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O.V. Mozyrska, O.V. Iemets
Bogomolets National Medical University, Kyiv, Ukraine

Risk factors associated with the incidence of asthma among adolescents in Ukraine

Abstract. ***Background.*** *Asthma is a common disease among children and adolescents.* *The purpose of this study was to describe the detailed characteristics of adolescents with asthma, identify risk factors associated with the development of asthma and to evaluate medical care for patients with asthma.* ***Materials and methods.*** *Asthma patients (n = 80) aged 12 to 18 years from the Allergology Department of the Kyiv City Children's Clinical Hospital 2, the clinical base of the Department of Pediatrics 2 of the Bogomolets National Medical University, were included in the study. The control group consisted of 120 children without asthma. In the group of interviewed children, asthma was diagnosed based on clinical data and objective measurement of lung function. All children underwent spirometry and skin prick test with aeroallergens. During the clinical examination, weight and height were measured, and body mass index was calculated. The survey was conducted by a research doctor using a Google form.* ***Results.*** *Parents of 80 children with asthma were involved in our survey between September 2023 and May 2024. Asthma occurred more often in boys than in girls: odds ratio (OR) = 7.3 (95% confidence interval (CI) 3.84–14.16, P < 0.0001). 31.25 % respondents reported a history of atopic dermatitis, 26.25 % had atopic dermatitis at the time of the study. Food allergy was detected in 25 % children. 48.75 % children had concomitant allergic rhinitis, of which 33.75 % had seasonal, 15 % had perennial. We found that children living in the city had asthma more often: OR = 7.3 (95% CI 3.26–16.62, P < 0.0001). Having an older sibling was associated with a lower risk of asthma: OR = 3.6 (95% CI 1.86–6.92, P < 0.0001). Also, we found that cat owners were significantly more likely not to have asthma: OR = 7.7 (95% CI 3.96–14.99, P < 0.0001). Such data are most likely related to the refusal to own a cat due to the prevalence of cat allergy among children with asthma or at risk of cat allergy. We have not found a statistically significant difference in the group of children with asthma and in the control group in relation to the exposure to tobacco smoke in the atmosphere (passive smoking): OR = 1.4 (95% CI 0.79–2.59, P > 0.05).* ***Conclusions.*** *Treatment of allergies and atopic conditions should be considered an important component of asthma treatment, which may affect the frequency and severity of the disease. In adolescents and adults, smoking cessation, in particular, as a factor in the impact of passive smoking on a sick child can also significantly reduce the number of hospitalizations. Confirming the diagnosis of asthma, demonstrating good inhaler technique, and emphasizing adherence to preventive therapies such as inhaled glucocorticosteroids can improve asthma control and reduce overreliance on short-acting bronchodilators.*

Keywords: *asthma; risk factors; adolescents*

Introduction

Asthma is a common disease among children and adolescents [1–3]. Adolescence brings not only physiological changes, but also new behavioral traits, such as smoking cigarettes. Asthma is more common in boys than in girls, further emphasizing the importance of this period for the epidemiology of asthma.

Allergic sensitization and allergic conditions, such as allergic rhinitis (AR) and atopic dermatitis (AD), are the main factors determining the frequency of asthma and wheezing in adolescence [4]. A family history of asthma and female gender also increase the risk of asthma [4]. The presence of older siblings and attending children's collectives have a protective effect on the development of asthma. Of particu-

Для кореспонденції: Мозирська Олена Вікторівна, кандидат медичних наук, доцент, кафедра педіатрії № 2, Національний медичний університет імені О.О. Богомольця, бульв. Тараса Шевченка, 13, м. Київ, 01601, Україна; e-mail: elenmoz85@gmail.com; тел.: +380 (67) 901-81-08
For correspondence: Olena Mozyrska, PhD in Medicine, Associate Professor, Department of Pediatrics 2, Bogomolets National Medical University, Taras Shevchenko boulevard, 13, Kyiv, 01601, Ukraine; e-mail: elenmoz85@gmail.com; phone: +380 (67) 901-81-08
Full list of authors' information is available at the end of the article.

lar interest are potential preventable risk factors for asthma. They include excess weight [5], air pollution, exposure to mold and indoor humidity, and smoking, including passive smoking [4, 6].

Acute asthma attacks requiring hospitalization often indicate poor symptom control and insufficient modification of risk factors [7]. Possible risk factors for a high frequency of asthma attacks include a severe course of the disease, insufficient adherence to the prescribed therapy, inadequate medical supervision and monitoring of the disease, the presence of comorbidities, tobacco smoking, socioeconomic deprivation, previous asthma attacks, comorbidities, such as AR and gastroesophageal reflux disease (GERD), and air pollution [8]. These factors have been widely studied in the world but their influence on the onset and course of the disease may vary in different countries.

According to the hygiene hypothesis, our microbial environment at an early age is an integral part of the development of immunity and the prevention of atopy and asthma. Over the past decade, several studies have examined the protective effects of growing up in farm settings as opposed to cities [9]. These studies of living conditions provided convincing evidence in support of the hygienic hypothesis. Microbial exposure due to the neighborhood with domestic animals at an early stage of life provides protection against the development of atopic asthma [10].

In general, literature data do not show a significant role of contact with animals at an early age in the development of asthma, but they indicate that contact with dogs at an early age provides protection against asthma [11]. According to some data, exposure to birds increases the risk of asthma. The source of exposure, the history of parents with asthma or allergies, and the period of contact with animals can also affect the risks [11].

It is well known that exposure to tobacco smoke in the atmosphere increases the risk of developing asthma at an early age [10]. A meta-analysis of 79 articles evaluating the effects of ambient tobacco smoke on asthma grouped studies by type and timing of secondhand smoke exposure (prenatal maternal, postnatal maternal, postnatal paternal, or familial) and age at which outcomes were measured (≤ 2, 3–4 or 5–18 years) [9]. Both antenatal and postnatal maternal smoking significantly increased the incidence of asthma at any age (odds ratio (OR) 1.18–1.70). Parental smoking was also associated with significantly increased odds of asthma in 5–18-year-old children (OR 1.39) [12]. Because adolescents may spend significantly less time in the presence of parents who smoke, the impact of passive smoking during adolescence needs to be studied.

We decided to evaluate how these factors affect the risk of asthma in Ukraine, and to assess whether adequate attention is paid to the control of asthma among adolescents in Ukraine today. The issue of asthma control in children in the de-occupied and near-front areas requires special attention [13, 14], but, unfortunately, such data are difficult to access and this study did not include a survey of children living in these areas.

The aim: to describe the detailed characteristics of adolescents with asthma, to identify risk factors associated with the development of asthma and evaluate medical care for patients with asthma.

Materials and methods

Asthma patients (n = 80) aged 12 to 18 (median 6 [3; 10]) years from the Allergology Department of the Kyiv City Children's Clinical Hospital 2, the clinical base of the Department of Pediatrics 2 of the Bogomolets National Medical University, were included in the study. The research was conducted on the basis of the Declaration of Helsinki of the World Medical Association and the rules of quality medical practice (ICH GCP), voluntary participation, informing patients about the nature of the research. The control group consisted of 120 children without asthma.

In the group of interviewed patients, asthma was diagnosed based on clinical data and objective measurement of lung function [15]. A diagnosis of asthma was made if parents reported symptoms of asthma (difficulty breathing, chest tightness in the past 12 months, difficulty breathing or wheezing after exercise, wheezing in the chest during the previous 12 months, or a previous physician diagnosis of asthma) and the child demonstrated significant airway reversibility (> 12% increase in the forced expiratory volume in 1 second (FEV1)).

The diagnosis of AD was verified according to the unified clinical protocol of primary, secondary (specialized), tertiary (highly specialized) medical care "Atopic dermatitis" (Order of the Ministry of Health of Ukraine dated July 4, 2016, No. 670) [16] and according to the criteria proposed by J.M. Hanifin, G. Rajka, which were supplemented by the British group of specialists and adopted in 1994 as international clinical guidelines. The diagnosis of AR was verified according to the protocol for the diagnosis and treatment of AR in children [17]. Early wheezing was detected for those children who, according to their parents, had wheezing in the first 3 years of life.

All examined children underwent spirometry and skin prick testing with aeroallergens: birch, alder, wormwood, timothy, ragweed, *Alternaria alternata*, cat, dog, and dust mites (*Dermatophagoides farinae* and *Dermatophagoides pteronyssinus*). A skin prick test was positive with a wheal ≥ 3 mm in diameter after 15 minutes. During the clinical examination, weight and height were measured, and weight/height^2 (body mass index, BMI) was calculated.

The survey was conducted by a research doctor using a Google form. The following questions regarding clinical, demographic, anamnestic parameters were included in the questionnaire of the main group:

— age;

— sex;

— age of the diagnosis of asthma (confirmed by medical card);

— the degree of severity of asthma;

— presence of an allergic disease in parents, grandparents, sisters or brothers;

— place of birth and residence: urban or rural;

— the presence of animal at home, kind of animal, and from what age the child has a pet;

— the presence of siblings, with clarification — younger or older in relation to the interviewee;

— having a family member who smokes;

— presence of AD (in history or at the time of examination);

— age of starting wheezing;
— frequency of asthma episodes for the last year;
— the presence of wheezing separately from ARVI;
— the relationship between asthma symptoms and contact with an allergen (with an indication of an allergen);
— presence of AR;
— the presence of a food allergy (connection between food intake and urticaria, vomiting, diarrhea, angioedema, constipation, anaphylaxis);
— presence of GERD;
— presence of obesity;
— results of spirometry performed during the last year (FEV1, test for the reversibility of bronchial obstruction);
— presence of sensitization;
— the presence of episodes of exacerbation that required admission to a hospital or intensive care unit, the need for oxygen;
— what method of drug delivery is used;
— the number of days missed at school in the last year due to asthma;
— availability of a written action plan for asthma from a doctor;
— prescribed basic therapy;
— assessment of the correctness of inhalations by a doctor;
— using a peakflowmeter at home.

We included the following questions regarding clinical, demographic, anamnestic parameters in the questionnaire for the control group:
— age;
— sex;
— absence of asthma (confirmed by a medical card);
— place of birth and residence: urban or rural;
— the presence of animal at home, kind of animal, and from what age the child has a pet;
— the presence of siblings, with clarification — younger or older in relation to the interviewee;
— having a family member who smokes.

Statistical processing of the obtained data was carried out using the statistical package IBM SPSS Statistics Base (version 22) and the software EZR version 1.32 (graphical interface of the R environment (version 2.13.0)). The research database was systematized in the Microsoft Excel. The relationship of risk factors and the development of asthma was determined using the OR with a 95% confidence interval (CI). The critical level of significance (P) in testing statistical hypotheses in this study was taken to be equal to 0.05.

Results

Parents of 80 children with asthma were involved in our survey between September 2023 and May 2024. The average age of the children was 15.5 ± 3.2 years. The control group consisted of 120 children without asthma, 47 boys and 73 girls. The average age of these children was 14.5 ± 2.4 years.

According to the survey data, 32 (40 %) children had intermittent asthma, 16 (20 %) had mild persistent asthma, 24 (30 %) had moderate asthma, and 8 children (10 %) had severe asthma. Twelve (15 %) children were diagnosed with asthma at the age of 1–3 years, 20 (25 %) — at the age of 3–6 years, 48 (60 %) — at the age of 7 years. Thirty-nine (48.75 %) children had a parental allergic history: in 23 (28.75 %), the mother had allergic diseases (asthma, AR), in 16 (20 %), the father, in 12 (15 %), the grandmother, in 3 (3.75 %), grandfather. Eight (10 %) had a brother with allergic diseases, 1 (1.25 %) had a sister. Asthma occurred more often in boys than in girls: OR = 7.3 (95% CI 3.84–14.16, $P < 0.0001$).

Twenty-five (31.25 %) respondents had a history of AD, 21 (26.25 %) had AD at the time of the study. Food allergy was defined as a connection between food intake and urticaria, vomiting, diarrhea, angioedema, constipation, and anaphylaxis. Thus, food allergy was detected in 20 (25 %) children, milk, eggs, fish, nuts were among the allergens. Thirty-nine (48.75 %) children have concomitant AR, of which 27 (33.75 %) had seasonal, 12 (15 %) had perennial.

Twelve (15 %) children had the onset of wheezing under the age of 1 year, 43 (53.75 %) — at the age of 1–5 years, 25 (31.25 %) — at the age of over 6 years.

The frequency of asthma exacerbations for the current year was 1–2 episodes in 12 (15 %) children, 3–4 — in 23 (28.75 %), more than 5 — in 25 (31.25 %). The absence of wheezing was reported by 20 (25 %) respondents. According to the survey, 40 (50 %) patients had wheezing with ARVI. Among them, 31 (38.75 %) also had asthma episodes without ARVI. In 45 (56 %) cases, exacerbations of asthma were associated with contact with an allergen, in 26 (32.5 %) — with stress, in 39 (48.75 %) — with physical activity, in 12 (15 %) — with weather changes.

Among those interviewed, skin testing with aeroallergens was performed in 38 (47.5 %) children and showed a positive result in 32 (40 %) people. Among the sensitized, 27 (33.75 %) were sensitive to pollen allergens, 20 (25 %) had a positive test to animals, 38 (47.5 %) to mold, 11 (13.75 %) to house dust mites.

According to the results of the survey, 45 (56.25 %) parents of children with asthma reported that asthma attacks were associated with contact with an allergen: in 32 (40 %), it was contact with animals, in 44 (55 %) — pollen season, in 26 (32.5 %) — household dust (house dust mites), in 24 (30 %) — dampness in the room, signs of mold.

The presence of excess body weight was determined by a body mass index ≥ 85th, but < 95th percentile for the corresponding age and sex; obesity — if BMI ≥ 95th percentile. In the main group, 12 (15 %) children were overweight, 3 (3.75 %) were obese. Three (3.75 %) respondents reported the presence of GERD symptoms in their child.

In our study, we evaluated some measures to control the course of the disease and their effect on the presence of severe asthma attacks. Fifty (62.5 %) children received basic therapy: 40 (50 %) — inhaled glucocorticosteroids (IGCS), low dose, 10 (12.5 %) — IGCS, medium dose. Twenty-seven (33.75 %) use a metered-dose inhaler, 2 (2.5 %) — a spacer, 24 (30 %) — a nebulizer for the purpose of drug delivery. According to the survey, 17 (21.25 %) reported that the doctor did not assess the correctness of the inhalation technique. Seventy (87.5 %) children do not use a peak flowmeter and do not have it at home, 8 (10 %) use it occasionally, 2

(2.5 %) use it constantly. Twenty-five (31.25 %) of the respondents reported that they have a written action plan for asthma from a doctor, and, accordingly, 55 (68.75 %) did not receive such an action plan.

In the main group, 40 (50 %) children were hospitalized for asthma at least once, among them 3 (3.75 %) required hospitalization in the intensive care unit, 12 (15 %) received oxygen therapy. We also assessed the impact of asthma on missing school classes: 12 (15 %) reported that the number of days missed at school due to asthma was less than 10 days, 11 (13.75 %) — within 10–20 days, 15 (18.75 %) missed more than 20 days during the current year.

Seventy-two (90 %) of the interviewed children live in urban areas. Among those who did not have asthma, this figure was 66 (55 %). We found a significant difference — children living in the cities had asthma more often: OR = 7.3 (95% CI 3.26–16.62, P < 0.0001).

In the control group, 49 (40.83 %) children had older siblings, 53 (44.17 %) had younger ones, 30 (25 %) were the only children in the family. In the group of children with asthma, 25 (31.25 %) were the only children in the family, 25 (31.25 %) had older siblings. The difference in groups according to this indicator was statistically significant: OR = 3.6 (95% CI 1.86–6.92, P < 0.0001). Having an older sibling was associated with a lower risk of asthma.

Studies have shown that growing with pets can affect the risk of asthma. Among the asthma patients interviewed by us, 12 (15 %) had a cat, 20 (25 %) — a dog, 8 (10 %) — another animal (gophers, chinchillas, rats, rabbits). In the control group, 79 (65.8 %) had a cat, 63 (52.5 %) had a dog, 27 (22.5 %) had another animal, and 17 (14.2 %) had cattle. Since the literature revealed that different animals can affect the risks in different ways, we compared the groups separately according to the presence of a cat: cat owners were significantly more likely not to have asthma (OR = 7.7, 95% CI 3.96–14.99, P < 0.0001), which may be due to the fact that parents of children with asthma are often allergic to cats, or do not get a cat due to worries about allergies.

The next factor, the importance of which we assessed in our groups, was exposure to tobacco smoke in the atmosphere (passive smoking). According to the questionnaire, 32 (40 %) children with asthma lived with a relative who smokes. Among the control group, this indicator was 38 (31.7 %). We have not found a statistically significant difference in the group of children with asthma and in the control group: OR = 1.4 (95% CI 0.79–2.59, P > 0.05).

Discussion

In this work, we described the detailed characteristics of adolescents with asthma, identified risk factors associated with the development of disease, assessed medical care for patients with asthma.

Among children with asthma, concomitant allergic pathology, AD and AR, was common. Asthma occurred more often in boys than in girls (OR = 7.3, 95% CI 3.84–14.16, P < 0.0001), and these data coincide with previous studies [18].

In most of the interviewees, the onset of wheezing took place at the age of 1–5 years. Preschool patients with constant wheezing and respiratory allergies are more likely to develop persistent asthma. Approximately 50 % of children with wheezing and atopic asthma continue to have symptoms at age 12 [19].

According to the results of the survey, 56.25 % of parents of children with asthma reported that asthma attacks are associated with contact with an allergen. In early childhood, sensitization to many inhaled allergens is a prognostic factor for persistent asthma, frequent attacks, and impaired lung function. The presence of allergy or atopic diseases was associated with asthma-related hospitalization. The role of allergens in triggering IgE-mediated inflammation, eosinophilia, and the release of inflammatory cytokines that contribute to airway inflammation and bronchial mucosal hypersecretion in asthma is well established. However, the determination of sensitization and allergy in asthma patients may often be unavailable, due to the financial burden on patients in particular. In this work, we drew attention to the fact that children more often knew about the significance of allergens for their asthma as a result of clinical manifestations of asthma from contact with an allergen. Much less often, sensitization was determined using allergy diagnostics: 56 versus 40 %. Our findings suggest that more effective allergy management may contribute to a reduction in asthma-related hospitalizations in children and adults.

GERD was reported by 2 %. It may be a risk factor for severe asthma [20]. The results of a meta-analysis showed that the overall probability of severe asthma attacks was 27 % higher in patients with GERD [20]. In addition, children with GERD were more prone to severe asthma attacks than adults [20]. A few reports of GERD in our study is more likely due to the small number of referrals and underdiagnosis of this disease.

In studies, poor disease control is defined by the number of salbutamol metered-dose inhalers used in the past year. A greater number of used bronchodilator inhalers is generally strongly associated with an increased risk of hospitalization for asthma. In the literature, children who received more than six prescriptions during the previous year (i.e., six metered-dose inhalers) had a fivefold increased risk of hospitalization compared to those who received none (OR = 4.97, 95% CI 4.06–6.09) [21]. According to our survey, 17 % reported that the doctor did not assess the correctness of the inhalation technique. 70 % of children do not use a peak flowmeter and do not have it at home, 55 % do not have a written plan for asthma.

In the main group, 40 % of children were hospitalized for asthma at least once, among them 3 % required hospitalization in the intensive care unit, 12 % received oxygen therapy. Asthma attacks severe enough to require hospitalization often indicate inadequate control of modifiable risk factors, including comorbidities. This includes factors, such as exposure to secondhand smoke and the presence of atopic diseases.

In adults and children, BMI was significantly associated with the risk of asthma hospitalization in previous studies [22]. In our work, 15 % of children were overweight or obese. In the N. Simms-Williams study, underweight, overweight and obesity were associated with an increased risk compared

to a normal BMI [21]. Addressing obesity in adults could potentially prevent one-fifth of all asthma-related hospitalizations. In our opinion, this recommendation should also be applied to teenagers.

90 % of the surveyed patients with asthma live in urban areas. Among children who did not have asthma, this indicator was 55 % (OR = 7.3, 95% CI 3.26–16.62, P < 0.0001). Given the clear predilection of urban populations for childhood asthma, the Inner-City Asthma Network was created to improve outcomes for these high-risk children in urban settings. The two most important factors in the development of asthma were allergic sensitization and exposure to tobacco smoke in a causal analysis of an inner-city asthmatic cohort [23].

The presence of an older sibling was associated with a lower risk of asthma (OR = 3.6, 95% CI 1.86–6.92, P < 0.0001). Previous studies suggest that the presence of older siblings protects against the development of asthma after 2 years, but increases the prevalence of early wheezing [24]. Having older siblings may increase the risk of wheezing in the first few years of life, but protects against the development of asthma later in childhood. This significant protective effect may reflect the hygiene hypothesis. Older siblings change the microbiome by sharing protective bacteria with their younger siblings. The more family members, the higher the risk of infections at an early age.

Our data showed that cat ownership was associated with lower risks of having asthma: OR = 7.7 (95% CI 3.96–14.99, P < 0.0001). Such data are most likely related to the refusal to own a cat due to the prevalence of cat allergy among children with asthma or at risk of cat allergy. Also, parents of children with asthma are often allergic to cats.

The relationship between contact with animals and the risk of atopy is controversial. Since cat and dog allergens are quite common, a questionnaire assessing only the presence of an animal at home as a risk factor may not be sufficiently objective [25]. In general, exposure to pet allergens does not increase the risk of atopy, and, according to some data, it even reduces it when in contact with cats [26]. The Urban Environment and Childhood Asthma study, contrary to expectations, demonstrated that higher concentrations of mouse, cat, and cockroach allergens during the first years of life were inversely proportional to the risk of asthma [26]. The authors postulated that this finding may be secondary to changes in the internal microbiome associated with pests and furry animals [26–29].

We failed to find a statistically significant difference between the group of children with asthma and the controls regarding the presence of family members who smoke: OR = 1.4 (95% CI 0.79–2.59, P > 0.05). Previous studies have demonstrated a significant association between personal smoking and secondhand smoke exposure and the prevalence of AD at the age of 16–17 years [21]. Secondhand smoke exposure is consistently described as strongly associated with asthma among young children and adolescents; however, the association is weaker among adolescents [21]. It is likely that this exposure diminishes during adolescence, as adolescents spend less time with their parents compared to younger children and are therefore less exposed to tobacco smoke. Smoking was associated with an increased risk in adolescents (OR = 1.26, 95% CI 1.05–1.53 for ex-smokers compared to non-smokers) [21]. Approximately 7 % of adolescent asthma-related hospitalizations could potentially be prevented by smoking cessation [21].

According to our data, such research is being conducted for the first time in Ukraine. Although studies of asthma risk factors and the status of disease control and treatment are described in the literature, these data may vary between countries and depend on traditional, cultural, socioeconomic, and other factors.

Conclusions

In our opinion, the incidence of hospitalizations associated with severe asthma attacks is potentially preventable by addressing modifiable risk factors. Treatment of allergies and atopic conditions should be considered an important component of asthma treatment, which may affect the frequency and severity of the disease. In adolescents and adults, smoking cessation, in particular, as a factor in the impact of passive smoking on a sick child can also significantly reduce the number of hospitalizations, emphasizing the need to integrate smoking cessation with the treatment of asthma. Maintenance of weight control and management of other comorbidities (obesity and GERD) should also be considered an integral part of overall asthma management, as they are likely to significantly contribute to avoidable hospitalizations.

Confirming the diagnosis of asthma, demonstrating good inhaler technique, and emphasizing adherence to preventive therapies, such as IGCS, can improve asthma control and reduce overreliance on short-acting bronchodilators. A high medication burden should be considered an important indicator of disease severity and a predictor of hospitalization for asthma.

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Information about authors

Olena Mozyrska, PhD in Medicine, Associate Professor, Department of Pediatrics 2, Bogomolets National Medical University, Kyiv, Ukraine; e-mail: elenmoz85@gmail.com; phone: +380 (67) 901-81-08; https://orcid.org/0000-0001-9936-8304

Oksana Iemets, PhD in Medicine, Associate Professor, Department of Pediatrics 2, Bogomolets National Medical University, Kyiv, Ukraine; e-mail: oxanai@ukr.net; phone: +380 (50) 387-97-50; https://orcid.org/0000-0003-3521-0537

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Мозирська О.В., Ємець О.В.
Національний медичний університет імені О.О. Богомольця, м. Київ, Україна

Фактори ризику, пов'язані із захворюваністю на бронхіальну астму серед підлітків в Україні

Резюме. Актуальність. Бронхіальна астма є поширеним захворюванням серед дітей та підлітків. **Мета:** надати детальні характеристики групи підлітків з астмою, визначити фактори ризику, пов'язані з розвитком астми, та оцінити стан медичної допомоги пацієнтам із бронхіальною астмою. **Матеріали та методи.** У дослідження були включені хворі на бронхіальну астму (n = 80) віком від 12 до 18 років з алергологічного відділення Київської міської дитячої клінічної лікарні № 2 — клінічної бази кафедри педіатрії № 2 НМУ імені О.О. Богомольця. Контрольну групу становили 120 дітей без бронхіальної астми. У групі опитаних бронхіальну астму діагностували на основі клінічних даних та об'єктивного вимірювання функції легень. Усім пацієнтам проводили спірометрію та шкірні прик-тести з аероалергенами. Під час клінічного обстеження вимірювали вагу та зріст, розраховували індекс маси тіла. Опитування проводив лікар-дослідник за допомогою гугл-форми. **Результати.** Батьки 80 дітей із бронхіальною астмою були залучені до нашого опитування з вересня 2023 р. по травень 2024 р. Бронхіальна астма частіше зустрічалася у хлопчиків, ніж у дівчат: відношення шансів (ВШ) = 7,3 (95% довірчий інтервал (ДІ) 3,84–14,16, P < 0,0001). Про атопічний дерматит в анамнезі повідомили 31,25 % респондентів, 26,25 % мали хворобу на момент дослідження. У 25 % дітей була харчова алергія. Супутній алергічний риніт мають 48,75 % дітей, з них 33,75 % — сезонний, 15 % — цілорічний. Ми виявили, що діти, які проживають у місті, хворіють на бронхіальну астму частіше: ВШ = 7,3 (95% ДІ 3,26–16,62, P < 0,0001). Наявність старшого брата або сестри асоціювалася з меншим ризиком астми: ВШ =3,6 (95% ДІ 1,86–6,92, P < 0,0001). Крім того, власники котів значно частіше не мали бронхіальної астми: ВШ = 7,7 (95% ДІ 3,96–14,99, P < 0,0001). Такі дані, швидше за все, пов'язані з відмовою мати тварину через поширеність алергії на котів серед дітей, які страждають на бронхіальну астму або мають ризик розвитку котячої алергії. Ми не виявили статистично значущої різниці в групі дітей з астмою та в контрольній групі щодо впливу тютюнового диму в атмосфері (пасивне паління): ВШ = 1,4 (95% ДІ 0,79–2,59, P > 0,05). **Висновки.** Лікування алергії та атопічних станів слід розглядати як важливий компонент терапії бронхіальної астми, що може впливати на частоту й тяжкість захворювання. У підлітків і дорослих відмова від куріння, зокрема, як фактора впливу пасивного куріння на хвору дитину також може значно зменшити кількість госпіталізацій. Підтвердження діагнозу астми, демонстрація коректної техніки інгаляції та наголошення на дотриманні профілактичних методів лікування, таких як інгаляції глюкокортикостероїдів, можуть покращити контроль бронхіальної астми й зменшити надмірну залежність від бронходилататорів короткої дії.

Ключові слова: бронхіальна астма; фактори ризику; підлітки