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Assessment of Risk and Prevention of Chronic Kidney Disease in Patients with Comorbid Conditions

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Abstract

The study included 126 patients with comorbid conditions and risk factors for chronic kidney disease. The mean age of the patients was 59.3 ± 8.7 years. Arterial hypertension was observed in 96 patients, diabetes mellitus in 62 patients, cardiovascular diseases in 54 patients, and obesity in 47 patients. A decrease in estimated glomerular filtration rate below 60 ml/min/1.73 m² was detected in 39 patients, while albuminuria was found in 58 patients. A high and very high risk of chronic kidney disease progression was identified in 51 patients.The proposed prevention algorithm included regular monitoring of eGFR, albuminuria, blood pressure, glycemic status, lipid profile, body mass index, lifestyle correction, and elimination of nephrotoxic risk factors. The results indicate that patients with arterial hypertension, diabetes mellitus, obesity, and cardiovascular diseases require systematic screening and multidisciplinary follow-up. The use of an integrated risk assessment algorithm may contribute to early detection of renal dysfunction and prevention of chronic kidney disease progression in patients with comorbid pathology.

Keywords: Chronic kidney disease, comorbid conditions, arterial hypertension, diabetes mellitus, albuminuria, estimated glomerular filtration rate, prevention, nephroprotection.

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1. Introduction

Chronic kidney disease is one of the important medical and social problems of modern healthcare, especially in patients with comorbid pathology. In the present study, 126 patients with risk factors for chronic kidney disease were analyzed. The mean age of the patients was 59.3 ± 8.7 years, which indicates the predominance of middle-aged and elderly individuals among the risk group. Comorbid conditions were common among the examined patients. Arterial hypertension was detected in 96 patients, diabetes mellitus in 62 patients, cardiovascular diseases in 54 patients, and obesity in 47 patients. The combination of these conditions may increase the risk of renal dysfunction, contribute to vascular damage, impair renal blood flow, and accelerate the progression of chronic kidney disease. A decrease in estimated glomerular filtration rate below 60 ml/min/1.73 m² was found in 39 patients, while albuminuria was detected in 58 patients. These findings indicate that early signs of kidney damage may be present even before the development of severe clinical symptoms. Therefore, timely assessment of eGFR, albuminuria, blood pressure, glycemic status, lipid profile, and body mass index is essential for identifying patients at high risk. Early risk stratification and the use of a structured preventive algorithm may help reduce the progression of chronic kidney disease in patients with

comorbid pathology. Particular attention should be paid to patients with arterial hypertension, diabetes mellitus, obesity, and cardiovascular diseases, as they represent the main risk group requiring regular monitoring and multidisciplinary follow-up.

Objective of the Study

The objective of the study was to assess the risk of chronic kidney disease development in patients with comorbid pathology and to develop a preventive algorithm aimed at early detection of renal dysfunction and reduction of disease progression.

2. Methods

The study was conducted at the Republican Scientific and Practical Center of Nephrology and Hemodialysis. A total of 126 patients with comorbid pathology and risk factors for chronic kidney disease were included in the study. The age of the patients ranged from 42 to 78 years, with a mean age of 59.3 ± 8.7 years. The study group included 68 women and 58 men. The main comorbid conditions analyzed in the study were arterial hypertension, diabetes mellitus, cardiovascular diseases, obesity, and metabolic disorders. Arterial hypertension was diagnosed in 96 patients, diabetes mellitus in 62 patients, cardiovascular diseases in 54 patients, and obesity in 47 patients. All patients underwent clinical and laboratory examination aimed at assessing the risk of chronic kidney disease development and progression. The examination included assessment of serum creatinine, estimated glomerular filtration rate, albuminuria, blood pressure, fasting blood glucose, glycated hemoglobin, lipid profile, and body mass index. Estimated glomerular filtration rate below 60 ml/min/1.73 m² and the presence of albuminuria were considered the main indicators of increased risk for chronic kidney disease progression. Patients were stratified into risk groups according to renal function, albuminuria, cardiovascular risk factors, and associated metabolic disorders. Statistical analysis was performed using descriptive and comparative statistical methods. Quantitative variables were presented as mean ± standard deviation, while qualitative variables were expressed as absolute numbers. The significance of differences between compared parameters was assessed using standard statistical methods, with $p < 0.05$ considered statistically significant.

3. Results

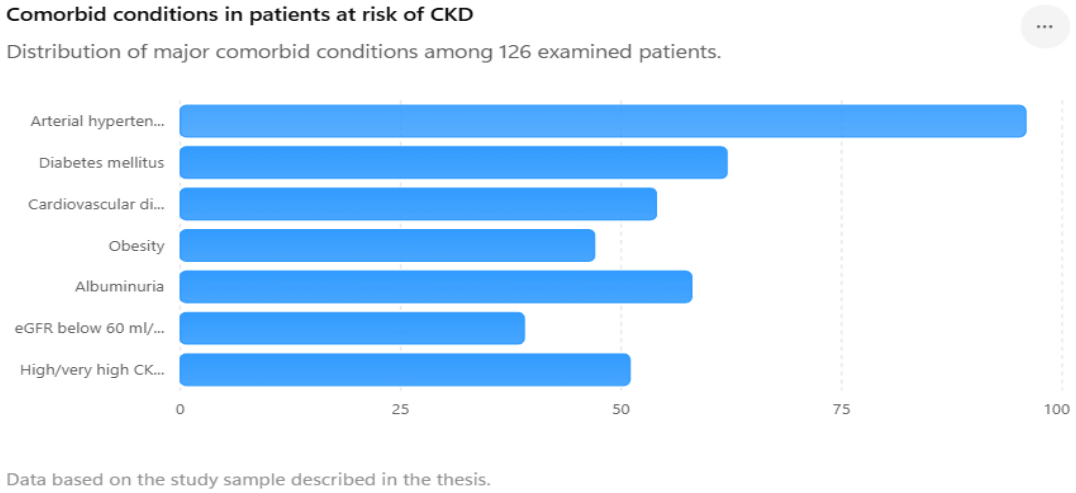
Clinical and laboratory analysis showed a high frequency of comorbid conditions among the examined patients. Arterial hypertension was detected in 96 patients, diabetes mellitus in 62 patients, cardiovascular diseases in 54 patients, and obesity in 47 patients. Combined comorbid pathology was observed in the majority of patients, which was associated with a higher risk of chronic kidney disease progression. A decrease in estimated glomerular filtration rate below 60 ml/min/1.73 m² was found in 39 patients. Albuminuria was detected in 58 patients. The combination of reduced eGFR and albuminuria was observed in 27 patients. A high and very high risk of chronic kidney disease progression was identified in 51 patients. The mean eGFR in the total study group was 67.8 ± 18.4 ml/min/1.73 m². In patients with high and very high risk of chronic kidney disease progression, the mean eGFR was significantly lower compared with patients with low and moderate risk: 48.6 ± 9.7 ml/min/1.73 m² versus 78.4 ± 12.5 ml/min/1.73 m², $p < 0.001$. The level of albuminuria was also significantly higher in patients with high and very high risk. The mean albuminuria level in this group was 112.4 ± 48.7 mg/g, while in patients with low and moderate risk it was 42.6 ± 21.5 mg/g, $p < 0.001$. Patients with a combination of arterial hypertension and diabetes mellitus had more pronounced renal dysfunction. In this subgroup, reduced eGFR was identified in 24 patients, and albuminuria was detected in 36 patients. The mean systolic blood pressure in patients with high renal risk was 151.4 ± 13.2 mmHg, compared with 135.6 ± 11.4 mmHg in patients with lower risk, $p < 0.01$. Among patients with diabetes mellitus, higher glycated hemoglobin values were associated with albuminuria and reduced renal function. The mean HbA1c level in patients with signs of kidney damage was 8.2 ± 1.1, while in patients without significant renal impairment it was 7.1 ± 0.9, $p < 0.05$. Obesity was also associated with an increased risk of chronic kidney disease progression. Patients with obesity had a higher mean body mass index and more frequent metabolic abnormalities. The mean body mass index in patients with high renal risk was 31.2 ± 3.8 kg/m², compared with 27.5 ± 3.2 kg/m² in patients with low and moderate risk, $p < 0.05$. The accumulation of three or more comorbid conditions was associated with a significant decrease in kidney function. In these patients, mean eGFR was 49.7 ± 10.8 ml/min/1.73 m², while in patients with one or two comorbid conditions it was 74.3 ± 12.6 ml/min/1.73 m², $p < 0.001$. Albuminuria in patients with multiple comorbidities was also higher: 121.6 ± 52.3 mg/g versus 35.8 ± 18.4 mg/g, $p < 0.001$. The obtained results indicate that arterial hypertension, diabetes mellitus, cardiovascular diseases, obesity, albuminuria, and reduced eGFR are closely associated with the progression risk of chronic kidney disease. The highest risk was observed in patients with combined cardiometabolic pathology, which

confirms the need for early screening, regular monitoring, and the use of a structured preventive algorithm.

4. Discussion

The results of the present study confirm the significant role of comorbid pathology in the development and progression of chronic kidney disease. Among 126 examined patients, arterial hypertension was detected in 96 patients, diabetes mellitus in 62 patients, cardiovascular diseases in 54 patients, and obesity in 47 patients. These findings indicate that patients with combined cardiometabolic disorders represent a high-risk group requiring regular screening, risk stratification, and preventive follow-up. According to the KDIGO 2024 Clinical Practice Guideline, the evaluation of chronic kidney disease should be based on an integrated approach that includes the cause of kidney damage, estimated glomerular filtration rate, and albuminuria [1]. In our study, a decrease in eGFR below 60 ml/min/1.73 m² was found in 39 patients, while albuminuria was detected in 58 patients. The combination of reduced eGFR and albuminuria in 27 patients indicates a clinically significant risk of chronic kidney disease progression. Arterial hypertension was the most frequent comorbid condition in the examined group. Persistent elevation of blood pressure contributes to renal vascular damage, nephrosclerosis, glomerular hypertension, and gradual decline in kidney function. The KDIGO 2021 guideline emphasizes the importance of strict blood pressure control in patients with chronic kidney disease as one of the key measures for slowing renal dysfunction and reducing cardiovascular risk [2]. In the present study, patients with high renal risk had higher systolic blood pressure values, confirming the importance of early antihypertensive correction. Diabetes mellitus is another major factor associated with chronic kidney disease progression. In the examined group, diabetes mellitus was diagnosed in 62 patients. Patients with diabetes demonstrated more frequent albuminuria and reduced renal function. These data are consistent with KDIGO recommendations on diabetes management in chronic kidney disease, which highlight the need for regular monitoring of eGFR, albuminuria, glycemic control, and nephroprotective therapy [3]. The American Diabetes Association also recommends systematic screening for kidney disease in patients with diabetes, including assessment of urinary albumin excretion and estimated glomerular filtration rate [4]. The relationship between diabetes mellitus and chronic kidney disease requires a multidisciplinary approach. The ADA and KDIGO consensus report emphasizes that patients with diabetes and chronic kidney disease should receive comprehensive care aimed at glycemic control, blood pressure management, cardiovascular risk reduction, and kidney protection [5]. In our study, the combination of arterial hypertension and diabetes mellitus was associated with more pronounced renal dysfunction, which supports the importance of integrated cardiometabolic risk management. Chronic kidney disease has a high global medical and social burden. According to the Global Burden of Disease study, chronic kidney disease is associated with increasing morbidity, mortality, and healthcare costs worldwide [6]. This makes early identification of high-risk patients especially important. The results of our study show that patients with several comorbid conditions had lower mean eGFR values and higher albuminuria levels compared with patients with fewer comorbidities. Therefore, the accumulation of comorbid diseases should be considered an important predictor of renal risk. Modern clinical trials have demonstrated the effectiveness of nephroprotective therapy in reducing the risk of chronic kidney disease progression. The DAPA-CKD trial showed that dapagliflozin reduced the risk of renal and cardiovascular outcomes in patients with chronic kidney disease [7]. Similarly, the EMPA-KIDNEY trial demonstrated the beneficial effect of empagliflozin in patients with chronic kidney disease, including those with and without diabetes mellitus [8]. These data support the inclusion of modern nephroprotective strategies in the management of high-risk patients. The CREDENCE trial also confirmed the renal protective effect of canagliflozin in patients with type 2 diabetes mellitus and diabetic nephropathy [9]. These findings are particularly relevant for our study, as diabetes mellitus was one of the most frequent comorbid conditions among the examined patients. Early use of evidence-based nephroprotective approaches may help slow the progression of kidney damage in patients with diabetes and albuminuria. In addition, finerenone has shown positive effects on kidney outcomes in patients with chronic kidney disease and type 2 diabetes mellitus. The FIDELIO-DKD study demonstrated that finerenone reduced the risk of chronic kidney disease progression in this group of patients [10]. This confirms the importance of individualized therapy aimed at controlling inflammation, fibrosis, albuminuria, and cardiovascular risk in patients with comorbid pathology. Obesity and metabolic disorders also contributed to increased renal risk in the examined group. Excess body weight may lead to insulin resistance, activation of the renin-angiotensin-aldosterone system, glomerular hyperfiltration, and progression of renal injury. Therefore, lifestyle modification, dietary correction, body mass index control, and physical activity should be considered

important components of chronic kidney disease prevention. Thus, the obtained results demonstrate that chronic kidney disease prevention in patients with comorbid pathology should be based on early detection of risk factors, regular monitoring of eGFR and albuminuria, control of blood pressure, glycemic status, lipid profile, body mass index, and correction of nephrotoxic factors. The proposed preventive algorithm is consistent with modern international recommendations and may improve early detection of renal dysfunction, slow chronic kidney disease progression, and reduce the risk of cardiovascular complications.



5. Conclusions

1. Comorbid pathology is an important factor in the development and progression of chronic kidney disease. The highest risk was observed in patients with arterial hypertension, diabetes mellitus, cardiovascular diseases, obesity, and metabolic disorders.

2. A decrease in estimated glomerular filtration rate below 60 ml/min/1.73 m² was detected in 39 patients, while albuminuria was found in 58 patients. These indicators are key markers for early identification of patients at increased renal risk.

3. Patients with combined comorbid conditions had more pronounced renal impairment, which confirms the need for systematic screening, regular monitoring, and early preventive measures.

4. The proposed preventive algorithm, including control of eGFR, albuminuria, blood pressure, glycemic status, lipid profile, body mass index, lifestyle modification, and elimination of nephrotoxic factors, may help prevent chronic kidney disease progression and improve patient outcomes.

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