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Features of Formation and Course of Bronchial Asthma in Children Who Have Covid-19

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Annotation: This article is devoted to studying the features of the formation and course of bronchial asthma in children who have suffered coronavirus infection. It was determined that in all examined children the course of the disease was mild and was not accompanied by a clinically significant exacerbation of asthma. Manifestations of bronchial obstruction during the COVID-19 period in the form of attacks of suffocation, shortness of breath, distant wheezing without a previous severe exacerbation of the underlying disease were observed in only 17.3%. When coronavirus infection occurred, 61.3% were on therapy with antileukotriene drugs, 33.4% received ICS, and 5.3% did not receive any treatment.

Keywords: children, bronchial asthma, COVID-19, trigger, rehabilitation

INTRODUCTION

Viral infections are the most common triggers of asthma exacerbations. Particular attention is paid to rhinovirus infection, the causative agent of which, joining ICAMI, easily penetrates the cell membrane and becomes the initiator of the

inflammatory process. Large epidemiological studies have shown that children account for 2–6% of total confirmed COVID-19 cases, with most cases being asymptomatic, mild or moderate [4,6]. Symptoms of COVID-19 can be similar to those of an asthma exacerbation, including a prolonged dry cough and shortness of breath. Fever, which is a common symptom of COVID-19, can help differentiate it from an asthma exacerbation, although fever is sometimes present in virus-induced asthma exacerbations [3,5].

The purpose was to study the clinical, immunological and functional characteristics of children with bronchial asthma who have suffered coronavirus infection (COVID-19) and to optimize treatment and rehabilitation measures.

Materials and methods of research.

We observed 178 children with asthma aged 7 to 15 years. The studied children were divided into 2 groups: group 1 - 72 patients diagnosed with bronchial asthma of varying severity, with a confirmed diagnosis from a history of COVID-19, group 2 - 106 children - diagnosed with bronchial asthma of varying severity, without COVID - 19. The control group consisted of 56 practically healthy children of the same age. Children with mild bronchial asthma were examined and treated on an outpatient basis; patients with moderate and severe disease were examined and treated in the allergy department of the Tashkent medical academy multidisciplinary clinic, with subsequent continuation of treatment on an outpatient basis.

Results and discussion

Analysis of the respiratory history showed that repeated “obstructive bronchitis”, appearing both against the background of respiratory infections and without them, which can be regarded as a manifestation of asthma, was observed in many children in the first, and more often in 2-3 years of life. The average age of onset of the disease was 3.3±0.8 years, and diagnosis was 6.6±0.9 years. Underdiagnosis, naturally, leads to a late start of adequate anti-inflammatory therapy and, accordingly, a severe course of the disease. Hereditary predisposition to atopy was identified in 87.02%.

A study of the anamnesis made it possible to identify in the majority of observed children with bronchial asthma a family history of allergic diseases, which generally corresponds to the results of studies by many authors [1]. Thus, in 51.68% of cases, one of the parents of the patients we observed had bronchial asthma, 20% - allergic rhinitis, 19% - atopic dermatitis and 25% - hay fever. Moreover, 20.35% of mothers and 32.4% of fathers of these children had signs of allergies.

When studying factors that aggravate the action of the causative factors in the formation of asthma, a relationship between passive smoking and the severity of the disease was revealed. It is indisputable that tobacco smoke has a toxic and irritating effect on the mucous membrane of the respiratory tract, inhibits mucociliary clearance and increases broncho-obstructive syndrome [2].

Technogenic atmospheric pollution associated with the release of sulfur and nitrogen dioxides, ammonia and formaldehyde, and numerous volatile organic compounds from various industrial enterprises and road transport has a negative effect on the respiratory tract.

A large contribution to the sensitization of the respiratory tract is made by air pollution in residential premises with chemicals, toxic substances, and mold and air pollutants. Unsatisfactory living conditions were noted by 5.6% of sick children. However, the “Western lifestyle” and the desire for comfort implies the presence of hermetically sealed windows, air conditioning systems, carpeting and leads to increased humidity, creating conditions for an increase in the concentration of house dust and other allergens in the premises. Therefore, most of the children with asthma living in comfortable apartments felt relief from their condition outside their permanent place of residence.

The most significant triggers were contact with causally significant allergens (95.64%), respiratory infections (77.33%). Physical activity, weather changes and weather conditions provoked an asthma attack somewhat less frequently (43.31% and 46.22%, respectively).

We assessed the manifestations of COVID-19 in children with asthma of varying severity according to outpatient cards and medical histories. A total of 27 medical records of children who were treated as inpatients in the children's department of the 1st Zangiata Hospital from March 2020 to January 2021 and 45 outpatient records of children aged 7–15 years with asthma who had COVID-19 were studied. We conducted a retrospective assessment of the manifestations and impact of COVID-19 in children with asthma of varying severity according to outpatient cards, medical histories, and based on the results of a survey of children and their parents. In most cases, coronavirus infection was detected during examination in connection with contact in the family or at school (78%).

In all children, the course of the disease was mild and was not accompanied by a clinically significant exacerbation of asthma. All children followed the recommendations for basic therapy with the prescription of inhaled glucocorticosteroids (ICS) or increasing their dose when a viral infection occurred. In children aged 7 years and older, a combination of ICS (budesonide or fluticasone) and long-acting β2-agonists (formoterol and salmoterol).

The initial symptoms of COVID-19 developed subacutely: from low-grade fever in 49.3% of children with asthma and proceeded as acute respiratory infections. Children with asthma were significantly more likely to have a dry obsessive cough (76.0%), blockage of nasal breathing (73.3%) and rhinorrhea (69.3%). The high frequency of these symptoms in children with asthma may be associated with hyperresponsiveness of the respiratory tract and the presence of allergic rhinitis (AR)

(67% of children with asthma have concomitant AR). A common manifestation was mucous or mucoserous discharge from the nasal passages, as well as episodes of sneezing (38.6%). In the group of children without asthma, blockage of nasal breathing and protracted mucopurulent discharge were noted. Complaints of anosmia, which is one of the common symptoms in adult patients with COVID-19, occurred in about 5% of patients in both groups, which may be due to age-related characteristics and sensations.

Manifestations of bronchial obstruction during the COVID-19 period in the form of attacks of suffocation, shortness of breath, and distant wheezing without a previous severe exacerbation of the underlying disease were observed in only 17.3% of patients, which may indicate an exacerbation of BA due to SARS-CoV-2 infection. The reason for this exacerbation was the lack of control and adequate basic therapy. Deterioration of external respiratory function (RPF) indicators according to peak flowmetry data during this period was noted in 25% of patients. During the period of illness, everyone was prescribed basic therapy: ICS + bronchodilators. Some symptoms persisted after the elimination of the main manifestations of COVID-19, which is regarded as partial control; most often, it observed in children with moderate asthma and required prolonged therapy. The findings are consistent with published results from other studies from different countries, indicating a rare exacerbation of asthma due to COVID-19. The remaining children had only a dry cough without changes in the lungs. Difficulties in diagnosing COVID-19 in children with asthma are associated with the similarity of the clinical picture with respiratory infections of various etiologies. When analyzing the main manifestations of COVID-19 in children with asthma, we did not identify specific symptoms.

A severe course of coronavirus infection was observed in 2 patients with moderate asthma who did not receive basic therapy at the time of illness. The severity of the course was due to bilateral lung damage, respiratory failure of 0–1st degree. It is important to note that basic inhalation therapy was not resumed for children. Systemic corticosteroids were prescribed. Recovery observed after 12–14 days.

In the group of children without asthma, four children had long-term manifestations of bronchial obstruction after SARS-CoV-2 infection. While taking Symbicort, the symptoms in two children were eliminated after 2 weeks. Two adolescents were diagnosed with asthma.

Conclusion

Thus, in children with asthma, the following variants of the course of coronavirus infection can be distinguished: asymptomatic in 4%, mild in 80%, moderate in 12% and severe in 2.7%.

An analysis of therapy in children with asthma showed that the majority had a history of receiving leukotriene receptor antagonists (LRA), ICS in courses of 2-3-6 months and short-acting bronchodilators as needed. When coronavirus infection occurred, 61.3% were on ALR therapy, 33.4% received ICS, and 5.3% did not receive any treatment.

18.9% of children without asthma and 13.3% with asthma had cephalalgia of predominantly frontotemporal localization. Manifestations from the gastrointestinal tract in the form of dyspeptic symptoms and moderate abdominal pain were observed in 15.0% of children without asthma and significantly less often in the group of children with asthma (5.3%). In addition, a third of the children had symptoms of asthenia: weakness, episodes of dizziness that intensified or occurred when changing body position from horizontal to vertical, fatigue, decreased concentration of varying degrees of severity.

The data obtained confirm the observations of researchers from other countries about a milder course of COVID-19 in children with allergic diseases. Noteworthy is the fact that the decrease in tolerance to physical and emotional stress detected in almost all patients (93.7%) persisted 3 months after the infection. These data confirm the need for observation, examination and prolonged rehabilitation of children with asthma who have suffered coronavirus infection.

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