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Cardiorehabilitations from Physiotherapeutic Treatments in Cardiovascular Diseases

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Annotation: Cardiac rehabilitation based on exercise therapy is a valuable treatment for patients with a broad spectrum of cardiovascular diseases. Current guidelines support its use in patients with stable chronic heart failure and coronary artery disease, aft er myocardial infarction, acute coronary syndrome, coronary artery bypass graft ing, coronary stent placement, and valve surgery. Its use in these conditions is supported by arobust body of research demonstrating improved clinical outcomes. The significant clinical improvement obtained through the regular training in patients with cardiovascular diseases is the result of a complex interplay of different effects: 1) improved cardiopulmonary efficiency and pulmonary functional capacity; 2) amelioration of myocardial perfusion by reducing endothelial dysfunction and by inducing new vessel formation; 3) improved myocardial contractility; 4) counteract the muscle wasting and cachexia; 5) reduction of the systemic infl ammation; 6) attenuation of the sympathoexcitation, a typical feature of CHF, even in the persistence of cardiac dysfunction. Despite this evidence, cardiac rehabilitation referral and attendance remains low and interventions to increase its use need to be developed.

Keywords: cardiac rehabilitation; exercise therapy; cardiovascular diseases; heart failure; coronary artery disease; myocardial infarction; endothelial dysfunction; skeletal

muscle; systemic infl ammation.

Despite the fact that advanced diagnostics and treatment lead to a continuous increase in the survival rate of patients with cardiovascular diseases (CVD), the need for a secondary prevention strategy for recurrence, which is met at an insufficient level, increases, with up to 40% of all coronary complications occurring in patients who had previously been hospitalized. This is precisely the reason why the reduction in the frequency of relapses is due to the increased effectiveness of non-pharmacological interventions should be cited by one of the priorities in the field of cardiology. Cardiovascular rehabilitation (CR) is a multidisciplinary approach to creating and maintaining an optimal level of physical, social and psychological well-being in patients with CVD. CR is indicated for arrhythmia, atherosclerosis of the coronary and peripheral arteries, ischemic heart disease (IHD), chronic heart failure (CHF), stable angina, after myocardial infarction, acute coronary syndrome and cardiovascular surgeries such as percutaneous coronary angioplasty, heart valve replacement or replacement, coronary artery bypass grafting, coronary stenting, heart or lung transplantation. Contraindications to CR are unstable angina, aortic stenosis, decompensated heart failure, severe obstructive hypertrophic cardiomyopathy, acute cardiac parietal thrombus, acute deep vein thrombosis, pulmonary embolism.

The effects of CR include reducing risk factors for CVD complications and recurrences, increasing exercise tolerance, eliminating adverse cardiac remodeling, and improving systemic oxygen transport. A sedentary lifestyle is the most common risk factor for CVD. The recognition of the benefits of exercise therapy (ERT) for CVD patients is a revolutionary change in perspective, since for a long time, they were prescribed physical rest. Patients after cardiovascular catastrophes were recommended at least 6 weeks of bed rest, however, this was associated with an increased incidence of complications. Today, a comprehensive ERT-based ERT (ERT/ERT) program is used to improve clinical outcomes in patients with CVD, which consists of three phases:

1) CR for inpatients (physical therapy at the level of low activity of daily living, education regarding lifestyle and transition to outpatient treatment) involves early mobilization in preparation for discharge;
2) a physician-supervised outpatient program for several months after discharge with periodic reassessment of risk factors such as diabetes mellitus, hypertension, lipid/lipoprotein profile and blood pressure (BP);
3) a lifelong maintenance exercise program, performed at home, with risk factor monitoring. At the beginning of the 2nd phase, an individual exercise therapy plan is formulated for each patient in the range of 50-70% of maximum functional capacity and psychosocial support to address stress, anxiety, depression and smoking cessation.

Regular exercise therapy improves endothelial function, myocardial blood flow reserve; reduces blood pressure; normalizes blood lipid profile and heart rate (HR); increases maximum aerobic endurance, antioxidant activity; reduces the progression of coronary atherosclerosis. These physiological changes lead to a weakening of diastolic dysfunction, an increase in muscle mass and an improvement in cognitive abilities [2]. CR also reduces depression and anxiety, improves the quality of life of patients. Depression is associated with increased (up to 4 times) mortality in patients. Symptoms of depression and mortality decreased by more than 60 and 70%, respectively, in depressed patients after CR compared with patients who did not participate in rehabilitation.

Cardiac rehabilitation in elderly patients with systolic heart failure:

A meta-analysis of 7 RCTs (130 patients aged 70–81 years) showed that exercise therapy increased 6-minute walk distance by 50.5 m and improved quality of life, although it did not affect mortality, hospitalization rates, or VO2peak. An RCT involving 343 patients over 70 years of age with systolic heart failure and heart failure with preserved left ventricular ejection fraction showed a

decrease in all-cause hospitalization in the exercise therapy group, an increase in 6-minute walk distance, and an improvement in quality of life. In a single-center RCT in patients with systolic dysfunction who began a 4-week exercise therapy program no later than 2 weeks after acute cardiogenic pulmonary edema, the duration of training, VO2peak, and ventilation threshold increased in both groups. However, the increase in left ventricular ejection fraction, maximum systolic blood volume and maximum cardiac blood flow velocity was more significant in the middle-aged group compared to elderly patients, indicating that the effectiveness of exercise therapy after acute decompensation depends on age. Nevertheless, both groups demonstrated an improvement in functional capacity.

Cardiac rehabilitation in patients after myocardial infarction:

RCT data showed that CR/PT in patients after myocardial infarction is associated with favorable ventricular remodeling, a lower risk of recurrent myocardial infarction, a decrease in the incidence of complications, hospitalization, and mortality from all causes. A random-effects meta-analysis showed that CR/PT reduces the incidence of myocardial infarction by 20% regardless of the number of minutes of PT per week and the type of usual treatment.

A more significant reduction in the incidence of coronary artery bypass grafting was demonstrated in studies of patients with mixed etiology of CVD than in those that included only patients with myocardial infarction. According to a multicenter RCT conducted in 65 cardiac rehabilitation centers (n=25,000), the most serious complications in patients who performed exercise therapy were acute myocardial infarction and sudden cardiac death, usually due to ventricular fibrillation, especially in patients with left ventricular dysfunction. A meta-analysis of 36 RCTs of CR after acute myocardial infarction showed a 47% reduction in the incidence of recurrent infarction [14]. In a meta-analysis by G. van Halewijn et al. (18 studies), CR/LFK reduced the incidence of recurrent myocardial infarction by 30%.

Cardiac rehabilitation and ischemic heart disease:

Although the benefits of CR/PT in secondary prevention of CHD are well established, the complex nature of this intervention poses a significant challenge to its implementation. CR studies vary considerably in the type and ‘dose’ of exercise, the involvement of physiotherapists and exercise physiologists in prescribing and monitoring training, the combination with other secondary prevention strategies such as counselling, risk factor education and stress management, and the completeness of data reporting, making it difficult to generalise and translate these findings into practice and to understand how and which features of the intervention are associated with clinical outcomes. An analysis of 69 studies evaluating 72 CR/PT programs (13,423 patients with CHD and MI) that were effective in reducing cardiovascular and all-cause mortality found significant differences in the components of PT, but no single exercise component was identified as a significant predictor of mortality, although studies with high levels of patient compliance showed reductions in both all-cause and cardiovascular mortality compared with lower levels of compliance, regardless of cardiac etiology. There was some heterogeneity in the effectiveness of CR in reducing all-cause mortality depending on the presence of lipid-lowering therapy. Correlations were found between the duration of the exercise session, the maximum exercise intensity, and the risk of myocardial infarction, as well as with an increase in the need for percutaneous coronary angioplasty. The individual range of exercise intensity was based on the peak heart rate achieved during maximal exercise, limited by the clinical condition. The minimum intensity of exercise in these studies was 68% of the maximum heart rate, increasing to 80% at the upper end of the prescribed range. Compliance with the prescribed exercise regimen varied from 60 to 100%.

Conclusion

Despite the obvious clinical benefits of CR programs and recommendations from professional societies, the use and attendance of CR remain insufficient. Improving the ability of an individual

to return to daily life, including domestic and professional activities, has been identified as an important goal of CR. Further efforts should be made to use comprehensive CR programs that can be tailored to the individual needs of patients.

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