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RISK FACTORS OF DAMAGE OF THE CARDIOVASCULAR SYSTEM IN PATIENTS WITH PRIMARY OSTEOARTHRITIS WITH IDENTIFIED CORONARY ATHEROSCLEROSIS

Abstract

The objective of the study was to assess risk factors of the cardiovascular system damage in patients with primary osteoarthrosis and diagnosed coronary atherosclerosis. **Materials and methods.** Fifty-two patients at the mean age of 41 [34; 52] years were involved in the study. There were 37 women and 15 men among them. Elective coronary angiography using the ALLURA Xper FD20 Philips 2012 device was provided to all patients. As a result, hemodynamically insignificant (less than 50%) atherosclerotic stenosis of the heart vessels was verified in this group. The height, weight, and waist circumference with the calculation of body mass index by the Kettle method were determined in patients. Evaluation of cardiovascular risk factors, such as smoking, family history of CVD, and hypodynamia, was performed using questionnaires. The daily monitoring of blood pressure (BP) was carried out with the Cardiotechnika-07-AD-3 device; complete blood count and biochemical analysis were performed, and the systemic coronary risk was evaluated. **Results.** Each patient had from 1 to 6 risk factors of cardiovascular diseases, the median [25th; 75th percentiles] was 3 [2; 5]. In women, family history of cardiovascular diseases, hypodynamia and hypertension were significantly more common than in men (p=0,002). The presence of bad habits (smoking), high levels of triglycerides and low density lipoproteins (p = 0.0001) occurred with higher frequency in men. The correlation analysis revealed that the incidence of hypertension, hypodynamia and dyslipidemia was associated with the duration of osteoarthrosis, the intensity of pain according to visual analog scale and the number of affected joints. **Conclusion.** The presence of generalized subclinical inflammation in patients with osteoarthrosis together with the classic risk factors of cardiovascular diseases, probably mediates the early onset of atherosclerosis in this category of patients.

Key words: *osteoarthrosis, atherosclerosis, inflammation, risk factors, cardiovascular diseases*

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BP — blood pressure; VAS — visual analogue scale; BMI — body mass index; NSAIDs — nonsteroidal anti-inflammatory drugs; OA — osteoarthrosis; CVD — cardiovascular diseases; RF — risk factors

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According to the Federal Rheumatology Center, the incidence of osteoarthrosis (OA) is 11.4 per 1,000 people aged over 18, and the increase in the incidence is 20% annually. The frequent combination of OA with cardiovascular diseases (CVD) is one of the urgent problems facing modern medicine, since the death rate from vascular accidents in this category of patients is much higher than in the general population [6, 7, 13, 15, 18]. At the same time, there is a significant reduction in the age of patients with both OA and atherosclerosis [1, 23].

Study objective: to assess the cardiovascular risk factors in patients with primary osteoarthrosis in whom coronary atherosclerosis was diagnosed.

Materials and Methods

The study was conducted at the State Healthcare Institution Krai Clinical Hospital and Federal State Budgetary Educational Institution of Higher Education Chita State Medical Academy. The study enrolled 52 patients with primary osteoarthrosis (37 women, 15 men). Median [25th; 75th percentiles] of age was 41 [34; 52] years. The OA duration in the study group was 7 [5; 8] years, the diagnosis was made on the basis of the ACR classification criteria with regard of the radiological Kellgren and Lawrence classification. All patients underwent elective coronary angiography using the ALLURA Xper FD20 Philips 2012 device during the period from September 2017 to June 2018, and hemodynamically insignificant (up to 50%) atherosclerotic coronary stenoses were verified. The individuals enrolled in the study gave their consent to undergo the manipulations. The Ethics Committee has approved study protocol.

The height, weight, and waist circumference with the calculation of body mass index (BMI) by the Kettle method were determined in patients. Obesity was diagnosed with an index value of 30 or more. Evaluation of cardiovascular risk factors (RF), such as smoking, family history of CVD, and hypodynamia, was performed using questionnaires. The questionnaire also included questions regarding the intensity of pain syndrome according to the visual analogue scale (VAS), the need for analgesia, the frequency of nonsteroidal anti-inflammatory drug (NSAIDs) use. In women, the state of reproductive function was further specified. The daily monitoring of blood pressure (BP) was carried out with the Cardiotechnika-07-AD-3 device; complete blood count and biochemical analysis were performed, and the systemic coronary risk was evaluated.

The data were processed using the Statistica 10.0 (StatSoft, USA) software package, nonparametric methods were used. Comparison of two independent groups was carried out using the Mann-Whitney test. For the correlation analysis, the Spearman method was used. The comparison of frequencies of qualitative variables between independent groups was performed using the χ^2 test. Significance of differences was determined at $p < 0.05$.

Results

In patients of the examined group, polyosteoarthrosis was most often identified with a predominant lesion of the knee, hip, shoulder and small joints of the hands and feet, at the radiographic stage 2–3. Clinical and laboratory characteristics of patients with OA are shown in Table 1.

Almost all respondents (92%) had their onset of OA with mechanical arthralgias, 8% noted a feeling of stiffness in the joints after a long rest in the early period of the disease. In terms of the disease duration and the onset age of OA, gender differences were not determined; in the general group, the medians were 7 years and 34 years, respectively. 10% of patients received regular course treatment with long-acting disease-modifying agents (glucosamine sulfate, chondroitin hydrochloride); the remaining 90% of patients did not comply with the prescribed dosage regimen or completely ignored medical prescriptions. It should be noted that chondroprotective agents were prescribed in 100% of cases. 64% of patients experienced the need for analgesia (NSAID group use) 3–4 times a week for the last 3 months. Aceclofenac, Nise and Movalis were the most frequently used selective NSAIDs. More than half of the respondents reported strong intensity of arthralgia, the median pain index according to the VAS was 60 mm. All respondents with hypertension received antihypertensive therapy: 36 persons (70%) received

Table 1. *Clinical and laboratory characteristics of patients with osteoarthrosis*

Parameters	Median [25th; 75th percentiles]
OA duration	7 [5; 8]
Number of affected joints	5 [3; 12]
OA onset age	34 [30; 42]
Radiographic stage	2 [2; 3]
Pain intensity according to VAS, mm (within 3 months)	60 [40; 90]
Need for NSAIDs (number of tablets per week for the last 3 months)	3 [1; 7]
Average daily BP score Systolic BP (mm Hg) Diastolic BP (mm Hg)	 135 ± 5 75 ± 12
CRP, mg/L, ρ = 0.002	0.5 [0.2; 4]
ESR, mm/hour	12 [6; 22]

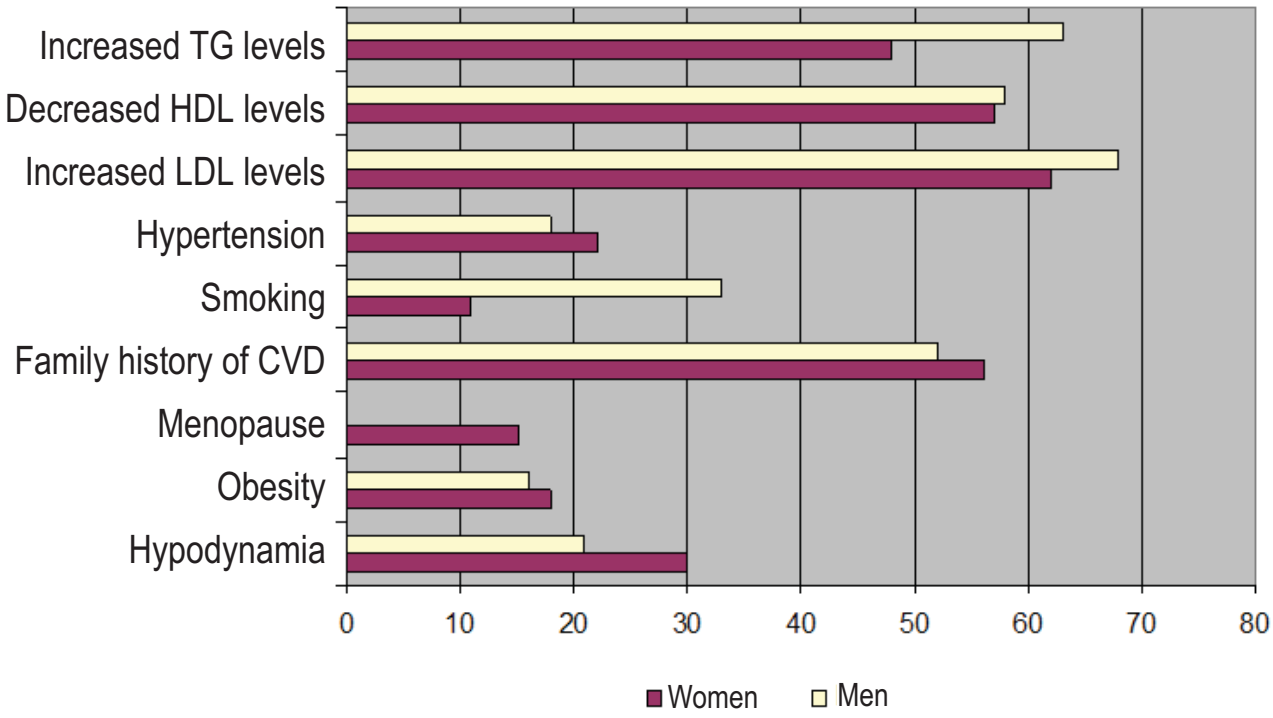

Figure 1. *Frequency of cardiovascular disease risk factors in patients with osteoarthrosis*

Table 2. *Indicators of correlation analysis of cardiovascular disease risk factors with clinical characteristics of osteoarthrosis*

	OA duration	Number of affected joints	Pain intensity according to VAS	Dosage frequency of NSAIDs
Hypertension	r = 0.63*	r = 0.72	r = 0.85*	r = 0.74*
Hypodynamia	r = 0.62*	r = 0.61*	r = 0.82*	-
Dyslipidemia	r = 0.71*	r = 0.58*	r = 0.66*	r = 0.56*

Note. * ρ < 0.05

monotherapy, and 16 persons (30%) received two-component therapy with angiotensin II receptor blockers and thiazide diuretics predominantly. Treatment of dyslipidemia before coronary angiography was provided only for 12% of patients, who were indicated for its use; atorvastatin was prescribed in the vast majority of cases (94%).

The results of the assessment of the frequency of CVD RF are presented in Figure 1.

Each patient had 1 to 6 CVD RF, median [25th; 75th percentile] was 3 [2; 5]. In the women group, hypodynamia, hypertension and a family history of CVD ($p = 0.002$) were significantly more common than in men. In 6 female patients (15%) menopause occurred as a result of surgery. The presence of bad habits (smoking), high levels of triglycerides and low density lipoproteins ($p = 0.0001$) occurred with higher frequency in men. High-density lipoprotein and BMI values did not differ in the compared groups. The presence of verified coronary atherosclerosis makes it possible to classify all individuals enrolled in the study as a group of very high systemic coronary risk, regardless of other factors.

Correlation analysis revealed that the frequency of hypertension, hypodynamia and dyslipidemia was associated with the OA duration, the pain intensity according to the VAS and the number of joints affected (Table 2). At the same time, hypertension and the high level of triglycerides were more frequent, the more the respondent took NSAIDs.

Discussion

According to standard scoring systems, age and hypertension grade are the main factors of high cardiovascular risk. Our study represents young people with medically achieved target blood pressure levels, and all of them have atherosclerotic lesions of the coronary arteries and belong to a group with very high systemic coronary risk.

The role of the immune and inflammatory process in the development and progression of atherosclerosis is illustrated by a number of rheumatic diseases, such as rheumatoid arthritis, ankylosing spondylitis, and systemic lupus erythematosus [7, 9, 12, 22]. In the OA pathogenesis, persistent inflammation also plays a key role, and causes the progression of cartilage destruction with the development of secondary chondritis, synovitis, osteitis and periarthritis [2, 8, 11, 19]. Destructive cytokines activate and regulate a cascade of pathophysiological reactions, which leads to a change in the functional activity of chondrocytes [11, 17, 24]. Hyperplasia and mononuclear infiltration of synovia in OA is indistinguishable from that in rheumatoid arthritis [16, 18, 23]. Along with inflammation and accumulation of classical CVD RF, adverse effects of the drug therapy also contribute to atherogenesis in OA. Inhibitors of the proinflammatory cyclooxygenase are prescribed to almost all patients for the treatment of pain and inflammation in OA [4, 10, 20, 21]. It is known that increasing the risk of myocardial infarction and sudden coronary death is one of the most common cardiovascular complications associated with taking NSAIDs [3, 5, 14, 25].

Conclusions

Thus, the presence of generalized subclinical inflammation in patients with OA, along with classical CVD RF, probably mediates the early development of atherosclerosis in this category of patients. In addition, OA patients use NSAIDs with certain frequency, which also adversely affects the state of the vessel wall. There is need to continue and deepen the study of the role of inflammation in primary OA in the development and progression of atherosclerosis. It is reasonable to develop specialized models for assessing the risk of damage to the cardiovascular system for patients with primary OA.

Conflict of Interests

The authors declare no conflict of interests.

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