al. in Bolu in 2006 among seven- to fourteen-year-olds [16], and Tomaç et al. in Zonguldak among six- to sixteen-year-olds [17] reported lifetime wheezing prevalence rates of 22.3%, 30.8%, 22.4%, 26.8%, 15.5%, and 15.5%, respectively. Past-year wheezing prevalence rates in these studies were 9.9%, 19.3%, 14.7%, 6.5%, 9.9%, and 11.2%, while physician-diagnosed asthma prevalence was 17.3%, 17.1%, 14.1%, 10.1%, 5.6%, and 4.9%, respectively.

When comparing our findings with those from previous

Table 3. Risk Factors for Asthma, Allergic Rhinitis, and Atopic Dermatitis.**(a)** Risk factors associated with wheezing (asthma).

Variable	Wheezing present n (%)	p value
Sex, Male	33 (16.6)	0.328
Family history of asthma	37 (44.6)	<0.001*
Family history of allergy	36 (37.9)	<0.001*
Family history of atopic dermatitis	20 (32.3)	0.005*
Family history of allergic rhinitis	27 (42.2)	<0.001*
Maternal smoking during pregnancy	8 (26.7)	0.347
Passive smoking at home	40 (22.9)	0.058
Keeping pets at home	4 (19.4)	0.964
Mode of delivery, Cesarean section	46 (19.9)	0.438
Preterm birth	10 (37)	0.022*
Parental consanguinity	13 (14.8)	0.384
Presence mold in the home	11 (22)	0.637

* p-values were calculated using continuity-corrected Chi-square test.

(b) Risk factors associated with allergic rhinitis.

Variable	Rhinitis symptoms present n (%)	p value
Sex, Male	56 (28.1)	0.452
Family history of asthma	48 (57.8)	<0.001*
Family history of allergy	54 (56.8)	<0.001#
Family history of atopic dermatitis	35 (56.5)	<0.001*
Family history of allergic rhinitis	38 (59.4)	<0.001*
Maternal smoking during pregnancy	14 (46.7)	0.062
Passive smoking at home	52 (29.7)	0.935
Keeping pets at home	22 (30.6)	1
Mode of delivery, Cesarean section	77 (33.3)	0.097
Preterm birth	12 (44.4)	0.138
Parental consanguinity	23 (26.1)	0.384
Presence mold in the home	11 (22)	0.255

* p-values were calculated using continuity-corrected Chi-square test. # p-values were calculated using Pearson's Chi-square test.

(c) Risk factors associated with atopic dermatitis.

Variable	Itchy rash present n (%)	p value
Sex, Male	15 (7.5)	0.486
Family history of asthma	13 (15.7)	0.026*
Family history of allergy	15 (15.8)	0.012*
Family history of atopic dermatitis	13 (21)	<0.001*
Family history of allergic rhinitis	11 (17.2)	0.020*
Maternal smoking during pregnancy	5 (16.7)	0.169
Passive smoking at home	15 (8.6)	1.000
Keeping pets at home	7 (9.7)	0.945
Mode of delivery, Cesarean section	21 (9.1)	0.964
Preterm birth	0 (0)	0.154
Parental consanguinity	9 (10.2)	0.755
Presence mold in the home	4 (8)	1

* p-values were calculated using continuity-corrected Chi-square test.

studies conducted in various regions of Türkiye and in our province, we observed a noticeable increase in past-year wheezing prevalence, except for the study by Çetemen et al., alongside a marked decrease in physician-diagnosed asthma prevalence. This may be explained by the increased air pollution in the region following the major earthquake on February 6, 2023, which could have contributed to the higher symptom frequency. Additionally, the reduced accessibility of health-care services in the post-earthquake period may have con-

tributed to the decline in physician-diagnosed asthma rates.

In our study, the lifetime prevalence of allergic rhinitis symptoms was 32.7%, past-year prevalence 29.9%, and physician-diagnosed allergic rhinitis 6.7%. In the 2015 study conducted in Malatya by Topal et al., lifetime rhinitis prevalence among six- to seven-year-olds was reported as 37%, past-year rhinoconjunctivitis prevalence as 12.1%, and physician-diagnosed rhinitis prevalence as 3.4% [12]. Similarly, studies by Akçay et al. in Denizli in 2003 [5], Çetemen et al. in Aydın

Table 4. Prevalence of allergic rhinitis-related symptoms.

Symptom or Condition	n (%)
Allergic rhinitis (AR) symptoms at any time in life	141 (32.7)
AR symptoms in the past 12 months	129 (29.9)
Allergic conjunctivitis symptoms in the past 12 months	56 (13)
Impact of AR symptoms on child's activities in the past 12 months	
None	11 (8.5)
Very little	45 (34.8)
Moderate	69 (53.4)
Severe	4 (3.1)
Physician-diagnosed AR	29 (6.7)

Descriptive data are presented as frequencies and percentages.

Table 5. Prevalence of atopic eczema-related symptoms.

Symptom or Condition	n (%)
Atopic dermatitis (AD) symptoms at any time in life	38 (8.8)
AD symptoms in the past 12 months	34 (7.9)
Night waking due to itching in the past 12 months	
None	25 (73.5)
Less than once per week	7 (20.5)
Once or more per week	2 (5.8)
Physician-diagnosed AR	11 (2.6)

Descriptive data are presented as frequencies and percentages.

in 2009 [13], and Arslan et al. in Sivas in 2008 [15] reported lifetime allergic rhinitis prevalence rates of 33.5%, 30.4%, and 25.2%, respectively. Past-year prevalence rates were 8%, 11.1%, and 17.7%, and physician-diagnosed allergic rhinitis rates were 6.1% and 8.3% in the latter two studies.

When compared with earlier studies from our region and other parts of the country, the observed increase in past-year allergic rhinitis symptoms in our study is likely linked to earthquake-related air pollution.

With respect to atopic dermatitis, our study found lifetime symptom prevalence of 8.8%, past-year prevalence of 7.9%, and physician-diagnosed prevalence of 2.6%. In the study by Topal et al. involving six- to seven-year-olds, these rates were 7.5%, 6.5%, and 7.3%, respectively [12]. Similarly, studies by Akçay et al. in Denizli in 2003 [5], Çetemen et al. in Aydın in 2009 [13], and Arslan et al. in Sivas in 2008 [15] reported lifetime atopic dermatitis prevalence rates of 11.3%, 9.6%, and 28.3%, respectively; past-year prevalence rates were 8.2%, 7.8%, and 20.5%; respectively and physician-diagnosed prevalence rates were 2.8% and 2.9% in the latter two studies. The lower physician-diagnosed atopic dermatitis prevalence in our study compared with others may be partly due to reduced access to healthcare services following the February 2023 earthquake. Additionally, variations in genetic predisposition, lifestyle, dietary habits, and the methodology of questionnaire administration may also have influenced prevalence rates.

Regarding risk factors, a significant association was found between premature birth and wheezing, supporting the hypoth-

esis that incomplete lung development in preterm infants increases susceptibility to respiratory diseases [18]. Furthermore, children with a family history of asthma, allergy, atopic dermatitis, or allergic rhinitis were significantly more likely to experience symptoms of all allergic diseases, reinforcing the role of genetic predisposition in their development, as supported by previous literature [19].

In contrast, no significant associations were observed between asthma or other allergic disease symptoms and environmental risk factors such as maternal smoking during pregnancy, exposure to household tobacco smoke, pet ownership, or the presence of household mold.

Limitations

Limitations of this study include the use of a questionnaire-based data collection method, which may be subject to recall bias, parental misreporting, and social desirability bias. In addition, the study relied exclusively on questionnaire-based data without objective clinical measurements such as spirometry, skin prick testing, or serum IgE levels. Future studies incorporating such quantitative assessments would provide a more comprehensive understanding of allergic disease prevalence and risk factors. Additionally, the potential indirect effects of post-earthquake changes in living conditions on the results should be considered.

CONCLUSION

In conclusion, allergic diseases appear to be an increasingly significant public health concern in the Malatya region. While

nonmodifiable risk factors such as family history and birth conditions play an important role, targeted interventions addressing environmental factors remain essential for regional healthcare planning.

Ethics Committee Approval: The study protocol was approved by the Local Ethics Committee of İnönü University Faculty of Medicine (Approval No: 2023/4503).

Informed Consent: Informed consent was obtained from the parents of all children who participated in the study.

Peer-review: Externally peer-reviewed.

Conflict of Interest: The authors declare that they have no conflict of interest.

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