ORIGINAL ARTICLE

ASSESSMENT OF CARDIOVASCULAR DISEASE RISK FACTORS IN PATIENTS WITH CORONARY HEART DISEASE COMBINED WITH NONALCOHOLIC FATTY LIVER DISEASE

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Yaroslav Y. Ihnatko, Maria A. Derbak, Paul M. Lukach, Kseniya I. Chubirko, Oleksandr O.Boldizar, Olesia I. Ihnatko
UZHHOROD NATIONAL UNIVERSITY, UZHHOROD, UKRAINE

ABSTRACT

The aim: To study the risk factors of cardiovascular diseases in patients with coronary heart disease with stable angina pectoris II functional class in combination with NAFLD.

Materials and methods: The study included 245 patients with a diagnosis of CHD, stable angina pectoris II functional class (FC), who were being treated at the Communal Nonprofit Enterprise «Central City Clinical Hospital» of Uzhhorod City Council. We singled out 2 groups of patients: group 1 (n=145) – patients with CHD with stable angina pectoris II FC in combination with NAFLD and group 2 (n=100) – patients with CHD with stable angina pectoris II FC.

Results: Analysis of the frequency of occurrence of CVD risk factors in patients with CHD showed that among patients of group 1 there are 50% more people with abdominal obesity, excess body and dyslipidemia. The reliability between the groups in the occurrence of hypertension and type 2 diabetes was not revealed. The obtained results confirm the data that the prevalence of NAFLD increases with increasing body weight and a high degree of obesity increases the risk of its development.

Conclusions: The most frequent risk factors for CVD in patients with coronary artery disease in combination with NAFLD are hypertension, obesity, and dyslipidemia.

KEY WORDS: overweight, NAFLD, risk factors, diabetes mellitus, dyslipidemia, coronary heart disease, stable angina pectoris

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INTRODUCTION

Cardiovascular diseases (CVD) have for a long time taken the first place in the structure of morbidity and mortality all over the world and are an important medical and social problem, due to the impact ony employable people [1]. The prevalence of all forms of coronary heart disease (CHD) among adults in Ukraine is 24%, including 10% among the working population. [2]. Annually, according to national statistics, more than 50,000 new cases of acute myocardial infarction (MI) are registered, and more than 500,000 citizens die from CVD in general, and this indicator continues to grow [3].

The most common form of CHD is stable tension angina, its frequency varies in different regions from 1.8 to 6.5%, while the prevalence gradually increases with age in both sexes [4].

In a third of patients, the development of coronary heart disease occurs against the background of provoking factors, namely excess body weight or obesity, which complicates the course of the main disease, and is also combined with such conditions as hypertension, non-alcoholic fatty liver disease (NAFLD), dyslipidemia, insulin resistance (IR), hyperinsulinemia and diabetes mellitus (DM) [5].

NAFLD is the most common liver disease in the world. It occurs in all age groups [6]. In the general population of developed countries, NAFLD is found in 14–27% [7]. However, the true prevalence of the disease is unknown, since a significant part of patients do not seek medical help. NAFLD has a mild course of symptoms, in most cases it is detected accidentally, during examination for other diseases, such as obesity, diabetes, CHD, when elevated levels of transaminases are detected, etc. [8].

Epidemiological studies have found that NAFLD is associated with CVD risk. Their presence during liver diseases increases the total mortality by 57%, mainly due to cardiovascular pathology [9].

NAFLD is not just a marker of cardiovascular pathology, but also a factor in its pathogenesis [10]. Potential pathogenetic mechanisms include endothelial dysfunction, systemic inflammation, oxidative stress, atherogenic dyslipidemia, genetic features, etc. [11].

Fatty liver index (FLI) is considered a surrogate marker of NAFLD. FLI, associated with insulin resistance, thickness of the intima-media complex, increased risk of CHD, is an independent predictor of the development of diabetes. High FLI values are associated with a high risk of mortality from both CVD and liver disease [12].

The problem of the development and progression of NAFLD in combination with CVD is one of the important issues of internal medicine, as it contributes to the deterioration of the prognosis and course of the underlying disease, and also leads to a decrease in the quality of life of patients [11].

Despite the presence of a large number of studies on the relationship between NAFLD and cardiovascular pathology, the mechanism of influence of NAFLD on cardiovascular risk has not been fully elucidated, which determines the relevance of the study.

THE AIM

The aim of the research was to study the risk factors of cardiovascular diseases in patients with coronary heart disease with stable angina pectoris II functional class in combination with NAFLD.

MATERIALS AND METHODS

The study included 245 patients with a diagnosis of CHD stable angina pectoris II functional class (FC), who were being treated at the at the Communal Nonprofit Enterprise «Central City Clinical Hospital» of Uzhhorod City Council in cardiology department with intensive care units (ICU). We singled out 2 groups of patients: group 1 (n=145) – patients with CHD stable angina pectoris of II FC in combination with NAFLD and group 2 (n=100) – patients with with CHD stable angina pectoris of II FC.

All subjects signed an informed consent, the methodology of which was in line with the Helsinki Declaration of 1975 and its revision in 1983 and was approved by Uzhhorod National University's Commission on Bioethics (Protocol №2/20 of 04.11.2022).

Criteria for inclusion in the study: informed consent of the patient, presence of CHD and NAFLD.

Exclusion criteria: alcoholic disease or liver cirrhosis, autoimmune and viral hepatitis; decompensated heart failure; acute coronary syndrome or acute cerebrovascular accident less than three months before the start of the study; congenital or acquired heart defects; systemic, oncological, autoimmune pathology.

The diagnosis of CHD stable angina pectoris of II FC was established according to the recommendations of the European Society of Cardiology (2013) and the order of the Ministry of Health of Ukraine No. 436 of 03.07.2006, based on the presence of angina attacks, a myocardial infarction suffered no earlier than 6 months ago, the results of cycle ergometry and coronary angiography (coronary artery stenosis was > 70%).

The diagnosis of NAFLD was established according to the unified clinical protocol «Nonalcoholic steatohepatitis» (2014) and according to the recommendations of the European Association for the Study of the Liver (EASL) [13,14].

Upon admission to the hospital, all patients with coronary artery disease underwent a comprehensive examination according to the generally accepted algorithm of the Ministry of Health. The following methods were used to solve the research tasks: clinical - collection of complaints and anamnesis, physical examination - to assess subjective and objective manifestations of the disease; anthropometric measurement - height, body weight, body mass index (BMI), waist circumference (WC), hip circumference (HC), conicity index - ratio of waist circumference to hip circumference. BMI was calculated according to the formula: BMI = body weight (kg) / height (m2). Determination of the level of total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL) was carried out using a set of Biolatest reagents from PLIVA-LACHEMA (Czech Republic) using an automatic biochemical photometer analyzer. The level of low-density lipoprotein cholesterol (LDC) was calculated according to Friedewald's formula (1972): LDL= TC - (HDL + TG/2.2). The following formula was used to calculate the atherogenic index (AI): AI = (TC - HDL) / HDL. The level of blood glucose, the activity of alanine aminotransferase (ALT), aspartate aminotransferase (AST), and the concentration of total bilirubin were studied according to generally accepted methods. Fibrinogen concentration was determined by the gravimetric method of R.A. Rutberg. (1961). The prothrombin index (PTI) was determined according to the method of V. I. Tugolukov. (1952).

Data analysis was performed using Janovi version 2.3.28. The average values of the numerical data were represented as M ± SD. The normality of the distribution was evaluated by the Shapiro-Wilk test. The critical level of reliability was considered to be $\alpha = 0.05$.

RESULTS

According to the clinical and anamnestic data, the following CVD risk factors were identified (Table I).

Analysis of the frequency of occurrence of CVD risk factors in patients with CHD showed that among patients of group 1 there are 50% more people with abdominal obesity (χ 2 =7.479; df=1; p0.05), excess body weight (χ 2 = 6.67; df=1; p0.05) and dyslipidemia (χ 2 =6;34 df=1; p0.05). The reliability between the groups in the occurrence of hypertension (χ 2 =1.472; df=1;

Table I. The risk factors of cardiovascular diseases in patients according to anamnestic data

Indicator	Group 1 n=145 abs./%	Group 2 n=100 abs./%
Excessive body weight	13/9*	4/4
Obesity	36/25*	15/15
Dyslipidemia	15/10*	6/6
Arterial hypertension	71/49	69/69
Type 2 diabetes mellitus	10/7	6/6

Note: The significance of the difference:* - with the indicator between groups 1 and 2 (p<0,05).

Table II. Clinical and laboratory indicators in patients

Indicator (units of measurement)	Group 1 n=145	Group 2 n=100
Systolic blood pressure	160±9,6	155±7,6
Diastolic blood pressure	90±10,1	85±10,3
BMI, kg/m2	31,5±7,7*	28,5±6,2
WC, see	95,7±6,1*	90,1±5,4
TC, mmol/l	6,3±4,1	6,1±2,7
HDL, mmol/l	1,1±0,6	1,3±1,2
LDL, mmol/l	3,2±0,9	3,9±0,8
TG, mmol/l	2,8±1,6*	1,8±1,2
AI	3,04±0,5	2,8±0,6
Blood glucose, mmol/l	4,9±2,1*	3,8±1,9
ALT, Unit	42±13,6	38±10,4
AST, Unit	40±15,1	36±3,4
Bilirubin, mmol/l	13,4±2,4	13,1±2,1
PTI, %	99,4±5,2*	86,1±4,3
Fibrinogen, g/l	3,4±2,5*	2,8±1,5

Note: The significance of the difference:* - with the indicator between groups 1 and 2 (p<0,05).

p0.05) and type 2 diabetes mellitus ($\chi 2=1.197$; df=1; p>0.05) was not revealed. The obtained results confirm the data that the prevalence of NAFLD increases with increasing body weight and a high degree of obesity increases the risk of its development.

During the analysis of clinical and laboratory indicators between the groups, the following data were found (Table II).

Statistically significant differences in anthropometric indicators were found in the patients of the examined groups. Thus, BMI and WC in patients with CHD with NAFLD were significantly higher than in patients with CHD (p<0.05).

The level of triglycerides is also significantly higher in group 1 compared to group 2 (p<0.05). A higher level of glucose in patients of group 1 may be due to a higher percentage of patients with type 2 diabetes mellitus (p<0.05).

When studying the functional state of the liver, it was established that the indicators of ALT and AST activity in patients did not differ between groups. In terms of bilirubin levels, the difference between the examined groups was not reliable.

When analyzing coagulation indicators, a tendency to increase the level of fibrinogen in blood serum was revealed in patients of group 1 compared to group 2 (p<0.05). Patients of group 1 had a significantly higher PTI (p<0.05), which may indicate the presence of hypercoagulation syndrome in this category of patients as a factor in the progression of coronary artery disease.

DISCUSSION

Thus, in patients with coronary heart disease with NAFLD, probably higher BMI, WC, increased levels of triglycerides and PTI were more often observed. These changes indicate more pronounced disorders of the lipid spectrum of the blood, as well as prothrombotic changes in the blood in patients with coronary heart disease with diffuse liver diseases.

To assess the relationship between the functional state of the liver and laboratory parameters in patients with CHD with NAFLD, a correlation analysis was performed. Relationships between AST and BMI (r=+0.59; p AI (r=+0.78; p<0.05); blood glucose (r=+0.69; p<0.05) were revealed .

Therefore, the data obtained by us coincide with the data of scientists regarding the large specific gravity of NAFLD in patients with excess body weight [15,16]. According to a study by Spanish scientists, from 70 to 100% of patients with NAFLD suffer from obesity [17]. Also in the work of Hassen et al. it is shown that among lipid disorders, NAFLD is more often associated with hypertriglyceridemia, which, according to modern data, is considered an important independent risk factor for CHD [18]. The authors explain this by the fact that when adipose tissue loses sensitivity to insulin, the level of TG and free fatty acids in the blood increases. A vicious circle is formed in which obesity, hepatic steatosis, and insulin resistance are related factors that stimulate mutual progression.

CONCLUSIONS

1. The most frequent risk factors for CVD in patients with coronary artery disease in combination with NAFLD are hypertension, obesity, and dyslipidemia.
2. In patients with coronary artery disease in combination with NAFLD, probable correlative relationships of the functional state of the liver with indicators of carbohydrate and lipid metabolism, anthropometric parameters, and prothrombotic changes of blood have been established.

Prospects for further research. Study of the clinical course of CHD in combination with NAFLD and development of optimal managament for this category of patients.

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ORCID and contributionship:
Yaroslav Y. Ihnatko: 0000-0003-1618-8952 [A-D]
Mariya A. Derbak: 0000-0003-4791-4080 [B,D,E]
Paul M. Lukach: 0009-0007-6033-8491 [F]
Kseniya I.Chubirko: 0000-0002-4379-0538 [F]
Oleksandr O. Boldizhar: 0000-0002-9553-5782 [F]
Olesia I. Ihnatko: 0000-0002-4379-5407 [B-D]

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CORRESPONDING AUTHOR

Yaroslav Y. Ihnatko
Uzhhorod National University
20 Hryboiedova st., 88000 Uzhhorod, Ukraine
e-mail: yaroslav.ihnatko@uzhnu.edu.ua

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