

Optimization of the Functional State of the Cardiovascular System in Women with a Complex of Dosage Physical Exertion

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In the second mature age, women increase the prevalence of arterial hypertension, often complicating hypertensive crises. This circumstance requires improving the recovery options for this category of patients. It seems very promising to be used for this in women with arterial hypertension regular physical exertion for the purpose of their overall recovery, reducing the level of blood pressure and the prevention of hypertensive crises. To easily be the effects of the hypertensive crisis, a complex of muscular loads was developed, the effectiveness of which was estimated in comparison with traditionally appointed patients in such patients of the recovery. Women were examined 36-55 years, who had over a month ago, hypertensive crisis. The women who have been rehabilitated under the author's scheme, have been rejected in the study, have shown a more pronounced improvement of the indicators registered in the study. The optimization of the function of the cardiovascular system turned out to be more pronounced than as a result of traditional recovery. The tested version of regular muscle training provides optimization of processes in the heart and vessels of women suffering from arterial hypertension, lowering the risk of repetition of their hypertensive crisis.

Keywords: Arterial hypertension, Hypertensive crisis, Rehabilitation, Women, Second mature age, Physical workouts.

The progressive development of medical science and practice around the world has not yet been able to reduce the prevalence of arterial hypertension, which often complicates hypertensive crises¹. Often, the development of a hypertensive crisis can lead to hemorrhagic strokes² with a deterioration in the general state of a person, to a disqualial persistence, and

sometimes to death³. Women suffering from arterial hypertension are often very emotional, which leads to the formation of a tendency to hypertensive crises. The development of a hypertensive crisis, including middle-aged women, has a very negative impact on their overall health level and reduces their overall working capacity⁴. The prevalence of hypertensive crises in women

hypertensive is one of the incentives for the development of medical science^{5,6}. Studies are conducted with the aim of improving the schemes for the use of drugs of vasculating effects⁷, as well as in relation to increasing the efficiency of rehabilitation, eliminating the effects of vascular spasms and preventing their occurrence later⁸. In this regard, regular physical exertion, promoting the optimization of their general emotional and physical condition and the resistant expansion of arterial and venous vessels, are presented^{9,10}.

Long-term observations make it possible to consider regular dosage physical exertion a very effective option for mass rehabilitation, strengthening the body as a whole¹¹. In this regard, muscle spacecraft regular loads rightfully refer to very frequently used rehabilitation options for different categories of patients, primarily with vascular pathology¹². Moderate activation of muscle work stimulates capillar closets, eliminating the phenomena of vessel spasms, weakens hypoxia in vital organs, lowering the risk of developing vascular disasters due to the normalization of hemodynamics in various vascular regions and contributing to the general recovery of patients^{13,14}.

Of great importance for the resistant optimization of the general functional status of people with any vascular pathology has the provision of rational rehabilitation after a hypertonic crisis¹⁵. It is possible to minimize the disorders that are available after the hypertensive crime and reduce the risk of repetition of the crisis situation^{16,17}.

The purpose of the study is to evaluate the rehabilitation possibilities of the developed complex of physical exertion for women who are ill hypertension after a hypertonic crisis.

MATERIALS AND METHODS

It was approved by the local ethics committee of the Belgorod State National Research University (protocol ¹10 of 2017.11.10).

The study was conducted at 55 women 36-55 years, with the arterial hypertension of the second degree without the phenomena of heart failure, which moved about one month ago the hypertensive crisis of the first type. All women taken under observation on a permanent basis took an Enalapril to 10mg two times a day as hypotensive

therapy. A random method of all patients were distributed into two comparable groups, called experimental 1 group and experimental 2 groups. Group 1 (26 people) has passed the rehabilitation of the scheme traditionally used during the rehabilitation. She included daily facilitated studies of therapeutic physical culture, short training on simulators, the use of 10 hydromassage sessions. An experienced group 2 (29 people) has been rehabilitated by the authored scheme consisting of daily runs in free mode with a duration of at least 20 minutes a day during the first half of the day, rational breathing exercises and walking along the horizontal plane at an accelerated pace daily at least 30 minutes after noon. In all cases, rehabilitation was carried out for two months. The control group consisted 23 clinically healthy women aged 36-60 years, surveyed once. Patients who entered both experienced groups were examined twice when taking into research and at the end of all health events.

A number of indicators were registered for the study: the frequency of heart cuts, the respiratory rate, the value of blood pressure was determined. All women conducted a standard orthostatic sample (a rapid lift to the feet after a five-minute stay in the lying position) and the standard trial of RF (after horizontal position for 5 minutes). The surveyed recorded the pulse value in 15 seconds (P1) alone, after 30 squats in 45 seconds, after adopting a horizontal position, it was again considered over the first 15 seconds (P2) and for the final 15 seconds for the first minute after load (P3). The data obtained during the measurement ensured the possibility of calculating the ruft index by applying the formula:

$$(4 \times (P1 + P2 + P3) - 200) / 10.$$

A 6-minute walk test, which takes into account the amount of the distance, which is possible to pass in 6 minutes by a strictly horizontal plane with the highest speed, which is possible. According to this data, a conclusion was made on a person belonging to a specific functional class. The surveyed were counted for the first functional class when they could pass 425-550 meters. The surveyed attributed to the second functional class in the event that they were able to pass 301-425 meters. The third functional class included persons

passing 151-300 meters. The fourth functional class was women capable of passing within 6 minutes less than 150 meters.

All results were processed statically by calculating the Student t-criterion.

RESULTS

The values established during the study are assembled in Table 1. At the beginning of the observation of statistically significant differences in all recorded indicators in women with the arterial hypertension of both experimental groups, there was no detected.

Evaluation of digital data in both observation groups After applying, their rehabilitation has made it possible to establish reliable differences between them in all charged indicators in favor of the author's proof.

Against the background of rehabilitation in the second experimental group of women suffering from arterial hypertension, the value of the frequency of heart cuts has dropped by 30.9%, leaving the level of the control group. In patients who had the first experienced group, this figure decreased by only 12.7%. In two experimental groups, the frequency of respiratory acts decreased, but it was more pronounced in patients of the second group (20.8%), providing them with their output of this indicator to the level of control. In women, the second experimental group, the levels of systolic and diastolic blood pressure were normalized, decreased by 33.6% and by 32.0%, respectively. In women of the first experimental group, the effectiveness of rehabilitation for this indicator was lower. They retained an increased level of blood pressure.

The results of the patients of the orthostatic sample after their rehabilitation have decreased: in a group of first by 24.6%, and in a group of second to 64.7% with the achievement of control values only in the second case. As a result of the recovery activities, the Ruffier index decreased, but reached the level of control only in women of the second group due to a decrease of 2.48 times (in women of the first group, its value was reduced by only 39.1%).

The values found during the sample with a 6-minute walking point indicated a greater efficiency of author's physical rehabilitation. In

the second experimental group, a more pronounced increase occurred, overcame in 6 minutes by 56.3%, while after applying the traditional scheme of physical rehabilitation, this indicator increased only by 11.9%. By the end of the observation, only in the experimental group 2 there was a correspondence of its value of the control level.

DISCUSSION

Hypertensive crisis often may occur in women suffering from arterial hypertension¹⁸. Under these conditions, hemodynamics are temporarily worsen in the entire body with the development of ischemia phenomena¹⁹. The decrease in the level of blood pressure eliminates the phenomena of ischemia and arising symptoms²⁰. In this case, the general state is improved, but the high risk of repetition of a hypertensive crisis is maintained, which can be complicated by thrombosis²¹. This makes a hypertonic crisis a very dangerous state, which needs to continue the improvement of physical rehabilitation options²².

Due to the serious practical need to ensure high efficiency of the process of rehabilitation of patients with arterial hypertension after a hypertensive crisis, further research is underway to develop schemes for their recovery^{23,24}. The authors were determined to determine the effectiveness of two improvement schemes for this vascular pathology. The normalization of the recorded indicators of the cardiovascular system of observed patients was marked in the second group, where the rehabilitation was carried out according to the author's scheme. The effectiveness of the impact was determined by the dynamics in patients of the cardio-vascular system functions against the background of the correction of their general physical status²⁵.

The data obtained in the conducted study make it possible to assume that the tested rehabilitation complex, which includes physical stages in the form of jogging, respiratory exercises and active walk, is able to more pronounce the body of women who have undergone hypertensive crisis, strengthening their heart and optimizing the tone of their vessels²⁶. It provided them to minimize the risk of repetition of a hypertensive crisis. A greater recovery achieved in the experimental group 2 is obviously due to a more complex positive effect on

Table 1. Results of research

Indicators taken into account in the work	Experimental group 1, M±m, n=26 at the beginning of the study	Experimental group 1, at the end of the study	Experimental group 2, M±m, n=29 at the beginning of the study	Experimental group 2, at the end of the study	Control group, M±m, n=23
Level of systolic blood pressure, mmHg	164.3±2.12	142.8±1.79 p<0.05	163.8±2.06	122.6±1.60 p<0.01	118.4±0.83
Level of diastolic blood pressure, mmHg.	105.6±0.61	94.5±0.54 p<0.05	106.7±0.57	80.8±0.45 p<0.01	71.3±0.32
The number of cardiac abbreviations in 1 minute, strikes/minute	92.8±0.85	82.3±0.74 p<0.05	90.3±0.72	p<0.05 69.0±0.61	68.2±0.96
The number of respiratory movements in 1 minute, times/minute	19.5±0.27	18.4±0.38 p<0.05	20.3±0.29	p<0.01 16.8±0.21	16.2±0.34
Orthostatic sample indicator, strikes / minute	24.3±0.21	19.5±0.33 p<0.05	25.2±0.36	p<0.05 15.3±0.22	14.4±0.30
Value of the index Ruffe, points	12.8±0.27	9.1±0.16 p<0.01	12.4±0.32	p<0.01 5.0±0.15	4.6±0.16
Distance in walking dough for 6 minutes, steps/minute	319.0±1.24	357.9±1.10 p<0.05	302.4±0.97	p<0.01 472.6±0.70	489.7±1.18

Note: p – is the statistical differences of changes in the value of parameters during the observation, p₁ – is the statistical differences between the final observation results in both groups of patients.

the body applied in these women's motion engine activity^{27,28}. It is clear that it is more intensifying the functioning of the heart, the brain and the bone-muscular apparatus²⁹. The simultaneous use of components that made up the author's rehabilitation scheme ensured the achievement of a more pronounced optimization of the parameters taken into account due to the onset of mutualation of the effects of all elements of the healing scheme^{30,31}. Undoubtedly, the greater efficiency of the author's rehabilitation is caused by the simultaneous use of its elements that enhance the activities of the heart and vessels^{32,33}. Apparently, the application of the components of the author's scheme ensured in women hypertensive, optimally coached the muscular system and activated biosynthetic and metabolic processes in the organs^{34,35}. Against the background of appointing the author's scheme of physical rehabilitation, the heart muscle was more stimulated and the metabolism was normalized in it. In addition, there is reason to believe that against the background of the copyright of the rehabilitation scheme there was a more pronounced increase in the venous return to the heart, optimizing general hemodynamics³⁶.

The use of at the same time all components that have been tested by rehabilitation scheme optimized the overall state of patients, contributing to strengthening adaptation to a regular increase in muscle activity, which positively affected the blood parameters and hemostasis system³⁷. Physiological changes in them lead to biologically advantageous morphological and functional changes in all organs and muscular system, increasing the reserves of the body³⁸. Stimulation of aerobic mechanisms in the brain after a hypertensive crisis normalized the emotional background of patients. This stimulated the process of optimizing their physical characteristics, providing a quick transition to the usual way of life due to the accelerated entry of processes in the body into the status of the norm.

CONCLUSION

Women hypertensive, having experienced hypertensive crisis, have obvious signs of asthenia system of heart and vessels. The use of the patient's traditional rehabilitation in this category of traditional rehabilitation has an unbearable effect. The appointment of the author's scheme

of physical exertion in women hypertensive after a hypertensive crisis, which includes regular jogging, breathing exercises and walking hours at an accelerated pace, turned out to be very effective in optimizing the state of their cardiovascular system. The result resulting after the author's rehabilitation scheme was formed to minimize the possibility of repetition of a hypertensive crisis and stimulated the existing functional reserves of the body of women suffering from arterial hypertension.

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Conflict of Interest

No conflict of interest is declared.

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Ethics Committee Resolution

The study was approved by the local ethics committee of the Belgorod State National Research University on September 15, 2018 (protocol '11).

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