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The prognostic value of determining the deficiency of iron, zinc and copper in the development of the chronic kidney disease

Radjabov N.M.
Bukhara State Medical Institute, Bukhara, Uzbekistan

Abstract: In recent years, when talking about comorbidity, the most discussed area in the field of internal medicine is the cardiorenal continuum. Cardiovascular diseases, obesity, type II diabetes and renal dysfunction are becoming more and more pandemics of the 21st century. In recent years, the main cause of kidney dysfunction is not its primary disease, but hypertension, that is, essential arterial hypertension and diabetes.

Earlier detection of changes in podocytes and nephropathy makes it possible to diagnose and stop the process of kidney damage before the appearance of clinical signs.

Keywords. Chronic kidney disease, trace elements, cardiorenal continuum, diabetes mellitius.

Introduction. In recent years, special attention has been paid to diseases that arise on the basis of the underlying disease and differ from it. Such cases were reported by the American epidemiologist-researcher A. Feinstein in 1970 and called comorbidity. [1,2,5,15,19].

Almost all studies reported that a high level of concomitant pathology reduces the quality of life, disrupts social adaptation and increases mortality. [3,5,8,9,15,16].

In the last 10 years, when talking about comorbidity, the most discussed area in the field of internal medicine is the cardiorenal continuum. Cardiovascular diseases, obesity, type II diabetes and renal dysfunction are becoming more and more pandemics of the 21st century. In recent years, the main cause of renal dysfunction is not its primary disease, but hypertension, that is, essential arterial hypertension (AH) and diabetes. [4,6,7,10,11,17,22,23,24,25,26].

The combination of diabetes mellitus and GC is detected in 60% of cases and is a serious risk factor for cardiovascular diseases. [3,5,12,15,18,27,28,29].

GC accounts for 75% of cardiovascular diseases diagnosed in patients with diabetes mellitus. [3,9,15] Only the presence of type II diabetes increases the risk of cardiovascular diseases by 2 times in men and 3 times in women, which increases by 4 times with the addition of hypertension. [2,6,18] According to diabetes

incidence statistics for 2011, 360 million patients were registered, and by 2030 their number will reach 552 million.

It is known that irreversible severe changes in target organs occur in type II diabetes mellitus. Their number increases sharply in comorbid cases, including when accompanied by GB. The combination of diabetes mellitus and GB is detected in 60% of cases and is a serious risk factor for cardiovascular diseases. [5,9,11,15] Podocytes are a complex structural structure that provides its broad functions and adaptive processes in physiological conditions. This also makes the cells very sensitive to damage.[2,7,9,14].

In recent years, the existence of an organic link between albuminuria and ultrastructural and functional disorders of podocytes has been confirmed in a number of experimental and clinical studies. [6,7,17,19]. It has been shown that these changes occur long before the appearance of microalbuminuria. [4,8]. The data obtained confirmed that podocytes were involved in the processes much earlier and increased interest in them. This is due to the fact that the detection of changes in this cell and nephropathy allows you to diagnose and stop the process of kidney damage before the appearance of clinical signs.

Micronutrients are essential micronutrients needed for normal body function and include iron (Fe), zinc (Zn), selenium (Se), copper (Cu), iodine (I) and manganese (Mn) in amounts ranging from 50 to 18 micrograms. milligrams per day. in patients with CKD, this may be abnormal as a result of poor nutrition, hypercatabolism caused by uremia, persistent inflammation, or the dialysis procedure itself (4). Optimal micronutrient status can help maintain optimal immune function, reducing exposure to infections and improving quality of life for patients with CKD. Previous research has shown that micronutrient homeostasis may help regulate immune disorders, enhance growth and development, and reduce infections, cardiovascular complications, anemia, and mineral and bone diseases (5). Additionally, loss of micronutrient homeostasis in patients with end-stage renal disease (ESRD) significantly contributes to increased morbidity and mortality. Therefore, micronutrient homeostasis should be considered in all stages of CKD, and all clinicians caring for patients should be aware of micronutrient requirements. This review summarizes the benefits and risks of micronutrients in patients with CKD.

Purpose. Evaluating prognostic role of trace elements as zinc, cooper and ferrum in the developing chronic kidney disease.

Material and methods. As a research source, 180 patients diagnosed with the early stages of CKD before dialysis, who referred to the multidisciplinary medical center of Bukhara region and received inpatient treatment, were taken. They were divided

into 3 groups. The first group consisted of 37 patients with CKD stage 1, the second group consisted of 94 patients with CKD stage 2, and the third group consisted of 49 patients with CKD stage 3a/b.

All patients in the follow-up were compared before and after treatment with standard clinical and laboratory tests, including microalbuminuria, type IV collagen, aldosterone, and cystatin-C. In all patients, the amount of zinc, iron and copper in blood serum, the amount of transferrin and ferritin from ferrokinetic indicators, and the amount of zinc in urine were determined.

Result. The results of the conducted research showed that the laboratory markers of essential trace element deficiency observed in patients with CKD are manifested in the early stages of the disease.

We evaluated the importance of each micronutrient in the development and progression of CKD at each micronutrient level.

Deficiency of the microelement of iron in 14.3% of patients (including 10.8% in men and 17.3% in women) in the form of monodeficiency, in which the degree of deficiency of this element prevails, in 18.1% (including 17.5% in men, 18.2% in women) it was found that mixed deficiency in the form of iron and zinc deficiency and polydeficiency in the form of iron+zinc+copper deficiency was manifested in 21.6% (including 24.5% in men, 18.6% in women).

Scientific literature reports that there is an inverse proportional relationship between the elements of copper and zinc, that is, a sharp decrease in the microelement of zinc in the body leads to a relative increase in the microelement of copper (S.V. Berestenko and co-authors, 2007).

We also emphasize the possibility that such changes in mim microelements are related to changes in the amount of zinc.

In patients with CKD, deficiency of micronutrient zinc was more evident than other micronutrients, and these changes were observed from the early stages of the disease.

In the first chapter of the thesis, information is presented based on the analysis of the existence of a strong positive correlation between urinary excretion of zinc trace element and CKD levels ($r= 0.7$; $p<0.001$). A strong negative correlation was found between the blood serum level of zinc trace element and the clinical stages of CKD ($r= -0.64$; $p<0.001$).

A sharp decrease in the amount of zinc in the early stages of the disease indicates that this trace element is a diagnostic marker in the development of CKD and, in turn, a prognostic marker for evaluating the progression of the disease.

Conclusions. The the relationship between uromodulin and urinary zinc excretion indicators suggests that zinc micronutrients can be used as a laboratory marker for evaluating renal fibrosis.

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