

Publication date: 01.03.2023  
DOI: 10.51871/2782-6570\_2023\_02\_01\_5  
UDC 612.1

## **INFLUENCE OF PHYSICAL REHABILITATION, INCLUDING MEANS OF PHYSICAL THERAPY ON THE PSYCHOFUNCTIONAL STATE OF ENGINE CREW EMPLOYEES WITH HYPERTENSION**

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**Annotation.** The article presents the dynamics of indicators of the psychofunctional status of engine crew employees with hypertension after a physical rehabilitation course. The results reflected a significant decrease in body mass by 12%, an improvement in the characteristics of attention (efficiency of working capacity – by 12%, attention warm-up – by 3.2%, attention span – by 19%), trait and state anxiety – by 5%, refinement of the chronological assessment of time – by 4%. The results obtained demonstrate the positive impact of means and methods of physical rehabilitation on the psychofunctional state of locomotive crew employees with hypertension.

**Keywords:** engine crew employees, physical rehabilitation, physical therapy, hypertension, psychofunctional state.

**Introduction.** Harmful and dangerous industrial factors affect crew employees throughout the work time, and mental strain increases the risk of occupational diseases [1], including hypertension.

Such conditions as long-term voyage, night shifts, which are often accompanied with physical inactivity and the state of monotonia, serve as provocative circumstances of developing fatigue, reduced immunity, disturbance in compensatory and adaptive responses, worsen the psychological and professionally significant qualities of the workers, lead to the development of occupational health dysfunctions [2-3].

Despite a great number of research on treating hypertension with drugs, the target levels of blood pressure are achieved only in 30-40% of cases, which predetermines the search for new means and methods of treatment [4].

For example, in recent decades, interest for non-drug treatment of arterial hypertension, along with the traditional drug therapy, is growing worldwide [5].

Normally, hypertension is a concomitant disease caused by work specificity and characterized by a long progressing course with a

gradual reduction in working capacity. It was the reason for a search for means and methods of physical rehabilitation that positively influence physical and psychological state of the workers with hypertension.

The purpose of this work was to evaluate the influence of physical rehabilitation measures on the psychofunctional state of the engine crew employees with hypertension.

**Methods and organization.** The state of the cardiovascular system's function was examined according to the systemic pressure indicators (heart rate – HR, beats/min; diastolic blood pressure – dBP, mm of Hg; systolic blood pressure – sBP, mm of Hg; BPmean – mean blood pressure, mm of Hg), identified according to the Korotkov's method. Body mass was assessed by weighing on medical scales, attention characteristics – according to the Schulte Tables, trait and state anxiety – with the Spielberger-Khanin questionnaire, chronological assessment of time – using the “Individual Minute” test during psychological testing. The statistical data processing was made with the Statistica 13 software package: the authors calculated arithmetic mean values and the standard deviation of obtained indicators,

the significance of parametric indicators was evaluated with the Student's T-test, non-parametric indicators – with the Wilcoxon's T-test if  $p \leq 0,05$ .

The study took place in the Rehabilitation Center of Russian Railways (Omsk). The rehabilitation course took 21 days. The study included men ( $n=26$ ) who work in Russian Railways as members of the engine crew. The age of participants – 40-55 years, diagnosis – I-II degree arterial hypertension, duration of

the regular medical checkup – 5 to 10 years. All test subjects did not engage in sports have a similar work routine. Patients with III degree arterial hypertension, class III obesity, coronary heart disease were not included, since the aforementioned diseases are classified as professional impropriety for engine crew workers. The course structure and distribution of physical rehabilitation means for the studied group are presented in table 1.

Table 1

Structure of the physical rehabilitation course for the engine crew workers with hypertension

Physical rehabilitation measures	Distribution percentage of recovery measures (%)
Callisthenic exercises	20
Specialized exercises Stretching exercises Relaxation exercises	20
Dynamic breathing exercises	10
Static breathing exercises	10
Autogenic training	10
Speleotherapy	30

Physical rehabilitation sessions were carried out sparingly at the outpatient stage. Duration of the speleotherapy session was 30 minutes. The autogenic training was conducted after preliminary training in the afternoon for 30 minutes.

Choice of the physical therapy method was based on a number of health factors: nature of pathological changes caused by the disease, degree of insufficient blood circulation, pronouncement of present complications and decree of adaptation to physical activity. We have used the method of dispersion and alternation of physical loads, when an exercise

of one muscle group was followed by an exercise for another muscle group, while exercises with high muscle activity were alternating with exercises requiring low activity, as well as breathing exercises of static and dynamic nature. We also implemented specialized exercises for relaxation of muscle groups, stretching and breathing exercises.

The physical therapy course was divided into two stages – initial and final. At the first stage, duration of session was 25 minutes, while near the end of the final stage it increased to 60 minutes. The pace at the initial stage was slow, at the end of the final stage – medium.

Table 2

Dynamics of body mass and systemic pressure indicators in the engine crew workers before and after the physical rehabilitation course,  $M \pm \sigma$

Indicators	Before	After
Body mass, kg	96.6±0.9	85.4±1.13*
HR, beats/min	71.9±1.3	71.3±1.2
sBP, mm of Hg	123.2±1.4	121.8±1.1
dBP, mm of Hg	79.2±1.1	78.4±0.23
BPmean, mm of Hg	93.6±1.6	92.6±0.15

Note: HR – heart rate; sBP – systolic blood pressure; dBP – diastolic blood pressure; BPmean – mean blood pressure; \* – statistically significant results,  $p \leq 0.05$

**Results and discussion.** The efficiency of recovery measures was evaluated according to dynamics of the studied indicators (table 2).

Reduction of body mass in the workers after the rehabilitation course amounted to 12% ( $p \leq 0.05$ ), which significantly decreased the risk of progressing hypertension and developing complications.

Values of systemic pressure and HR during the course have slightly changed ( $p \geq 0.05$ ) and remained within the range of standard values. It can be explained by a systematic intake of hypotensive medications.

Dynamicity of professionally important qualities of the studied group evaluated during the psychological testing after the course revealed improved characteristics of attention. The efficiency of working capacity improved

from ( $p \leq 0.05$ )  $32.6 \pm 0.2$  to  $28.7 \pm 0.02$  s, the attention warm-up reduced ( $p \leq 0.05$ ) from  $1.1 \pm 0.02$  c.u., the attention span improved ( $p \geq 0.05$ ) from  $1.1 \pm 0.01$  to  $0.9 \pm 0.01$  c.u. The anxiety level also reduced: trait anxiety ( $p \leq 0.05$ ) – from  $38.0 \pm 0.2$  to  $36.6 \pm 1.07$  points; state anxiety ( $p \leq 0.05$ ) – from  $37.5 \pm 0.7$  to  $35.8 \pm 0.53$  points. The chronological assessment of time was refined ( $p \leq 0.05$ ) – from  $62.1 \pm 0.41$  to  $59.4 \pm 0.01$  s.

**Conclusion.** The obtained significant changes ( $p \leq 0.05$ ) of the following indicators: reduced body mass, improved attention characteristics, refinement of the chronological assessment of time show a positive effect of the physical rehabilitation course on the psychofunctional state of the engine crew employees with hypertension.

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**For citation:** Lunina N.V., Khasanova E.V. Influence of physical rehabilitation, including means of physical therapy on the psychofunctional state of engine crew employees with hypertension. *Russian Journal of Sports Science: Medicine, Physiology, Training*, 2023, vol. 2, no. 1. DOI: 10.51871/2782-6570\_2023\_02\_01\_5