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Risk Factors Leading to Kidney Damage in Patients with Ischemic Heart Disease

Akhmedova Nilufar Sharipovna[1,*], Zaripov Odil Olimovich[2]

[1]Professor, Deparmnent of Faculty and Hospital Therapy, Bukhara State Medical Institute, Bukhara, Uzbekistan
[2]Independent Researcher, Department of Faculty and Hospital Therapy, Bukhara State Medical Institute, Bukhara, Uzbekistan

Abstract Coronary heart disease (CHD) is currently one of the most common diseases among the population and one of the leading causes of death. Fatal outcomes associated with this disease are caused not only by the underlying pathology, but also by its complications. One of these complications is renal dysfunction in CHD, which increases the mortality rate due to the comorbid condition. In our study, we studied the significance of etiologic risk factors contributing to the development and progression of nephropathy in patients with CHD of different ages and genders.

Keywords CHD, Chronic kidney disease, Age, Gender, Risk factor

1. Introduction

In recent years, the world community has been facing a global problem not only in the field of medicine, but also of socio-economic importance for countries - the annual increase in mortality and disability among the population as a result of the pandemic of chronic non-communicable diseases and their complications [2,4]. In particular, based on scientific research, it is shown that the incidence of ischemic heart disease, hypertension, atherosclerosis, depression, diabetes mellitus, obesity, gastric and intestinal ulcers, and tumor diseases, as well as disability and mortality as a result of them, are increasing [1,6].

The results of kidney function and urine analysis, studied during screening processes among tens of thousands of people in different countries, showed that one in ten people in the world has chronic kidney damage of varying degrees. All cases of kidney damage of varying degrees, not detected and not treated in a timely manner, develop over the years, as a result of which patients are forced to resort to dialysis or kidney transplantation procedures.

Chronic kidney disease is considered one of the socially urgent problems that can negatively affect public health and the economic situation of the country, occurring in almost 15% of the population of developed countries, and the resulting chronic kidney disease is characterized by a high incidence of disability and mortality among patients [2,3,6].

The concept of chronic kidney disease was introduced into science and put into practice at the beginning of the 21st century in the USA after numerous scientific studies and publications of their results by the National Kidney Foundation (NKF). In 2002, a practical recommendation on the principles of identifying and treating patients with chronic kidney disease K/DOQI (Kidney Disease Outcomes Quality Initiative) was developed and implemented in the USA [6].

The widespread introduction of the concept of CKD into medical practice leads to the early identification of risk factors and causes of the development of this disease and the need for patients to consult a nephrologist and cardiologist in the early stages of the disease.

The aim of the research is to study the age-related features of renal dysfunction and the development of renal tissue fibrosis in patients of different ages with coronary heart disease and to improve the prevention of nephropathies.

2. Materials and Methods

The study involved 132 patients who received outpatient treatment and inpatient treatment in the therapy department of the Kagan City Medical Center of the Bukhara region during 2021-2023. Taking into account the established criteria, 132 patients under the age of 18 with coronary heart disease were included in the study. Of these, 68 were women and 64 were men, with an average age of 54.8±4.7 years.

Since the purpose of the work was to study the significance of age in the manifestation of renal dysfunction, the patients were divided into 3 groups.

1 group - 40 patients aged 18-44 years (30.3%)
2 group - 49 patients aged 45-59 years (37.1%)
3rd group - 43 patients aged 60-74 years (32.6%)

* Corresponding author:
nilufarakhmedova230474@gmail.com (Akhmedova Nilufar Sharipovna)
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To assess kidney function, the content of Cystatin C, creatinine, urea in blood and urine, galectin 3 in blood serum, urine analysis, and collagen 4 in urine were determined.

Statistical analysis of the obtained results was carried out using Microsoft Office Excel 2010 (Microsoft Corp., USA) and Portable Statistica 8 (StatSoft, Inc., USA). The description of categorical data was carried out in the form of level indicators, expressed as percentages. Considering that most of the analyzed properties have a different distribution than usual, non-parametric statistical tests were used for statistical analysis of the obtained results. The relationship between the studied properties was assessed using the Spearman degree correlation method (r - correlation coefficient).

3. Results and Discussion

Analysis of the research results showed that in patients with coronary heart disease, a number of risk factors leading to renal dysfunction are important, and the significance of these factors varies depending on age. Table 1 presents an age-related analysis of the significance of risk factors in patients with CHD. From the data presented in the table, it can be concluded that risk factors such as arterial hypertension, hypercholesterolemia, and the use of nephrotoxic drugs increase with age. It was noted that the incidence of such risk factors as chronic inflammatory foci, diabetes mellitus, and obesity was 0.6 and 0.9 times higher in the middle-aged group compared to the 1st and 3rd groups. In the younger group, there was a high risk of excess body weight, a tendency towards kidney damage, i.e., the presence of arterial hypertension, diabetes mellitus, and kidney diseases in close relatives.

Table 1. Analysis of the significance of risk factors in patients with CHD depending on age

Indicators	1st group n=40	2nd group n=49	3rd group n=43
Arterial hypertension	54,2±2,8	60,1±2,6	67,4±2,6
Diabetes mellitus	26,7±2.6	34,4±2.6	32,5±2.7
Obesity	37,5±2.8	48,3±2.7	42,8±2.7
Excess body weight	42,1±2.8	33,1±2.6	26,9±2.6
Chronic inflammatory foci	62,4±2.8	65,3±2.6	64,7±2.7
Hypercholesterolemia	48,3±2.8	48,8±2.7	56,4±2.7
History of COVID-19 infection	57,5±2.8	52,6±2.7	61,1±2.7
Presence of hypertension, diabetes mellitus in close relatives	57,1±2.8	44,7±2.7	41,2±2.7
Anemia	37,5±2.8	41,1±2.6	39,1±2.7
Chronic need to take NSAIDs	41,7±2.8	44,6±2.7	50,6±2.8

Note: NSAIDs - non-specific anti-inflammatory drugs; *p≤0,05; **p≤0,01;

A significant risk factor in all groups was the incidence of the COVID-19 virus, which, in turn, indicates that the post-COVID period is an independent risk factor in the development of CKD.

At the next stage of the study, an analysis of the significance of risk factors in the gender aspect was conducted (Table 2).

Based on the results of the analysis, it can be concluded that among the risk factors for the development of nephropathy in patients with CHD, obesity and excess body weight, anemia are significant, while obesity was more common in men (45.7±2.5% in men; 40.2±2.4% in women, respectively), and excess body weight was more common in women (52.4 ±2.5% in men; 71.8±2.3% in women, respectively), p<0.01.

Anemia was detected 1.51 times more often among women than among men.

Table 2. Analysis of the significance of risk factors in patients with CHD depending on gender

Indicators	Men n=64	Women n=68	p<
Arterial hypertension	63,7±2.5	57,8±2.4	0,01
Diabetes	27,7±2.4	34,5±2.4	0,01
Obesity	45,7±2.5	40,2±2.4	0,01
Excess body weight	52,4±2.5	71,8±2.3	0,01
Chronic inflammatory foci	48,7±2.5	52,3±2.5	0,05
Hypercholesterolemia	54,4±2.5	56,3±2.5	0,05
History of COVID-19 infection	52,3±2.5	49,5±2.5	0,01
Presence of hypertension, diabetes mellitus in close relatives	48,2±2.5	44,1±2.5	0,01
Anemia	27,6±2.4	41,6±2.4	0,01
Chronic need to take NSAIDs	45,1±2.5	49,8±2.5	0,05

Note: NSAIDs - non-specific anti-inflammatory drugs.

From the analysis of the indicators, it can be concluded that in assessing nephropathy, urinary markers have not only diagnostic, but also prognostic significance.

As can be seen from the results of our study, the study of risk factors for early detection of kidney damage in patients with CHD and prevention of CKD progression by eliminating risk factors is also important.

The effectiveness of prophylaxis of nephropathy in CHD depends on the identification of the leading pathogenetic mechanism in the comorbid state, and timely nephroprotection prevents the development of not only renal, but also chronic heart failure and reduces mortality.

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