

## Bronchial Asthma in Children and Covid-19: Features of the Course of Comorbidity

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### ABSTRACT

**Introduction.** Bronchial asthma (BA) is one of the most common chronic lung diseases in children. At the beginning of the COVID-19 pandemic, BA, like other lung diseases, was considered a risk factor for the severe course of COVID-19.

**Aim of the study** – to analyze the main clinical manifestations of COVID-19 in children with BA.

**Material and methods.** We assessed the manifestations of COVID-19 in children with asthma of varying severity according to outpatient cards and case histories. In total, 27 case histories of children who were hospitalized in the children's department of the 1st Zangiota Hospital from March 2020 to January 2021 and 56 outpatient records of children aged 8–16 years with intermittent and persistent BA (mean age) were studied. –  $10.8 \pm 1.2$  years) who had COVID-19.

**Results.** It has been shown that the symptoms of COVID-19 can be similar to those of an exacerbation of asthma and manifest itself as dry cough and shortness of breath, and fever, which can also be observed with exacerbations of asthma against the background of a respiratory infection of any genesis.

**Conclusion.** Based on the factual clinical material, it was shown that the new coronavirus infection is easier in children, and in asthmatics among patients with less pronounced clinical symptoms.

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**Relevance.** Bronchial asthma (BA) is the most common chronic disease in childhood [1]. The population of children with asthma tends to be mild to moderate (85–90%) [2]. Viral infections are the most common triggers for asthma exacerbations. Particular attention is paid to rhinovirus infection, the causative agent of which, by joining ICAM1, easily penetrates through the cell membrane and becomes the initiator of the inflammatory process [2–4].

Coronaviruses cause up to 15% of seasonal acute respiratory viral infections in children and are the cause of asthma exacerbations [5,6]. Currently, COVID-19, a respiratory infectious disease caused by the SARS-CoV-2 virus, has been identified in more than 120 countries around the world and is regarded as a

pandemic. Large epidemiological studies have shown that children make up 2-6% of total confirmed cases of COVID-19, with asymptomatic, mild to moderate cases predominating in most cases.

There is evidence that regular basic therapy in patients with asthma leads to improved disease control, which is important for recovery from COVID-19 [4,8]. Symptoms of COVID-19 can be similar to those of an asthma flare-up, such as dry cough and shortness of breath. Fever, which is a common symptom of COVID-19, may help differentiate it from an asthma exacerbation, although fever is sometimes present in virus-induced asthma exacerbations.

According to the EAACI Allergy and Asthma Experts, there is no scientific evidence that allergy treatment increases susceptibility to SARS-CoV-2 or the severity of COVID-19. Uncontrolled bronchial asthma is classified as a risk factor, so one of the main goals should be the basic therapy of asthma with appropriate medications and achieve control. Seasonal allergy symptoms sometimes resemble flu or SARS and therefore can also indicate the presence of COVID-19 [1,7].

**Purpose of the study** – analysis of the main clinical manifestations of COVID-19 in children with asthma.

**Material and methods.** We assessed the manifestations of COVID-19 in children with asthma of varying severity according to outpatient cards and case histories. In total, 27 case histories of children who were hospitalized in the children's department of the 1st Zangiota Hospital from March 2020 to January 2021 and 56 outpatient records of children aged 8–16 years with intermittent and persistent BA (mean age) were studied. –  $10.8 \pm 1.2$  years) who had COVID-19. We conducted a retrospective assessment of the manifestations and impact of COVID-19 in children with asthma of varying severity according to outpatient cards, case histories, and the results of a survey of children and their parents. In most cases, coronavirus infection was detected during the examination in connection with contact in the family or at school (78%).

**Results and discussions.** In all children, the course of the disease was mild and was not accompanied by a clinically significant exacerbation of BA. All children followed the recommendations for basic therapy with the appointment of inhaled glucocorticosteroids (IGCS) or an increase in their dose when a viral infection was added. In preschool children, these were budesonide suspension through a nebulizer, from 6 years of age and older - a combination of ICS (budesonide or fluticasone) and long-acting  $\beta$ 2-agonists (formoterol and salmeterol). The initial symptoms of COVID-19 developed subacutely: from subfebrile condition in 49.3% of children with BA and in 79.2% of children without BA, and proceeded as acute respiratory infections. In children with BA, a dry obsessive cough (76.0%), blockade of nasal breathing (73.3%), and rhinorrhea (69.3%) were much more common. The high frequency of these symptoms in children with asthma may be associated with airway hyperreactivity and the presence of allergic rhinitis (AR) (67% of children with asthma have concomitant AR). A frequent manifestation was mucous or muco-serous discharge from the nasal passages, as well as episodes of sneezing (38.6%). In the group of children without BA, blockade of nasal breathing, mucopurulent discharge of a protracted course were noted. Complaints of anosmia, which is one of the common signs in adult patients with COVID-19, were reported by about 5% of patients in both groups, which may be related to age-related characteristics and sensations.

Manifestations of bronchial obstruction during the COVID-19 period in the form of asthma attacks, shortness of breath, remote wheezing without a previous pronounced exacerbation of the underlying disease were observed only in 17.3% of patients, which may indicate an exacerbation of BA against the background of SARS-CoV-2 infection. The reason for this exacerbation was the lack of control and adequate basic therapy. Deterioration of external respiration function parameters (RF) according to peak flowmetry during this period was noted in 25% of patients. During the period of the disease, all were prescribed basic therapy: IGCS + bronchodilators. Some of the symptoms persisted after the elimination of the main manifestations of COVID-19, which is regarded as partial control; most often it was observed in children with moderate BA and required prolonged therapy. The data obtained are consistent with the published results of other studies from different countries, indicating a rare exacerbation of asthma due to COVID-19. The rest of the 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 noted in 2 patients with moderate BA who did not receive basic therapy at the time of the disease. The severity of the course was due to bilateral lung damage, respiratory failure grade 0-I. It is important to note that the basic inhalation therapy was not resumed in children. Systemic corticosteroids were prescribed. Recovery was observed after 12-14 days.

In the group of children without BA, 4 children had long-term manifestations of bronchial obstruction after SARS-CoV-2 infection. Against the background of taking Symbicort in 2 children, the symptoms were eliminated after 2 weeks. 2 adolescents were diagnosed with BA.

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

The analysis of therapy in children with BA showed that most of them received leukotriene receptor antagonists (ALR), IGCS courses for 2-3-6 months and short-acting bronchodilators as needed. When coronavirus infection was added, 61.3% were on ALR therapy, 33.4% received ICS, and 5.3% did not receive any treatment.

18.9% of children without BA and 13.3% with BA had cephalgia predominantly of frontotemporal localization. Gastrointestinal manifestations in the form of dyspepsia and moderate abdominal pain were observed in 15.0% of children without BA and much less frequently in the group of children with BA (5.3%). Also, a third of the children had symptoms of asthenia: weakness, episodes of dizziness, aggravated or occurring when the body position changes from horizontal to vertical, fatigue, decreased concentration of varying severity. The data obtained confirm the observations of researchers from other countries about a milder course of COVID-19 in children with allergic diseases. Attention is drawn to the fact that the decrease in tolerance to physical and emotional stress (93.7%) revealed in almost all patients persisted 3 months after the infection. These data confirm the need for observation, examination and prolonged rehabilitation of children with asthma who have had a coronavirus infection.

## Conclusion

Our study showed that children with asthma who received basic treatment had a predominantly mild course of coronavirus infection with a predominance of symptoms from the upper respiratory tract and moderate intoxication. The data obtained generally agree with the results of international studies.

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