

UDK:616-022.32 .616.61-008.64

**EARLY MARKERS OF KIDNEY DAMAGE IN POST-COVID SYNDROME
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Abstract. Impaired kidney function is one of the most important risk factors for cardiovascular complications (CVC). The results of epidemiological studies suggest that early subclinical renal dysfunction is an independent risk factor for CVC events and death. The new coronavirus infection COVID-19 is currently one of the leading causes of severe and persistent asthenic syndrome. Separately, the “Condition after COVID-19” (ICD-10 U09.9) [3] is singled out, which is characterized by progressive organ pathology, polyneuropathy, autoimmune disorders, and prolonged severe asthenic syndrome [4]. Some of the complications of kidney and gastrointestinal injury in COVID-19 and POST-COVID-19 are fluid and electrolyte disturbances.

Keywords: *COVID-19, long COVID-19, post-COVID-19 syndrome, arterial hypertension, chronic kidney disease, cystatin C, glomerular filtration rate.*

Relevance of the topic. COVID-19 infection, manifested by acute respiratory syndrome, has caused enormous problems in the world health system. This infection, which was first recorded in Wuhan, Hubei Province, China, in December 2019, soon spread to all countries of the world. In March 2020, the World Health Organization declared the coronavirus infection a global pandemic. Today (January 2023), 667.1 million people on earth are infected with the SARS-CoV-2 virus and 6.7 million have died [1,3,4,8,9,10,11]. The pandemic of the new coronavirus infection COVID-19 has become a serious challenge to humanity. Before this period, one of the main health problems in all countries was diseases of the cardiovascular system (CVS), including arterial hypertension (AH), which is a leading risk factor for the development of vascular accidents; acute cerebrovascular accident, myocardial infarction. According to WHO, all non-communicable diseases accounted for 74% of deaths in 2019, registered in the world. Hypertension makes a significant contribution to the structure of mortality and disability from cardiovascular diseases. Thanks to the modern development of medicine, changes in the level and lifestyle in general, mortality from infectious diseases throughout the world has significantly and steadily decreased [5,6,12,13,14,15,16,17], 2020 has

changed the decades-old understanding of diseases that pose a threat to health in on a global scale. The threat of infectious origin came first - the SARSCoV-2 virus, which caused the disease COVID-19. By March 2022, 461,564,485 cases of COVID-2019 were registered in the world, with 6,051,365 deaths. The number of countries in which cases of COVID-19 were registered is 227 [7,8,21,22,23].

A number of diseases, including changes in the kidneys observed in those who underwent SOVID 19 on the basis of Arterial Hypertension (AH), unfortunately, are detected in the terminal, i.e., irreversible stages in many cases due to the fact that they are hidden for a long time. At this point, it should be noted that in nephropathies, which are observed as a complication in most diseases, the changes in the kidney do not differ sharply from each other, but the primary mechanism of action may be hemodynamic, metabolic, immune, toxic or a combination of them. AH changes in the kidney, which are common among the population, develop in a more hemodynamic way.

The purpose of the study. Comparative assessment of microalbuminuria, kidney functional status using creatinine and cystatin-S indicators in the early and late stages of post-covid syndrome in patients with different severity levels of COVID-19 based on hypertension.

Material and methods. As a source of research, 120 patients of both sexes aged 30-60 years who were treated in the Bukhara regional multidisciplinary hospital and diagnosed with AH and who underwent COVID-19 on its basis were taken.

Results. Microalbuminuria was detected in 65% of patients with moderate-to-severe COVID-19 and 45% of patients with mild-to-moderate COVID-19. In patients with AH II-III stage, this indicator was 80%-70% and 100%-85%, respectively. Figure 3.1 below presents a comparative analysis of microalbuminuria indicators according to AH stages in patients with moderate and mild COVID-19.

Indicators of microalbuminuria were 46.8 ± 2.2 mg/day in patients with moderate level of COVID-19 with AH I stage and 1.64 times higher than in patients with mild level of COVID-19 (they had 28.5 ± 1.4 mg/day). days) and a highly reliable difference was noted ($R < 0.001$). In patients with AH II stage, this indicator was 108.4 ± 6.8 and 84.8 ± 6.1 mg/day, respectively ($R < 0.05$). A reliable difference of microalbuminuria 197.7 ± 14.2 and 127.4 ± 10.1 mg/day was noted in patients who passed the moderate stage of AH III stage of COVID-19 ($R < 0.05$).

Based on the results of the analysis, it was found that the indicators of microalbuminuria were higher in hypertensive patients who had a moderate level of COVID-19 compared to those who had a mild level. Taking these changes into account, we studied the correlation of microalbuminuria with a number of indicators in both groups.

In order to fully study the changes in the kidneys in the patients involved in the study, its functional reserve was also evaluated. For this, the difference between the GFR indicators before loading and after loading was obtained using cystatin-S.

It was found that the renal functional reserve was preserved in all groups involved in the study. However, it was noted that in patients with a moderate level of COVID-19, its indicators significantly decreased compared to those with a mild level. In particular, the renal functional reserve was 20.1 ± 2.6 % and 22.5 ± 3.1 %, respectively, in the patients who underwent a moderate and mild stage of hypertension, stage I of COVID-19 ($R > 0.05$). Reliable changes were found in patients with hypertension II stage ($R < 0.05$). High-reliability ($R < 0.001$) changes were noted in patients with moderate-severe stage III of hypertension, 7.8 ± 1.1 %, and 12.5 ± 1.6 % in mild patients.

Duration of disease with renal functional reserve ($r = -0.588$; $p = 0.001$), microalbuminuria ($r = -0.610$; $p < 0.001$) and VEGF-A ($r = -0.434$; $p = 0.001$) and aldosterone ($r = -0.620$; $p < 0.001$), moderate strong negative, strong positive correlation with glomerular filtration rate ($r = 0.865$; $p < 0.001$) was observed. A

strong negative correlation was found between renal functional reserve and systolic arterial pressure ($r=-0.807$; $p<0.001$). Also, a correlation between the above indicators was found in patients with mild COVID-19, but it was weaker than in patients with moderate COVID-19.

Summary. It was noted that the indicators of renal functional reserve were significantly reduced in patients with mild and moderate levels of Covid-19 due to hypertension compared to outpatients treated. It is 20.1 ± 2.6 and $22.5\pm 3.1\%$ ($R>0.05$) in patients treated in the I stage of Covid-19 inpatient and outpatient treatment, respectively, in the II stage it is 11.1 ± 1.2 and $15.5\pm 1.6\%$ ($R<0.05$). Highly reliable ($R<0.001$) changes of $7.8\pm 1.1\%$ and $12.5\pm 1.6\%$ were noted in the III stage of hypertension. In patients with severe Covid-19, there is a moderately strong negative relationship between duration of disease with renal functional reserve ($r=-0.588$; $p=0.001$), microalbuminuria ($r=-0.610$; $p<0.001$), glomerular filtration rate ($r=0.865$; $p<0.001$) was found to have a strong positive correlation.

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