MULTIFACTOR RELATIONSHIP OF PHYSICAL ACTIVITY WITH OTHER RISK FACTORS FOR CORONARY HEART DISEASE

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Abstract
The importance of physical inactivity as a health problem is constantly growing, since insufficient physical activity (FA) is a proven risk factor (RF) for the development of a number of chronic noncommunicable diseases (CNCDs) and their complications. A significant reduction in total cholesterol, lowdensity lipoprotein cholesterol and assign was observed in both groups under the influence of individually selected constant physical activity. HDL cholesterol levels were significantly increased in both groups. Calculation of physical activity in relation to risk factors for coronary artery disease with hypertension according to noninvasive research methods, taking into account the place of residence, lifestyle in real conditions and the possibilities of primary health care, should receive a full assessment and have a positive effect on the course of the underlying disease, improving the quality of life of patients

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INTRODUCTION

The World Health Organization (WHO) states that significant benefits in reducing the risk of cardiovascular disease can be achieved with moderateintensity physical activity (PA) for at least 150 minutes per week or vigorous intensity physical activity for at least 75 minutes per week, or any combination FA of moderate and high intensity. It is also empha-sized that any amount of FA brings health ben-efits [9].

There is clear evidence of an inversely linear dose-response relationship between FA volume and all-cause mortality in men and women, and in young and old people. Minimal adherence to the current PA guidelines of about 1000 kcal/week (-1) energy expenditure is associated with a significant reduction in overall mortality risk of 20–30%. Further risk reduction is observed at higher amounts of energy consumption [10].

Physical activity improves systolic blood pressure, angina symptoms, and exercise tolerance in patients without revascularization [8], and patients with revascularization achieve improved physical activity, quality of life, and exercise tolerance (also a 29% reduction in the risk of heart attacks by 20% and/or or reduced repeated admittance rate) [2].

Inactive people have a 30-50% higher risk of high blood pressure/hypertension than healthy and active people (there is an inverse relationship between physical activity and the incidence of hypertension) [16].

The acute effect of FA causes a decrease in blood pressure for 4-10 hours; therefore, daily activity can lead to a clinically significant improvement in the condition of a patient with CAD [4].

Aerobic training is most beneficial, followed by dynamic resistance and isometric resistance in moderate intensity training [1,4,5]

The evidence for the benefits of exercise in coronary heart disease (CHD) is strong, and exercise is indicated for primary and secondary prevention of CHD. The benefits of exercise outweigh those of percutaneous coronary intervention (PCI). Based on a recent randomized controlled trial investigating the feasibility, acceptability, and shortterm clinical efficacy of the Physical Activity Toward Health (PATH-way) system for maintaining FA and physical fitness in patients with cardiovascular disease (CVD) after completion of outpatient cardiac rehabilitation, showed positive results using a remote home cardiac rehabilitation program based on a different base. [3].

A study of men with stable CAD over a two-year period of regular exercise outperformed PCI in all respects. Thus, the eventfree survival rates at 24 months were 78% in the exercise group compared to 62% in the PCI cohort. In addition, after two years, maximal oxygen uptake (VO_2 max) increased by 10% in the exercise group compared to 7% in the PCI group. Inflammatory markers improved in the exercise cohort: high sensitivity C-reactive protein levels and interleukin-6 levels were significantly reduced after two years of exercise by 41% and 18%, respectively, and no significant changes were observed in the PCI group [13].

A 2-year study in a cohort of 44,452 US men enrolled to assess potential risk factors for CAD and

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identify newly diagnosed cases confirms a significant inverse doseresponse relationship between total PA and CAD risk. In addition, running, rowing, and strength training have been found to be associated with a reduced risk of CHD. Increasing the total volume of activity, increasing the intensity of aerobic exercise from low to moderate and moderate to high, and adding strength training to the exercise program are some of the most effective strategies to reduce the risk of CHD in men [6].

Prevention of CVD has not lost its sig-nificance as an urgent problem in the medical and social spheres due to the high proportion of disability and mortality among the working-age population. Physical inactivity or lack of physical activity is one of the manageable risk factors for CVD. Hypodynamia leads to the accumulation of excess body weight. In such people, minor physical activity increases the heart rate and blood pressure. It is known that coronary artery disease is 4-5 times more common in men aged 40-50 years old, working in the office, compared with people engaged in heavy physical labor [12].

In patients with CHD risk factors during aerobic exercise (AN), there is an increase in myocardial perfusion, expansion of the diameter of large coronary arteries, improvement of microcirculation and endothelial function, modulation of autonomic vegetative balance, changes in the area of myocardial ischemia. AN leads to a decrease in myocardial damage, as well as a decrease in the risk of life-threatening ventricular tachyarrhythmias [11].

Under the influence of physical activity (FA), against the background of increased fibrinolytic activity in the blood, a decrease in the level of fibrinogen, a decrease in the activity of coagulation factor VII, a decrease in platelet aggregation, i.e. reduces the risk of thrombosis. Such physical activity (PE) does not lead to an imbalance between energy production and its consumption, prevents the development of obesity and leads to weight loss. This, in turn, reduces carbohydrate tolerance and reduces the risk of developing diabetes [12].

It has also been found that an active life style reduces the risk of developing malignant tumors located in different parts of the body, while the exact mechanism of action of FA on the immune system is not fully understood. Prolonged, moderate intensity physical activity (for instance, 30-60 minutes per day) is known to prevent breast and colon cancer. It has been shown that physically active people are more resistant to stress and depression, have a good mood and self-confidence [7].

Regular exercise for 150 minutes a week has been shown to reduce the risk of developing cardiovascular disease by 40%, stroke by 27%, type 2 diabetes by 58%, Alzheimer's by 40%, rectal cancer by 60%, and lung cancer by 20%-24%, breast cancer by 50%, and also prevents the development of depression and obesity, promotes a healthy lifestyle, maintains optimal performance. Regular aerobic exercise in cardiac rehabilitation has been shown to reduce the risk of death from cardiovascular disease by 30% per year, the overall risk of death by 20%, the need for hospitalization by 60%, and the risk of recurrent myocardial infarction by 17%. At the same time, an increase in physical performance by 1 IU reduces mortality by 8-20%. Increasing the load per 1 IU increases survival by 10-25% [15].

The aim of our work was: to study the effect of intense physical activity on the dynamics of risk factors and the clinical condition of patients with coronary heart disease (CHD) living in different regional living conditions.

APPROACH AND MATERIAL

The study included 183 male and female patients aged 45-70 years with a diagnosis of IHD: stable exertional angina FC II-III, who were hospitalized in the cardiology department of the Multidisciplinary Clinic of the Tashkent Medical Academy. Among the patients, 98 were men and 85 women.

The patients were divided into two groups according to the place of residence. The 1st group included 89 urban patients (47 men, 42 women), the 2nd group included 94 rural patients (51 men, 43 women). Not all patients worked, most of the patients spent time at home. There were no contraindications to physical activity in patients.

In group 1, 89 patients had a mean age of 63.7 ± 5.1, and in group 2, 94 patients had a mean age of 65.4 ± 4.3 years. 84.3% of patients in group 1 and 81.4% of patients in group 2 suffered from arterial hypertension (AH) in combination with coronary artery disease. 35.7% of patients of the first group and 40.4% of patients of the second group smoked. In terms of body mass index and indicators of abdominal obesity, determined by the Quetelet index, the first group prevailed, that is, patients living in urban areas. The results of the collected anamnestic data, objective examination, physical and laboratory examinations are presented in table 1.

All examined patients underwent electrocardiography (ECG), echocardiography (EchoCG), Holter ECG monitoring (XM ECG), cycle ergometer (VEM) in combination with clinical and laboratory

tests.

All patients were prescribed 15-20 minutes of morning exercises 5-7 times a week, 25-30 minutes of individually dosed walking and up to 3-5 times a week walking 1.5-2.0 km daily. All exercises were performed before meals or 1.5-2 hours after meals. In addition to physical exercise, the amount of work requiring daily physical activity was also determined. The patients were in constant contact with the researchers, and the exercise regimen was strictly controlled. All patients were reexamined after 6 months.

Table 1

The presence of risk factors in the examined patients

Indicators	1 group, (n=89)	2 group, (n=94)
Sex:		
-male	47 (52,8%)	51 (54,2%)
-female	42 (47,2%)	43 (45,8%)
Average age	63,7 ± 5,1	65,4 ± 4,3
Duration of	5,6±1,4	4,5±1,4
BMI (kg/m^2)	29,7	30,8
WA (sm)	111,8	118,4
SAP (mm Hg)	138,8	144,2
DAP (mm Hg)	77,85	82,11
Smoking (%)	40,4%	35,7%

The results of the lipid spectrum of patients in the study showed that dyslipidemia was noted in both groups of patients, both among the urban and rural populations, especially among the rural population. Results after 6 months, based on baseline CAD treatment and an individually tailored physical activity program, are presented in table 2 and figure 1.

As shown in figure 1, significant reductions in total cholesterol, low-density lipoprotein cholesterol, and atherogenicity were observed in both groups under the influence of individually adjusted sustained physical activity.

The results of the initial and 6-month 24-hour Holter monitoring of patients are pre-sented in Table 3.

According to the results of Holter ECG monitoring, group and early ventricular extrasystoles were not observed. Against the back-ground of basic treatment and physical activity for 6 months, the maximum number of heart-beats and the frequency of single ventricular extrasystoles were reduced in patients with coronary artery disease of the urban and rural population, and especially significantly among the rural population. The number of paired ventricular extrasystoles significantly decreased in both groups of patients (p <0.05).

Table 2

Results of baseline and 6-month lipid spectrum analysis of patients in the study

INDICATORS	1 group, (n=89)		2 group, (n=94)	
	initially	After 6 months	initially	After 6 months
TCh*	6,7	5,8	6,8	5,44
TG	2,53	2,14	2,61	2,07
HDL-C***	0,91	1,1	0,93	1,1
LDL-C*	5,35	3,6	5,45	4,26
VLDL-C	1,63	1,45	1,71	1,53
C_{ax*}	5,6	4,18	6,4	5,11

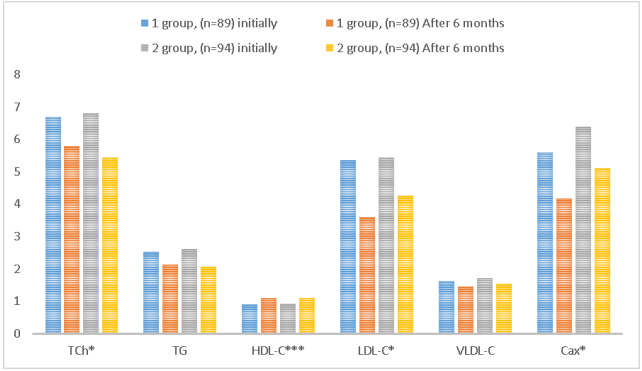

Figure 1. Results of baseline and 6-month lipid spectrum analysis of patients in the study
(Note: *-p<0.05; **p<0.01; ***p<0.001)

Table 3

Results of Holter monitoring of examined patients IHD

INDICATORS	1group, (n=89)		2 group, (n=94)	
	Initially	After 6 months	Initially	After 6 months
HR max	127,5± 15,9	107,52± 11,61	138,7± 12,4	103,7± 9,8*
HR min	59,94± 7,2	54,63± 5,1	57,19± 6,9	55,23± 5,4
Average CCR	74,2± 7,16	66,5±5,8	73,7±6,9	63,8±7,7
premature atrial complexes (PACs)	134,52± 10,3	101,4± 9,2	158,85± 13,4	143,77± 12,8
Paired and group PACs	63,4±7,3	42,1±4,3	88,6±8,4	65,7±6,4
premature ventricular complexes (PVCs)	106,8± 13,8	98,3± 10,1	145,7± 10,1	101,7± 10,1*
Paired PVCs	12,6±2,8	4,6±2,3*	23,7± 2,42	10,7± 1,8*
ST segment (mm)	0,69± 0,03	0,65± 0,03	0,64± 0,03	0,63± 0,03
QTc (msec)	414,3± 23,8	408,3± 22,1	418,0± 24,7	413,0± 21,3

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There was also a decrease in the number of maximum heart rate during the day, as well as the number of single, double, group supra-ventricular extrasystoles.

Based on the foregoing, an individually selected physical activity program prescribed for patients with coronary heart disease, based on living conditions and tolerance to physical activity, has a positive effect on the lipid spec-trum of patients, as well as on the indicators of daily ECG monitoring against the background of basic therapy.

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