



ORIGINAL ARTICLE

Trace Element Imbalance in Patients with Combined Digestive and Renal Pathology Complicated with COVID-19

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ABSTRACT: Diagnosis and treatment of digestive lesions remain the hold the limelight of both practitioners and scientists. Their combination worsens the prognosis in patients with chronic kidney disease in chronic glomerulonephritis, there is an imbalance of trace elements, which negatively affects the course of the disease and increases the risk of such complications. The paper aims to study the effect of Minerol on the clinical manifestations of the disease in patients with combined damage to the gastroenterological zone (chronic gastroduodenitis, peptic ulcer disease) and kidneys (chronic glomerulonephritis and pyelonephritis) according to clinical, laboratory and instrumental research methods. The diagnosis was verified by esophagogastroduodenoscopy with targeted biopsy, X-ray method, ph-metry, ultrasound; association with *Helicobacter pylori* – according to biopsy urease and respiratory tests, the presence of urinary syndrome – generally accepted laboratory methods, and radionuclide methods, if necessary. Patients were divided into two groups aged 18-60 years. When included in the complex treatment of gastroduodenal zone and kidney lesions, the biologically active drug Minerol contributes to a faster recovery of patients and plays an indispensable role in the prevention of complications such as uremic anaemia, cardiomyopathy, etc., providing anti-inflammatory and sanogenetic effects, can be useful in the treatment of post COVID syndrome.

INTRODUCTION

Diagnosis and treatment of digestive lesions remain the hold the limelight of both practitioners and scientists. Their combination worsens the prognosis in patients with chronic kidney disease Zinc is a part of more than 300 enzymes and affects carbohydrate, fat and protein metabolism, redox processes, and the regulation of gene activity [1-7]. In chronic glomerulonephritis (CGN), there is an imbalance of trace elements (cobalt, copper, zinc), which negatively affects the course of the disease and increases the risk of complications such as uremic anaemia, cardiomyopathy, which can become a direct cause of death. Microelements have a positive effect on the body and overwhelmingly potentiate the influence of

each other, both on the body as a whole and on its systems [8-15].

Identifying the cause of chronic glomerulonephritis is not always possible. In this issue, the most important importance should be attached to beta-hemolytic Group A Streptococcus, as well as the presence of chronic infectious lesions in the body of a sick person, which can manifest themselves in conditions of frequent hypothermia and decreased immunity. Diagnosis and further lifelong follow-up are carried out of patients with glomerulonephritis on an outpatient basis. In the hospital, the diagnosis is confirmed either by the results of a renal biopsy or during clinical trials (if the biopsy is not possible).

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Streptococcal and viral infections are the most common causes of glomerulonephritis and pyelonephritis, and can also be the main factor in the development of dysmicroelementemia in patients with combined digestive and renal pathology. Very often this occurs during the development of rheumatic diseases, with systemic vasculitis, blood diseases, carcinoma, helminthiasis, protozoan infestations, and under the influence of certain medications. Conducting timely medical research in this area contributes to a more complete study of this issue and an effective search for ways to establish the true causes of dysmicroelementemia in patients with combined digestive and renal pathology in addition to COVID-19.

The latent course of these diseases is very widespread, which causes the detection of kidney diseases mainly at one of the last stages, so doctors have many difficulties in finding ways to effectively treat them. Prolonged inflammation in the glomeruli, which periodically worsens, causes the progression of the diseases and results in nephrosclerosis and kidney failure. As nephrosclerosis increases, hemodynamic and metabolic mechanisms are added that cause the progression of the current situation.

The paper aims to study the effect of Minerol on the clinical manifestations of the disease in patients with combined damage to the gastroenterological zone (chronic gastroduodenitis, peptic ulcer disease) and kidneys (chronic glomerulonephritis and pyelonephritis) according to clinical, laboratory and instrumental research methods. The results and conclusions of this scientific study will be essential for researchers of a wide range of issues of the occurrence of dysmicroelementemia in patients with combined digestive and renal pathology against the background of COVID-19, which in turn is extremely important from the point of view of effective ways to prevent the occurrence of the described diseases and promote the health of patients who have suffered from coronavirus.

MATERIALS AND METHODS

The diagnosis was verified by esophagogastroduodenoscopy with targeted biopsy, X-ray method, ph-metry, ultrasound; association with *Helicobacter pylori* – according to biopsy urease and

respiratory tests, the presence of urinary syndrome – generally accepted laboratory methods (General urinalysis, analysis according to Nechiporenko [16], Zimnitsky [17], daily proteinuria), and radionuclide methods, if necessary. Patients (12 males and 18 females) were divided into two groups (the main and the control one – 15 people, respectively) aged 18-60 years. In the main group, the patients received medical treatment according to accepted standards and additionally Minerol (a biologically active drug enriched with silicon, calcium, magnesium, iron, zinc, copper, manganese, molybdenum, chromium, iodine, selenium) 1 t.s., 3 times a day, 30 minutes before meals, the control group was treated with basic drugs without Minerol.

The methodology of this research work is based on a combination of methods for analytical research of the causes of respiratory pathologies in patients with a systemic prevention analysis of digestive diseases against the background of COVID-19. The rapid spread of the pandemic around the world has become one of the reasons for the exacerbation of a large number of diseases that previously had a latent form of course, which is confirmed by statistics provided by public organizations responsible for protecting public health in different countries of the world. The methodology of this research work provides for a qualitative choice of methods for conducting scientific research to maximize the quality coverage of issues raised in the subject of this paper, and for complete and objective conclusions formulated based on the results obtained in the course of the study.

The materials of this research work consisted of experimental data of domestic and foreign researchers of issues related to the topic of this work or related to them. In combination with the conducted experimental studies, the theoretical justification of the scientific concepts under consideration forms a qualitative basis for the results and conclusions of this scientific study. In addition, the methodology of this scientific study provides for conducting clinical examinations of patients with the identified pathologies of respiratory and digestive organs, to identify patterns of their condition and analyse promising opportunities for treating the identified pathologies. This was done to analyse the effectiveness of several antioxidants and immunostimulants in eliminating the consequences of

dysmicroelementemia in patients with combined digestive and renal pathology complicated with COVID-19.

Based on the results obtained in the course of this scientific research, conclusions are drawn, and the results of the entire complex of scientific works are summed up. In general, the methodology of this scientific work acts as a qualitative foundation for conducting all the scientific research necessary within the framework of the stated topic of scientific research and can serve as a basis for further scientific research of the full range of issues related to researching the field of qualitative analysis of dysmicroelementemia in patients with combined digestive and renal pathology complicated with COVID-19, and after the end of the treatment process.

RESULTS AND DISCUSSION

30 patients with chronic kidney disease (22 with chronic pyelonephritis and 8 with chronic glomerulonephritis) were examined without impaired renal function in combination with damage to the gastroduodenal zone (30 with chronic gastroduodenitis and 6 with duodenal bulb ulcer). Before treatment, painful conditions were observed in 100% of the patients, nausea in 60%, vomiting in 20%, heartburn in 60%, tongue plaque in 80%, general weakness in 70%, headache in 10%, sleep disorders in 10%, leukocyturia in 30%, and proteinuria in 40% of the patients. Under the influence of Minerol, a positive dynamics of the average values of laboratory blood and urine parameters were observed both in the main group (before treatment–, after treatment– respectively): white blood cells- 6.02 ± 1.27 and 6.21 ± 1.34 ($\times 10^9/l$) erythrocyte sedimentation rate (ESR) – 16.12 ± 1.23 and 12.37 ± 1.16 (mm /g), daily proteinuria – 1.265 ± 1.024 and 0.428 ± 0.372 (g), $P < 0.05$, proteinuria in the general urinalysis – 0.684 ± 0.488 and 0.230 ± 0.177 (G/L), $P < 0.05$, red blood cells in the general urinalysis, 7.12 ± 4.58 and 4.11 ± 3.98 (per high power field), $p < 0.05$, white blood cells in the general urinalysis 5.32 ± 3.25 and 4.86 ± 3.52 (per high power field), red blood cells in the urinalysis according to Nechiporenko 6.84 ± 6.54 and 2.97 ± 2.96 ($\times 10^6/l$), $P < 0.05$, leukocytes in the Nechiporenko urinalysis- 5.04 ± 4.85 and 4.41 ± 4.32 ($\times 10^6/l$). Similar changes occurred in the control group, but the number of likely outcomes was lower: white

blood cells – 5.94 ± 1.12 and 5.86 ± 1.15 ($\times 10^9/l$), ESR – 15.84 ± 1.18 and 14.66 ± 1.18 (mm /g), daily proteinuria – 1.104 ± 0.829 and 0.914 ± 0.664 (g), proteinuria in the general urinalysis – 0.650 ± 0.441 and 0.472 ± 0.327 (g/l), $P < 0.05$, red blood cells in the general urinalysis – 6.68 ± 4.14 and 6.48 ± 4.22 (per high power field), white blood cells in the general urinalysis 5.26 ± 3.27 and 4.98 ± 3.12 (per high power field), red blood cells in the Nechiporenko urinalysis 6.78 ± 6.68 and 6.16 ± 6.12 ($\times 10^6/l$), white blood cells in the urine test according to Nechiporenko- 4.92 ± 4.88 and 4.74 ± 4.86 ($\times 10^6/l$).

No negative side effects of Minerol were detected during treatment and 6 months of follow-up. After treatment in both the groups, the patients showed a decrease in the number of white blood cells in the blood, a decrease in ESR, daily proteinuria, the number of red blood cells and white blood cells in the general urinalysis and the Nechiporenko urinalysis ($P < 0.05$). All these changes were not statistically likely ($P > 0.05$). After 14 days of treatment, the patients of the main group showed a significant decrease in daily proteinuria, ESR, and proteinuria in the general urinalysis ($P < 0.05$). Before treatment, the average values of the studied laboratory parameters did not differ in the groups ($p > 0.05$). After treatment in both the groups, the patients showed a decrease in the number of white blood cells in the blood, a decrease in ESR, daily proteinuria, the number of red blood cells and white blood cells in the general urinalysis and the Nechiporenko urinalysis ($P < 0.05$). All these changes were not statistically likely ($P > 0.05$). After 14 days of treatment, the patients of the main group showed a significant decrease in daily proteinuria, ESR, and proteinuria in the general urinalysis ($P < 0.05$).

Under the influence of treatment, a positive total clinical effect was registered in 78% of the main group and 63% – of the control room taking into account esophagogastroduodenoscopy data. Relief of pain syndrome under the influence of Minerol was observed more often by 6.3% ($p < 0.05$), nausea by 13% ($p < 0.05$), vomiting by 6.7% ($p < 0.05$), heartburn by 6.3% ($p < 0.05$), the disappearance of tongue plaque by 19% ($p < 0.05$), general weakness by 13.3% ($p < 0.05$), headache by 10% ($p < 0.05$), leukocyturia by 6.7% ($p < 0.05$), proteinuria by 20% ($p < 0.05$) than in the control group. Under the

influence of Minerol, positive dynamics of indicators of the secretory and acid-forming function of the stomach was observed. The effectiveness of exposure was higher in the main group ($\chi^2 = 14.57$, $P < 0.01$) than in the control one. Under the influence of Minerol, the indicators of the hourly volume of basal secretions significantly changed (from 0.045 ± 0.001 to 0.049 ± 0.006 l, $P < 0.02$), the flow rate of basal and stimulated HCl production (respectively from 0.731 ± 0.121 to 1.120 ± 0.023 mmol/H, $P < 0.001$; and C 2.063 ± 0.051 to 3.434 ± 0.530 mmol/h, $p < 0.01$). The change in the hourly volume of stimulated secretions (from 0.063 ± 0.002 to 0.074 ± 0.003 l) was insignificant ($P > 0.1$).

Silicon has long been known as a sorbent that provides a detoxifying effect. Trace elements, in particular zinc, copper, selenium, are natural antioxidants and mediated immunostimulants. The effectiveness of each of these antioxidants increases when used in combination due to their mutual synergy. The combination in one preparation significantly enhances not only the antioxidant but also the immunomodulatory effects of each of the ingredients. Lack of zinc leads to disruption of the functioning of the immune system, gastrointestinal tract and skin, lack of copper in the body increases with the appointment of zinc and, conversely, zinc in high doses reduces the copper content in the body. The simultaneous presence of copper and zinc ions is accompanied by a synergy of their action. The synergistic effect of the components determines the high effectiveness of the drug as a preventive and curative agent. The digestive system is the first to encounter trace elements that enter the body. These substances strengthen local immunity and are well absorbed into the bloodstream in therapeutic doses. Minerol helps to stabilise biological membranes, stability and activation of the immune system, which together reduces inflammatory phenomena of the mucous membrane of the digestive canal and the urinary system.

If glomerulonephritis or relapses are diagnosed for the first time, the patient should be referred to a hospital for a definitive diagnosis and appropriate treatment. It is necessary to find out if the disease is acute, rapidly progressive or chronic after dynamic observations. In adults, this disease is quite rare, with no more than 1-2 cases per 1,000 subjects, clinically manifested by nephritic syndrome, which develops a few weeks after

streptococcal or other infection. It is possible to develop a post-infectious form of this disease only with hematuria, which usually resolves within six months.

Thus, Minerol can be considered an effective means of treating lesions of the gastroduodenal zone and kidneys and ensuring the achievement of anti-inflammatory and sanogenetic effects, which is essential for patients with combined digestive and renal pathology against the background of COVID-19.

CONCLUSIONS

When included in the complex treatment of gastroduodenal zone and kidney lesions, the biologically active drug Minerol contributes to a faster recovery of patients and plays an indispensable role in the prevention of complications such as uremic anaemia, cardiomyopathy, etc., providing anti-inflammatory and sanogenetic effects, can be useful in the treatment of post covid syndrome.

In addition, the rapid recovery of patients with established pathologies of the digestive and respiratory organs is facilitated by the high-quality implementation of all the doctor's recommendations provided during treatment. Minerol can qualitatively stabilise the patient's biological membranes and immune system, but this becomes possible only if the drug intake standards and storage conditions are met. Timely treatment can qualitatively reduce the consequences of COVID-19, as well as remove acute pain.

In general, the process and sequence of treatment of post covid syndrome directly depend on the nature and the course of the disease and the individual characteristics of patients. High-quality provision of anti-inflammatory and sanogenetic effects, as positive consequences of Minerol, can be achieved by ensuring the proper quality of administration, which was prescribed taking into account the patient's condition and its ability to perceive the treatment offered. In addition, it is necessary to take into account the effectiveness of natural antioxidants, which are additional elements of influence on the treatment of digestive and renal pathology complicated with COVID-19.

Thus, the correct choice of treatment and strict adherence to all appropriate recommendations are the keys to the ultimate success in eliminating dysmicroelementemia in

patients with combined digestive canal and renal pathology complicated with COVID-19.

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Conflict of interest

The authors declare no conflict of interest.

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