RATIONALE OF PHYSICAL REHABILITATION OF PATIENTS WITH VIOLATION CORONARY CIRCULATION

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Annotation. The aim of the study is to examine the risk factors that lead to the violation of the coronary circulation. Rationale for the use of physical rehabilitation to restore optimal hemodynamics in the myocardium. Considered views on the causes of the high mortality rate of the population of Ukraine of cardiovascular disease. It is shown that the main cause of death is coronary heart disease. Suggested that the major risk factors for coronary heart disease is high cholesterol, hypertension and obesity. Proposed to use exercise therapy, dosage walking, psychotherapy, autogenic training and diet therapy in rehabilitation program patients with impaired coronary circulation.
Key words: factors, risk, coronary, circulation, physical rehabilitation.

Introduction

In spite of conducted in Ukraine prophylaxis measures and treatment of arterial hypertension, cardiac-vascular and cerebral-vascular diseases they still remain a significant medical-social problem [1,2,21,22].

In Ukraine, in 2007 specific weight of mortality form diseases of blood circulation system (DBCS) was 63% in all structure of mortality, including deaths form different reasons [5,11].

Recent years gradual increasing of mortality from all forms of blood circulation system's diseases has been being registered. For example, in 2009 mortality index increased up to 65%, in 2011 it was already 66.3% [11,16,22].

In the structure of mortality from cardiac-vascular diseases main place is taken by coronary heart disease (in modern interpretation – CAD – ischemic heart disease) [1,2,4].

In the opinion of well-known Ukrainian cardiologist M.I. Lutay, the mentioned growth of Ukrainian population's mortality form CAD (coronary disease) can be connected with the following factors.

Informational level of Ukrainian doctors – cardiologists about modern medical preparations and their optimal combinations is rather high, and it is proved by results of "PRESIGE" research, published by the author [15].

However, significant discrepancies between "PRESTIGE" data and actual situation, in author's opinion, are likely connected with poor adherence of sick people to treatment with statines, which are preparations, reducing cholesterol level, patients take them irregularly, for short period of time and in insufficient quantity [15].

Poor adherence of sick people to treatment with statines can be explained, in our opinion, by high price of these preparations as well as by necessity of their taking for long period of time – from 4 to 12 months and even more; by sometimes appearing gastroenteric complications; by need in repeated analysis of cholesterol's content in blood after 4 and after 8 months that is connected with significant material expenditures.

The work has been fulfilled as per subject 4.4 "Improvement of organizational and methodic principles of physical rehabilitation process's programming with dysfunctional disorders in different systems of human organism" and as per plan of scientific & research works in the field of physical culture and sports for 2011-2015 (state registration number 0111U001737).

Purpose, tasks of the work, material and methods

The purpose of the research is to regard, on the base of analysis of scientific literature data, risk factors, which lead to breaching of coronary circulation and to ground application of rehabilitation means for restoration of optimal hemo-dynamics in myocardium.

Results of the research

From positions of etio-patho-genesis breaching of coronary circulation in more than 90-95% of cases is a result of progressing of atherosclerosis in coronary vessels, which make coronary vessels hard inelastic and their diameter reduces.

It results in reducing of blood supply, development of ischemia in cardiac muscle, worsening of metabolism in it with further weakening of its contraction function, in insufficiency of blood circulation of different degree and appearing of unfavorable consequences such as stenocardia of physical load, which gradually progresses in stenocardia of rest, which, in its turn, often results in cardiac infarction [1,9,13,14].

However in the process of atherosclerosis's progressing in vessels of heart, brain, in kidneys and in lower limbs in organism there appear disorders of the mentioned above organs' functioning in the form of CAD, breaching of cerebral circulation, breaching of blood circulation in kidneys as kidney hypertension, endarteritis in lower limbs. Abnormalities of blood circulation's physiology in kidneys and lower limbs increase periphery blood resistance, which make contraction heart function in maintaining hemo-dynamics more difficult and create conditions for BP increasing in vessel and for appearing of hypertension [3,10,17,24].

Excessive cholesterol in human organism switches on the process of breaching of lipoid exchange, which results in excessive weight and obesity of different degree [3].

More over there is a definite connection between hyper-cholesterol content and blood pressure [3,10,19,22].

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Connection between BP and risk of atherosclerosis's progressing is proved by the fact that atherosclerotic lesion is characteristic only for vessels, in which BP exceeds 100 mm.merc. col., though other mechanisms of athero-genesis (lipidic abnormalities, humoral and hormonal factors) affect in equal degree on all other parts of vessel risk [9,22].

Combination of cholesterol excess, arterial hypertension, excessive weight and obesity become clear reasons of coronary circulation's abnormalities or CAD [8,9,10].

This opinion about etio-patho-genesis of coronary disease (CAD) comes from results of long term researches, which were begun in 1948 in Fremingam (USA) and initiated creation of "Conception of risk factors".

According to this conception hyper cholesterol content, increased hypertension and obesity are risk factors of CAD progressing (W.B.Kannel, 1999).

Excessive weight, as a rule, is accompanied by reduction of person's motion activity, i.e. by appearing of hypokinesia [17].

Acceleration of scientific-technological progress, modern technologies as well as computerization facilitate human hypokinesia, while changes of economical relations in society result in excessive nervous-psychic overloads, which breach human psycho-emotional state and cause different unhealthy states.

These are, in general, risk factors of coronary circulation disorders or ischemic heart disease.

Literature data witness that physical rehabilitation means – therapeutic physical culture, massage, physical therapy can be successfully applied, owing to mechanisms of their therapeutic influence, at different stages of myocardium circulation' abnormalities [2,3,15,22].

In particular, therapeutic physical culture is a mean, which effectively influences on etio-psth-genesis of coronary circulation, i.e. on progressing of atherosclerosis in coronary vessels, thus, blocking progressing of myocardium's ischemia [2,3].

More over, therapeutic physical culture positively influences on second factor of etio-patho-genesis of myocardium ischemia – tonus of vessels, i.e. on increasing of BP [10].

It has been proved that with hypertension of 1st degree therapeutic physical culture gives positive result, because with physical loads activity of sympathetic nervous system reduces, resulting in reduction of catecholamine's (adrenaline, nor-adrenaline) level [10].

It has also been established that risk of cardiac vascular diseases is closer connected not with level of motion activity but with endurance, i.e. with state of organism, which appears as a result of long term influence of physical exercises.

Human endurance is progressing only under influence of aerobic exercises. Just aerobic exercises increase ability of blood circulation system to supply tissues with oxygen and to assimilate oxygen.

During physical trainings the work of oxygen supply system to such organs as heart and brain improves, speed of blood circulation increases as well as heart stroke volume, the net of capillaries and collaterals develops. In the future it facilitates improvement of oxygen supply of these organs in state of rest [17,19,21,22].

Aerobic exercises are such dynamic exercises as walking, swimming, dosed running, gymnastics, bicycle racing. The mentioned aerobic exercises, first of all, train cardiac-vascular and respiratory systems that is expressed as reduction of heart stroke blood emission in rest, decreasing of sympathetic vessels' tonus that influences favorably on BP. People of high physical activity have risk of hypertension by 35-50% lower in comparison with physically passive people [10,21].

It is also known that physical exercises of dynamic character improve lipidic spectrum of blood – decrease cholesterol and triglyceride level that, in its turn, reduces risk of CAD, stenocardia and myocardium infarction [3,9,16,22].

The same authors think that physical exercises in aerobic regime increases oxidation-restoration processes, facilitate energy consumption and decreasing of body mass.

Physical exercises, consisting of dynamic and static muscular contractions, which are used for treatment of patients with diseases of cardio-vascular system, make different hemo-dynamic effect on this system, depending on many factors: intensity of executed physical exercises, groups of muscles, loaded by these exercises, duration of their application, correlation of dynamic, static or combined exercises, workability level of patient's organism, functional state of his cardio-vascular system, his psychological state and many other factors [17,18,20,23].

It is interesting that with fulfillment of dynamic or static exercises differences in hemo-dynamic effect become noticeable even with one-time loads.

With using of dynamic exercises relaxing speed of patients' myocardium increases, and owing to this fact the quantity of rich with oxygen, organ blood increases in it, as well as organic substances and electrolytes, required for meeting metabolic demands of intensively working myocardium [17,18,20].

At the same time, with static loads, when organism uses anaerobic energy supply, the changes, which appear in cardio-vascular system, differ from changes, characteristic for dynamic loads [19,21].

Even moderate static load is accompanied by pressing of vessels in contracted muscles and by reduction of blood circulation in them.

If with dynamic physical loads substantial change in patient's cardio-vascular system is significant reduction of total periphery vessels' resistance (TPRR), caused by accumulation of metabolic vasodilators and by decreasing of vessels' resistance in actively contracted skeleton muscles, that finally result in decreasing of BP and making easier

work of cardiac muscle, then with static loads TPRR does not decrease as a rule but can even increase, is large muscles' groups are strained.

Thus, trainings with using of static physical exercises are accompanied by increasing of load on heart, by additional work and straining of cardiac muscle.

Nevertheless, in opinion of some authors, after using of isometric physical loads, ischemic changes are registered by ECG much rarer than after using of cyclic physical loads [18].

They mean indicators of central hemo-dynamics, double product, less frequency of ischemic responses and these permitted for the a.m. authors to affirm that static loads are more favorable for cardio-vascular system.

However, in spite of the fact that the question about application of static loads for treatment of patients with diseases of coronary vessels is still a discussable one, as on to day it has been considered to be proved that only dynamic physical loads facilitate increasing of physical workability (PW), because they cause more significant increasing of functional abilities of patient's blood circulation system [18,19].

Nevertheless, the same authors point that physical exercises only of dynamic or of static type do not exist separately in the process of labor or sport activity, including therapeutic physical culture.

Just owing to this fact, as the authors affirm, the most optimal variant can be application of combined static-dynamic loads for treatment of patients with cardio-vascular system's diseases [17,18,21].

Application of static-dynamic loads for rehabilitation of patients with blood circulation system's disease was developed by prof. I.Yu.Tiomkin in 1977. The author developed indications and counter-indications to application of exercises in isometric regime and grounded necessity of combining of isometric and dynamic exercises for some cardio-vascular diseases, including atherosclerosis of myocardium's vein vessels.

Summarizing different authors' points of view about application of static-dynamic and dynamic physical exercises for patients with pathology of coronary vessels and other heart diseases, it should be noted that authors, who recommend application of static-dynamic physical loads for rehabilitation of patients with diseases of cardio-vascular system are likely more right. However, the authors, who prefer dynamic physical exercises, are also right, moreover both groups of authors render numerical data and results of their statistical processing [12,17,18,20].

Different opinions of authors seem to be connected with contingent of patients, they examined (healthy people, patients with different heart diseases, sportsmen), with intensity of loads, different age of the examined, quality of abnormalities' diagnostics, methodic of formation of one-type groups, duration of trainings and with many other factors, such as presence of attendant pathology – excessive weight (obesity of different degree), insular diabetes, arterial hypertension, diffuse goiter.

From all above presented it is clear how difficult is the process of creation of rehabilitation programs for patients with coronary circulation disorders with application of physical rehabilitation means, in particular therapeutic physical culture.

The question of application of therapeutic gymnastics (TG) for patient shall be solved considering indicators of complex appraisal of his functional state – the state of his hemo-dynamics, physical workability and patient's functional class, HBF and BP under physical load.

It is also known that with coronary circulation disorder nearly 50% of patients have progressing of different psycho-pathological syndromes – anxiety, depression, hypochondria that worsen physical state of patient and became a reason of coronary circulation disorders [6,7,23].

That is why the mentioned authors recommend for such patients to use psychotherapy and autogenous training, for improvement of psycho-emotional and general state of patients that is likely connected with improvement of coronary circulation [6,7,21,23].

Conclusions:

In spite of conducted in Ukraine prophylaxis measures on cardiac-vascular diseases mortality indicators still remain high.

Main reason of high mortality is disorders of coronary circulation.

Hyper cholesterol content, arterial hypertension and obesity are main risk factors of coronary circulation disorders.

For weakening of negative influence of the mentioned risk factors means of physical rehabilitation are effective: therapeutic physical culture, dosed walking, psycho-therapy, autogenous training and diet therapy.

The prospects of further researches imply development of new methodic of physical rehabilitation's application for patients with coronary circulation disorders.

References:

1 Aronov D.M. *Lechashchij vrach* [Attending doctor], 2007, vol.3, pp. 23-26.
2 Aronov D.M., Bubnova M.G. , Pogosova G.V. *Kardiologiia* [Cardiology], 2006, vol.2, pp. 86-89.
3 Aronov D.M. *Lechenie i profilaktika ateroskleroza* [Treatment and prevention of atherosclerosis], Moscow, Triada-X, 2000, 412 p.
4 Gurevich M.A. *Khronicheskaia ishemicheskaia (koronarnaia) bolezn' serdca* [Chronic ischemic (coronary) heart disease], Moscow, Prakticheskaya meditsina, 2006, 336 p.
5 Kovalenko V.M., Kornac'kij V.M. *Demografiia ta stan zdorov'ia naselennia Ukrayini* [Demographics and health status Ukraine], Kiev, 2010, 144 p.
6 Zajcev V.P., Khramenashvili V.V. *Kardiologiia* [Cardiology], 1988, vol.3, pp. 5-10.
7 Zinenko Iu.I. *Psikhoterapiia bol'nykh ishemicheskoj bolezn'iu serdca* [Psychotherapy patients with coronary heart disease], Simferopol, Tavriya, 2009, 204 p.
8 Kovaleva O.N., Demidenko A., Ledovskij A. *Liki Ukrayini* [Medications Ukraine], 2005, vol. 11(100), pp. 27-29.
9 Kovalenko V.N. *Rukovodstvo po kardiologii* [Manual of cardiology], Kiev, Morion, 2008, 1424 p.
10 Kolomoec N.M., Baksheev V.I. *Gipertonicheskaia bolezn' i ishemicheskaia bolezn' serdca* [Hypertensive heart disease and coronary heart disease], Moscow, Medicine, 2003, 336 p.
11 Kornac'kij V.M., Klimenko V.I. *Khvorobi sistemi krovoobigu i psikhichne zdorov'ia* [cardiovascular diseases and mental health], Kiev, 2009, 176 p.
12 Kotko D.N., Levon M.M., Ershova G.S *Pedagogika, psihologia ta mediko-biologicni problemi fizicnogo vihovanna i sportu* [Pedagogics, psychology, medical-biological problems of physical training and sports], 2010, vol.11, pp.95-97.
13 Krasnickij V.B. *Lechashchij vrach* [Attending doctor], 2007, vol.3, pp. 32-36.
14 Bagrij A.E. *Lechenie bol'nogo so stabil'noj stenokardiej* [Treatment of patients with stable angina pectoris], Kiev., Morion, 2012, 88 p.
15 Lutaj M.I. *Ukrayins'kij kardiologichnij zhurnal* [Ukrainian Journal of Cardiology], 2011, vol.1, pp. 25-36.
16 Lutaj M.I. *Zdorov'ia Ukrayini* [Health of Ukraine], 2012, vol.4 (281), pp.16-18.
17 Makarova I.N., Epifanov V.A. *Automiokorrekciia* [Automiocorrection], Moscow, Triada-X, 2002, 160 p.
18 Nekorkina O.A. *Voprosy kurortologii, fizioterapii i lechebnoj fizkul'tury* [Questions health resort, physical therapy and exercise therapy], 2005, vol.3, pp. 23-25.
19 Oganov R.G., Kalinina A.M., Pozdniakov Iu.M. *Profilakticheskaia kardiologiia* [Preventive Cardiology], Moscow, Media sphere, 2007, 213 c.
20 Parkhotik I.I. *Dieto- i kineziterapiia* [Diet and physical therapy], Kiev, TOV DSG dtd, 2005, 104 p.
21 Kotko D. *Rekomendacii po reabilitacii pri zabolevaniiakh serdca.* [Cardilac Rehabilitation Resource Manual], Kiev, Olympic Literature, 2011, 240 p.
22 Kovalenko V.M., Lutaj M.I. *Sercevo-sudinni zakhvoriuvannia* [Cardiovascular disease], Kiev, Morion, 2011, 408 p.
23 Smulevich A.B., Syrkin A.L. *Psikhokardiologiia* [Psychocardiology], Medical Information Agency, 2005, 784 p.
24 Sniehotta F.F., Scholz U., Schwarzer R. Bridging the intention–behaviour gap: Planning, self-efficacy, and action control in the adoption and maintenance of physical exercise. *Psychology & Health*, 2005, vol. 20(2), pp. 143–160.

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