MODERN MEDICINE AND PRACTICE
https://inovatus.es/index.php/ejmmp
EUROPEAN JOURNAL OF MODERN MEDICINE AND PRACTICE
Vol. 4 No. 10 (Oct - 2024) EJMMP ISSN: 2795-921X

UROMODULIN AS A PREDICTOR OF NEPHROPATHY IN ARTERIAL HYPERTENSION IN THE POST-COVID PERIOD

Giyosova Nigora Odiljonovna
Bukhara State Medical Institute, Department of Hematology and Clinical Laboratory Diagnostics, Bukhara, Uzbekistan

Abstract: Scientific studies conducted worldwide have shown that hypertension is the most common comorbidity in COVID-19, confirming that it is registered in 10-34% of cases. Their combination leads to severe complications not only of COVID-19, but also of hypertension, including kidney damage. The article presents the results of a study of modern approaches to the early diagnosis of nephropathy caused by the above diseases.

Key words: COVID-19, uromodulin, arterial hypertension, nephropathy, type IV collagen, post-COVID syndrome.

According to the World Health Organization (WHO) Among people infected with COVID-19, the main risk group is patients with comorbid conditions. On the other hand, the coexistence of coronavirus with other chronic diseases creates unique difficulties in the diagnosis and treatment of patients. A series of observations noted a high incidence of cardiovascular diseases (CVD) , including arterial hypertension, diabetes mellitus and chronic obstructive pulmonary disease among patients suffering from COVID-19. Among them, arterial hypertension (AH) occupies one of the leading places in the development and severity of COVID-19 [1]. Although the incidence of this infection in the world has stabilized, as of today (March 2023), 676.1 million people are infected with the SARS-CoV-2 virus, and the mortality rate is 6.8 million [7].

Scientific studies conducted around the world prove the importance of arterial hypertension, which is the most common concomitant disease in COVID-19 , which is confirmed by statistics where it is registered in 10-34% of cases [4]. This combination leads to serious complications not only of COVID-19, but also of hypertension, including worsening kidney function [5,8]. In this case, high blood pressure (BP) and the direct negative impact of the virus on the kidneys due to the penetration of coronavirus into target cells through the receptors of the angiotensin-converting enzyme inhibitor-2 (ACE-2) can be of decisive importance. It is known that angiotensin-1 is separated from angiotensinogen by renin and converted to angiotensin II by the action of angiotensin-converting enzyme [9]. ACE-2 receptors are found in the kidneys, lung tissue , heart, intestines and other organs. As discussed above, the renin-angiotensin-aldosterone system plays an important role in human physiology and blood pressure control. At this time, the use of angiotensin-converting enzyme inhibitors (ACE inhibitors) and angiotensin II receptor blockers (ARBs) in the treatment of patients with hypertension during COVID-19 is controversial [2,3,6].

The aim of the study is to determine the diagnostic and prognostic value of uromodulin in assessing the development of nephropathy and to evaluate the effectiveness of antihypertensive and nephroprotective

treatment based on uromodulin levels in the comorbid state of COVID-19 against the background of arterial hypertension.

Material and methods. The source of the study was 120 patients with a history of post-COVID syndrome, who had COVID -19 and were treated on an outpatient and inpatient basis at the Multidisciplinary Medical Center of the Bukhara Region. They, in turn, were divided into 2 groups: COVID-19 with a mild course , who were treated on an outpatient basis (49.2%), and with a moderate severity of COVID-19 (50.8%), who received inpatient treatment. There were 57 women (47.5%), 63 men (52.5%). These groups were also divided into subgroups according to the stage of arterial hypertension, including 29 patients with stage 1 arterial hypertension, 28 patients with stage II arterial hypertension and 2 patients with stage III arterial hypertension in the group of mild COVID-19. In a study of patients with moderate severity of COVID-19 by the stage of arterial hypertension, the numbers were 18; 16 and 27 people, respectively. The control group consisted of 30 patients with mild and moderate severity of COVID-19 without arterial hypertension.

The work used clinical, biochemical (serum urea, creatinine), enzyme immunoassay (cystatin-C, TGF β_1 - transforming growth factor), urine analysis (microalbuminuria (MAU) , uromodulin) and statistical methods.

Research results. Uromodulin is a glycoprotein with a molecular weight of 80-90 kDa, which is excreted mainly from the initial sections of the distal renal tubules and is normally present in daily urine from 15 to 100 mg [10.6].

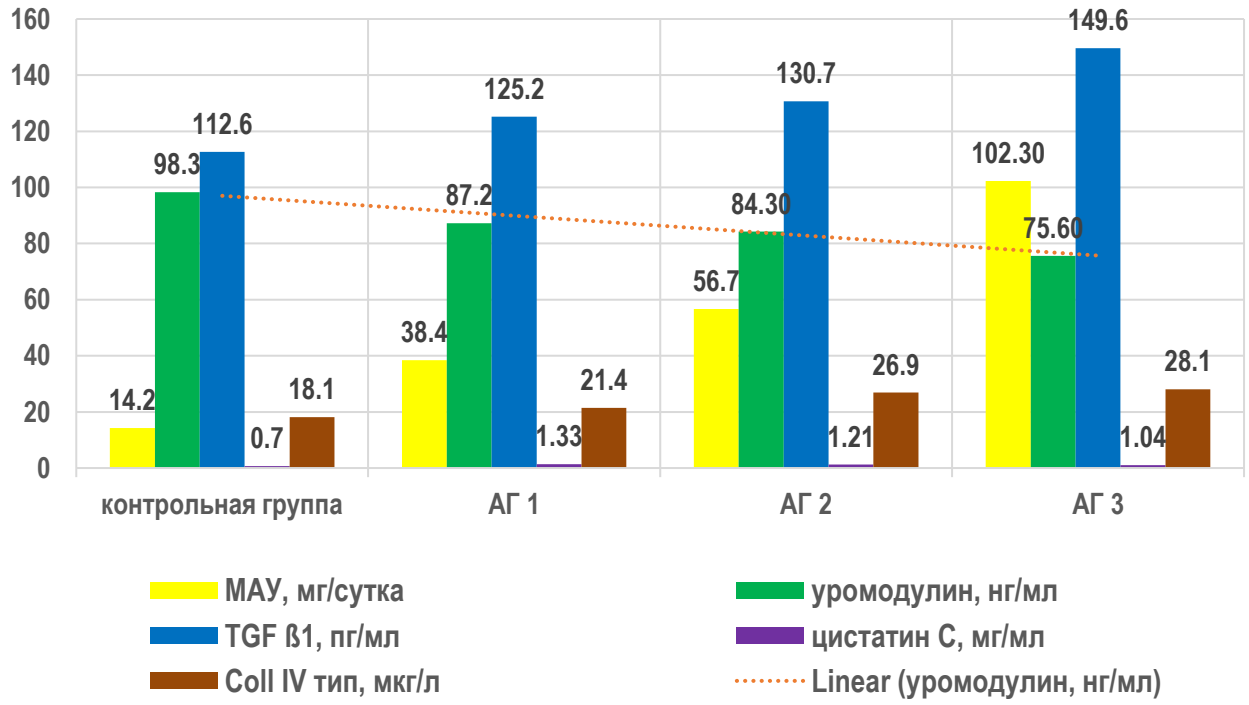

Figure 1. Comparative analysis of renal tubular function indicators depending on the stage of arterial hypertension in patients with mild COVID-19 against the background of arterial hypertension.

As can be seen from the data presented in the attached diagram (Fig. 1), in the group of patients with a mild degree of coronavirus infection against the background of arterial hypertension, the MAU indicator of traditional markers of nephropathy development tended to increase in accordance with the stage of arterial hypertension , respectively, 38.4 ± 1.2 mg / day; 56.7 ± 0.9 and 102.3 ± 0.4 mg / day. Among the biomarkers, an increase in the content of type IV collagen was practically not observed at the level of stage

1 of hypertension, the manifestation of this biomarker with a pathological shift was obvious at stage 3 of hypertension, it turned out to be 1.5 times higher than the indicator in the control group. A comparative analysis of the uromodulin indicator in urine in relation to the stage and hypertension in patients of group 1 shows that with an increase in the stage and background disease, the amount of uromodulin in the urine decreased in inverse proportion . The amount of uromodulin in urine at stage 1 of the disease decreased by 1.12 times compared to the control group, by 1.2 times in the group of patients with stage 2 of the disease and by 1.3 times at stage 3 of arterial hypertension ($p<0.001$). A strong negative correlation was found between the amount of uromodulin excretion in urine and the stage of the underlying disease ($r=-1.12$; $p<0.01$).

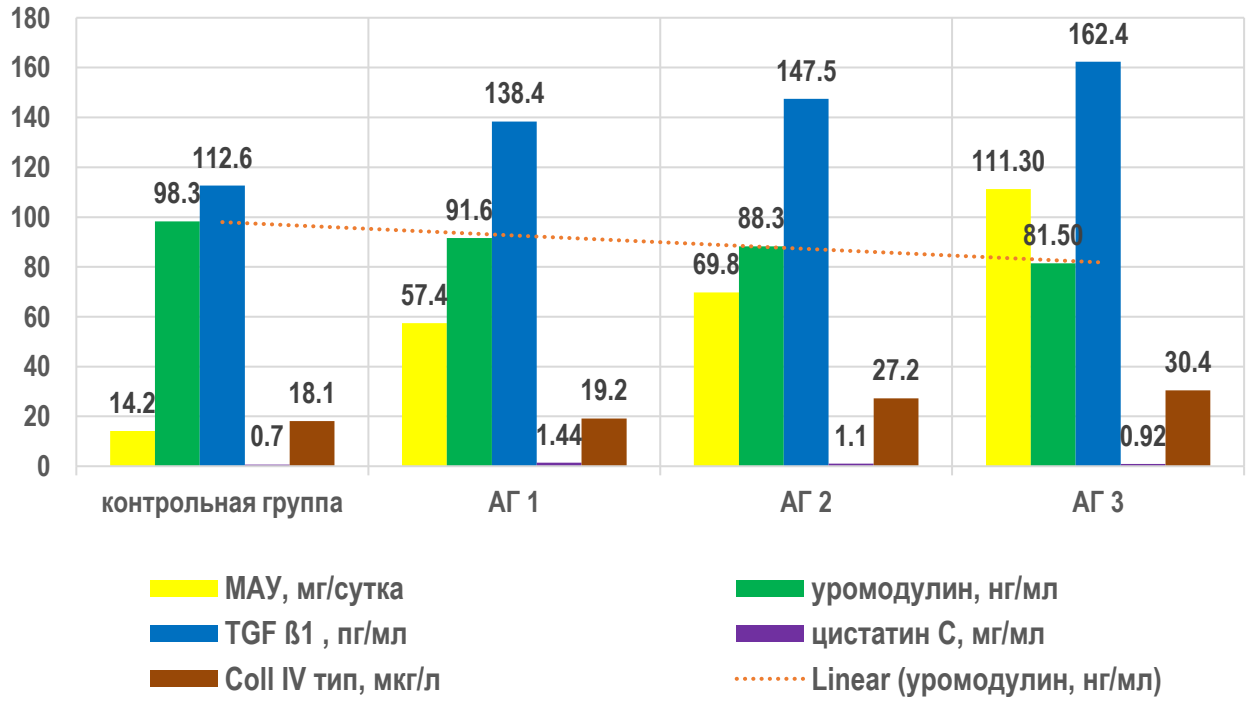

Figure 2. Comparative analysis of renal tubular function indicators depending on the stage of arterial hypertension in patients Moderate COVID-19 against the background of arterial hypertension.

Among patients with arterial hypertension who had mild COVID-19, a positive correlation was found between microalbuminuria and the stage of the underlying disease ($r=0.5$; $p<0.01$), type IV collagen ($r=0.628$; $p<0.01$), TGF-β1 ($r=0.4$; $p<0.05$) and a strong negative correlation was found with uromodulin ($r=-1.05$; $p<0.01$). A strong positive correlation was also noted between uromodulin values and microalbuminuria ($r=0.758$; $p<0.001$).

In addition, a correlation between the above indicators was also found in patients with moderate to severe COVID -19, but it was found that the amount of uromodulin was reduced less compared to patients with mild COVID -19.

Uromodulin levels were 91.6±5.8 ng/ml in patients with stage 1 hypertension who had experienced moderate COVID -19 and 87.2±6.1 ng/ml in those who had experienced mild severity of COVID-19 ($p<0.01$). In patients with stage 2 hypertension, 88.3±6.5 ng/ml and 84.3±7.1 ng/ml, respectively ($p<0.01$). In patients with stage 3 hypertension with moderate to severe COVID -19, the uromodulin level was 81.5 ± 8.2 ng/ml, and in patients who had a mild degree of COVID-19 75.6±9.7 ng/ml , which was 1.07 times lower ($p <0.05$). (Fig. 2)

This means that the degree of damage to the renal tubules in post-COVID syndrome in patients with a mild degree of coronavirus infection against the background of arterial hypertension is higher than in patients treated in hospital settings in accordance with recommendations.

angiotensin-converting enzyme inhibitors , and azilsartan (at a dose of 40, 80 mg), which belong to the group of angiotensin receptor blockers, with a nephroprotective effect.

Uromodulin levels increased by 1.6 times after treatment in patients with stage I hypertension with mild COVID-19, in patients with moderate COVID-19 it increased by 1.57 times and a significant difference was noted (p <0.05). In patients with stage II hypertension, these indicators were increased by 1.53 and 1.5 times, respectively (p <0.01).

It was noted that in stage III of hypertension, the uromodulin level increased by 1.37 times in patients who had a mild form of COVID-19 and by 1.25 times in patients with moderate COVID-19. When comparing the results, a highly reliable difference was found (p <0.01). (Fig. 3).

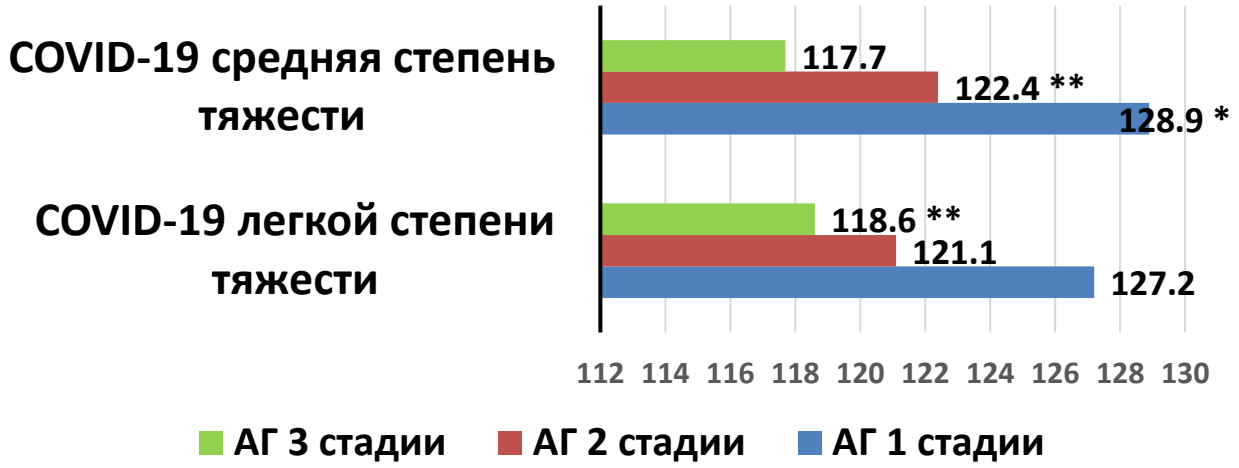

Figure 3. Post-treatment uromodulin levels (ng/ml) in patients with mild to moderate COVID-19 with arterial hypertension and

Note: * - differences are significant for indicators before and after treatment in groups with mild and moderate severity of COVID-19 (* - p<0.05, ** - p<0.01).

The results obtained in the study showed that the level of uromodulin significantly increased after standard treatment in groups of patients who had COVID-19 with arterial hypertension. This confirms that inflammatory processes persist in the body for a long time in those who have had this infection. The fact that highly reliable changes were found in patients with hypertension who had a mild form of COVID-19 can be explained by the effect of the complex of standard treatment procedures.

Conclusions. The uromodulin level was 91.6±5.8 ng/ml in patients with stage 1 hypertension who had moderate COVID -19 and 87.2±6.1 ng/ml in those who had mild COVID - 19 , with a highly significant difference (p<0.01). In patients with stage 2 hypertension , the uromodulin level was 88.3±6.5 ng/ml and 84.3±7.1 ng/ml, respectively (p<0.01). In patients with stage 3 hypertension, the uromodulin level was 81.5±8.2 ng / ml in patients with moderate COVID-19 and 75.6±9.7 ng/ml in patients with mild COVID - 19 (p<0.05). The identified changes confirm that uromodulin is a reliable indicator of renal dysfunction;

List of references.

1. Badawi A, Ryoo SG. Prevalence of comorbidities in the Middle East respiratory syndrome coronavirus (MERS-CoV): a systematic review and meta-analysis. Int J Infect Dis. 2016;49:129-133.
2. Emami A, Javanmardi F, Pirbonyeh N, Akbari A. Prevalence of underlying diseases in hospitalized patients with COVID-19: a systematic review and meta-analysis. Arch Acad Emerg Med. 2020;8(1)
3. Esler M, Esler D. Can angiotensin receptor-blocking drugs perhaps be harmful in the COVID-19 pandemic? J Hypertens. 2020;38(5):781–782.
4. Giyosova NO Basic moments of kidney damage in covid-19 in patients with Comorbid diseases// Tibbiyotda Yangi kun. 2021 No. 6 p. 227-232 (14.0.0.00)
5. Giyosova NO Nurov BB Course and therapy of arterial hypertension in patients with covid-19 // Web of scientist: international scientific research journal. Volume 3, Issue 12, 1142-1149 . Dec., 2022
6. Giyosova NO Uromodulin as an early marker in the diagnosis of chronic kidney disease // Asian journal of Pharmaceutical and biological research. Volume 12. 42-49. May-Aug.2023
7. https://www.interfax.ru/chronicle/novyj-koronavirus-v-kitae.html .
8. Akhmedova N.Sh., Giyosova N.O. Buyrak functional zaxirasini aniklash - surunkali buyrak kasalliklari erta diagnostics sifatida predictor // Journal of Cardiorespiratory Research. Materials of the II International Scientific and Practical Conference (Samarkand, April 7-8, 2023) Volume II
9. Dzhanashiya P.Kh., Poteshkina N.G., Selivanova G.B. Arterial hypertension. M: Miklosh. 2007. 168 p.
10. Smirnov AV, Hasun M, Kayukov IG, et al. Serum uromodulin as an early biomarker of tubular atrophy and interstitial fibrosis in patients with glomerulopathies. *Ter arkh* 2018;90(6):41–44. doi: 10.26442/terarkh201890641-47