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***Kurbanov X.A.***

*Department of Phthisiatry and Pulmonology, Microbiology,*

*Virology, and Immunology Assistant Andijan State Medical Institute.*

# ELDERLY PATIENTS WITH COVID-19 AND BRONCHIAL ASTHMA

**Abstract.** Bronchial asthma and COVID-19 pose serious health challenges, especially in older patients whose immune system may be weakened and whose comorbidities often complicate the clinical picture. In recent years, there has been an increase in the incidence of both these pathologies, which requires a more detailed study of their relationship. Bronchial asthma, being a chronic inflammatory disease of the airways, can significantly worsen the course of infectious diseases, including COVID-19. Older patients with asthma are at higher risk of developing severe forms of viral infection. Studies show that the presence of asthma increases the likelihood of hospitalization and increased mortality when infected with SARS-CoV-2. This is due to both pathological changes in the lungs and the likelihood of developing comorbidities, such as cardiovascular disorders and diabetes[1]. In addition, COVID-19 itself can provoke an exacerbation of asthma due to viral inflammation and hyperreactivity of the airways. It is important to note that many asthmatics take inhaled corticosteroids, which, according to recent data, may have a protective effect against COVID-19 by reducing inflammation and preventing exacerbations of the disease. [6]However, there is a need for an individualized approach to treatment, taking into account the specifics of each patient. As part of prevention, it is important to vaccinate against COVID-19, which is recommended for older adults with chronic diseases, including asthma, as it has become one of the most effective ways to reduce the risk of serious complications and death. Thus, the management of bronchial asthma in older patients in the context of the COVID-19 pandemic requires an integrated approach, including optimizing treatment, regular health monitoring, and informing patients about risks and precautions. Understanding the relationship between these two conditions will help develop more effective strategies to protect the most vulnerable groups of the population.

**Key words:** Asthma in the elderly, COVID-19, population, inflammation.

**The aim** of this study was to systematically evaluate the clinical course of SARS-CoV-2 infection in elderly patients with asthma and to determine the impact of asthma and comorbidities on COVID-19-related outcomes. Old age and the presence of chronic diseases significantly increase the risk of developing severe forms of COVID-19, which makes this study particularly relevant. During the analysis of clinical data, various aspects of the disease were assessed, such as the severity of the infection, the need for hospitalization, the length of hospital stay and mortality in this group of patients. Particular attention was paid to the study of predictors, such as the presence of comorbidities, asthma duration and disease control, which could affect the outcome of COVID-19.[3]

**Materials and methods.** This study aimed to analyze the clinical characteristics of elderly patients with asthma (BA) hospitalized due to COVID-19. The sample included 131 patients over 60 years old, including 59 men and 72 women, with a mean age of 74 years (range 67-80 years). The inclusion criteria complied with the 2020 World Health Organization recommendations, which ensured the relevance and standardization of the collected data. Confirmation of the presence of COVID-19 in all patients was carried out through laboratory tests, in particular using the polymerase chain reaction (PCR), as well as by radiographic examination. It is important to note that all study participants had a

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documented diagnosis of BA, which complied with the recommendations of the Global Asthma Initiative. [4]This fact emphasizes the need for special attention to this category of patients, since the combination of BA and COVID-19 can negatively affect the course and outcome of the disease. All patients were assessed for demographic parameters, body mass index (BMI), alternative oxygenation index (the ratio of blood oxygen saturation level (SpO2) to fraction of inspired oxygen (FiO2)), disease symptoms, data from objective, laboratory (complete and biochemical blood tests, D-dimer and C-reactive protein (CRP) levels on days 1 and 5 of observation, coagulography) and instrumental (chest computed tomography (CT)) studies, and the Charlson comorbidity index. Pulse oximetry with SpO2 measurement was used to detect respiratory failure and assess the severity of hypoxemia. Respiratory failure was defined in accordance with the severity classification based on pulse oximetry (SpO2) values. The smoking index (number of cigarettes smoked per day × number of years of smoking) / 20 (pack-years) was also calculated. To assess the nutritional status of patients, the BMI (body weight, kg / height, m2) was used. The oxygenation index SpO2 / FiO2 was calculated using the following formula: SpO2 / 21 + 3 × oxygen flow rate [19]. Pulse oximetry was performed using an MD300C series pulse oximeter. Upon admission, CT of the lungs was performed using an Aquillion TSX-101A spiral computed tomography scanner (Toshiba Medical Medical Systems, Japan), slice thickness - 1 mm, pitch - 1.5. Further data analysis will identify specific clinical and pathophysiological characteristics of this group, which may contribute to the development of optimal treatment and management strategies for patients with asthma in the context of the COVID-19 pandemic.[3]

**Results.** A mortality study of 131 inpatients showed that 30 patients, or 22.9%, died in hospital. After discharge, mortality was observed in an additional 15 patients (14.9%) within 90 days. These data highlight the seriousness of the condition of patients requiring hospitalization and the importance of preventing negative outcomes after inpatient treatment. Comparative analysis of the group of deceased and recovered patients revealed statistically significant differences in clinical parameters. Patients who died before discharge had significantly higher values of the Charlson index, which serves as an indicator of comorbidity. Respiratory rate, the degree of lung damage according to CT data, and the absolute number of leukocytes and neutrophils were also higher. Important inflammatory markers, such as the level of C-reactive protein on the fifth day of hospitalization and the level of lactate dehydrogenase, were also significantly higher in patients with a fatal outcome. In contrast, lower values were observed for absolute eosinophil count, total protein level, pulse oximetry (SpO2), and alternative oxygenation index. It is also worth noting that patients susceptible to death were more likely to require glucocorticosteroid therapy during the year and were more likely to have non-atopic asthma. Multivariate and ROC analysis allowed us to identify the most significant predictors of hospital mortality: Charlson comorbidity index ≥ 6 points, neutrophil/lymphocyte ratio ≥ 4.5, total protein level ≤ 60 g/L, and eosinophil level ≤ 100 cells/μL. Thus, the study results emphasize the importance of monitoring these clinical parameters to improve prognosis and optimize therapeutic approaches in the treatment of hospitalized patients.[2]

The features of the COVID-19 course in elderly patients with bronchial asthma are analyzed. It is shown that elderly patients with COVID-19 most often had moderate bronchial asthma, non-atopic phenotype, and high comorbidity. Among the comorbidities, coronary heart disease, hypertension, chronic heart failure (systolic), type 2 diabetes, and chronic obstructive pulmonary disease (COPD) prevailed. Patients with a fatal outcome compared to those who recovered had statistically significantly higher values of the Charlson index, dyspnea severity, degree of lung damage according to CT, absolute white blood cell count, neutrophils, and neutrophil-to-lymphocyte ratio. The

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indicators associated with an increased risk of death at the hospital stage include a higher CRP level on the 5th day of hospitalization and LDH level, a lower total protein content, and a lower SpO2 / FiO2 ratio. Also, patients who died during hospitalization were more likely to have taken GCS for 1 year, and they were more likely to have a non-atopic variant of BA. Most of the parameters associated with a fatal outcome are interrelated. A higher absolute eosinophil count is associated with a favorable outcome.

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