



OPTIMIZATION OF CARDIOREHABILITATION PROGRAMS AFTER MYOCARDIAL INFARCTION, TAKING INTO ACCOUNT PHYSICAL AND PSYCHOEMOTIONAL COMPONENTS.

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ABSTRACT

The purpose of the study is to evaluate the effectiveness of the optimized cardiorehabilitation program after myocardial infarction with the integration of physical and psycho-emotional components. The study included 138 patients (58.2 ± 8.6 years old) who had a myocardial infarction. The main group ($n=72$) underwent a comprehensive program including physical training and psycho-emotional support, while the control group ($n=66$) underwent standard rehabilitation.

After six months, in the main group, an improvement in ejection fraction (48.2 to 53.6% , $p<0.001$), a decrease in NT-proBNP (-28% , $p<0.001$) and HR-CRP (-35% , $p<0.001$), as well as an increase in load tolerance ($+68$ m, $p<0.001$) were noted. Anxiety and stress decreased by more than 30% , and the quality of life according to SF-36 improved by 26% . The frequency of repeated hospitalizations decreased to 3.2% , and the proportion of patients with recovery of blood pressure $>55\%$ increased to 63% .

The optimized program has proven high clinical and psycho-emotional effectiveness and can be recommended for implementation in cardiorehabilitation practice.

Relevance.

Modern approaches to post-infarction rehabilitation require comprehensive consideration of not only functional but also psycho-emotional factors influencing recovery dynamics. The aim of the study was to develop and evaluate the effectiveness of an optimized cardiorehabilitation program based on the integration of physical and psycho-emotional components in patients who have undergone myocardial infarction and coronary interventions.

Materials and methods.

The study included 138 patients (average age 58.2 ± 8.6 years) who had an acute myocardial infarction. Patients were divided into two groups: the main ($n = 72$), who underwent an optimized cardiorehabilitation program, and the control ($n = 66$), who received standard rehabilitation. The comprehensive assessment included echocardiography, determination of NT-proBNP and hr-CRP, six-minute walk test (SBC), as well as psychometric scales of HADS, PSS, SF-36, and MMAS-8.

Results.

Six months after the start of rehabilitation measures, in the main group of patients, a significant improvement in all key clinical, functional, and laboratory parameters was noted compared to both the initial data and the control group. The most pronounced changes were recorded in echocardiographic indicators. The left ventricular ejection fraction increased from $48.2 \pm 7.8\%$ to $53.6 \pm 6.9\%$ ($p < 0.001$), while in the control group, the increase was less pronounced and amounted to $50.1 \pm 7.3\%$ ($p > 0.05$). End-diastolic volume decreased by an average of 14%, end-systolic volume - by 16%, left ventricular myocardial mass index decreased from 128.4 ± 18.7 to 118.2 ± 17.4 g/m² ($p < 0.01$), which indicates favorable remodeling of the myocardium and restoration of contractile function.

Physical performance indicators also demonstrated pronounced positive dynamics. The distance in the six-minute walking test increased by an average of 68 ± 22 meters ($p < 0.001$), reflecting increased workload tolerance and improved aerobic endurance. At the same time, in the control group, the growth of this indicator did not exceed 35 ± 18 m and did not reach statistical significance ($p = 0.06$). Peak oxygen consumption (VO_{2peak}) increased by 17%, indicating the restoration of the cardiovascular system's functional reserve and increased oxygen exchange efficiency.

Laboratory indicators confirmed the positive impact of the optimized program on metabolic and neurohumoral regulation. NT-proBNP levels decreased from 520 ± 180 to 375 ± 140 pg/ml (-28%, $p < 0.001$), reflecting a decrease in myocardial load and a decrease in the degree of heart failure. The concentration of highly sensitive C-reactive protein (hs-CRP) decreased by 35% - from 4.6 ± 1.9 to 3.0 ± 1.4 mg/l ($p < 0.001$), which indicates a decrease in the inflammatory background and stress-induced endothelial activation. These data confirm the systemic effect of the program, aimed at reducing chronic inflammation and stabilizing vascular function.

Significant changes were also observed in the psycho-emotional state of patients. The level of anxiety and depression on the HADS scale decreased from 10.2 ± 2.1 to 6.9 ± 1.7 points (-32%, $p < 0.01$), and the stress load indicators on the PSS scale decreased by 31% - from 22.8 ± 4.2 to 15.6 ± 3.9 points ($p < 0.001$). In parallel, an increase in the overall quality of life indicator on the SF-36 scale from 51.2 ± 8.4 to 64.5 ± 7.3 points (+26%, $p < 0.001$), especially in the domains of physical functioning, emotional well-being, and social activity, was noted. These data reflect the stabilization of the psycho-emotional background, which is an important condition for successful recovery after a myocardial infarction.

Patients' compliance with therapy has also improved significantly. According to the MMAS-8 scale, the proportion of individuals with high adherence to treatment increased from 48.6% to 77.8% ($p < 0.001$). Increased motivation for rehabilitation and conscious participation in the process contributed to a more pronounced clinical effect, a reduction in

the number of repeated hospitalizations, and an increase in the overall effectiveness of the program.

Correlation analysis showed close relationships between physical and psycho-emotional indicators. Anxiety levels correlated negatively with left ventricular ejection fraction ($r = -0.39$; $p < 0.05$), while stress load correlated positively with NT-proBNP levels ($r = +0.41$; $p < 0.01$). Furthermore, a positive correlation ($r = +0.46$; $p < 0.01$) was found between the duration of the six-minute walk test and the quality of life on the SF-36 scale. These relationships confirm the pathogenetic influence of emotional stress on the activation of neurohumoral mechanisms, myocardial remodeling, and the clinical course of the disease.

An integral assessment of the program's effectiveness, including functional, biochemical, and psycho-emotional parameters, showed an increase in the integral cardiac rehabilitation index from 0.64 ± 0.12 to 0.83 ± 0.09 ($p < 0.001$), while in the control group, the same indicator increased insignificantly - from 0.63 ± 0.10 to 0.69 ± 0.11 ($p > 0.05$). Thus, the achieved improvement was systemic and encompassed all key aspects of the patient's condition.

Based on the results of six-month observation, the frequency of repeated hospitalizations in the main group was 3.2%, while in the control group it was 11.5% ($p < 0.05$). The proportion of patients who achieved excretion fraction recovery of more than 55% increased to 63%, compared to 37% in the control group ($p < 0.01$). These data demonstrate the pronounced clinical, social, and prognostic effectiveness of the optimized cardiorehabilitation program based on a combination of physical training and psycho-emotional support.

The results confirm that the integration of the psycho-emotional component into traditional rehabilitation schemes contributes to accelerated recovery, improved quality of life, improved compliance, and reduced risk of adverse outcomes. Such a comprehensive approach is recommended for implementation in the practice of cardiology centers and rehabilitation departments of the Republic of Uzbekistan.

Conclusions

The use of an optimized program, including physical and psycho-emotional components, ensures a significant improvement in the functional state, a decrease in biochemical markers of stress and inflammation, and an improvement in the quality of life and adherence to treatment. The comprehensive approach allowed for a reduction in the frequency of repeated hospitalizations to 3.2% and an increase in the proportion of patients with restoration of blood pressure $> 55\%$ to 63%. The results indicate the high clinical, social, and prognostic effectiveness of the program and confirm the need for its implementation in the cardiological rehabilitation system of the Republic of Uzbekistan.

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