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# Importance of early physical rehabilitation in improving functional state of vegetative nervous system of women with postmastectomy syndrome

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**Purpose:** to determine the expediency of early application of physical rehabilitation to improve the functional state of vegetative nervous system of women with postmastectomy syndrome.

**Material & Methods:** theoretical analysis of scientific and methodical literature, analysis of heart rate variability, methods of mathematical statistics. The study involved 135 women with postmastectomy syndrome who underwent radical mastectomy for Madden.

**Results:** at the end of the research value of high-frequency component of the spectrum was significantly higher in women MG<sub>1</sub>, compared to MG on 257,72 msl ( $p < 0,01$ ) and the stress index was lower on 107,01 c. u. ( $p < 0,001$ ).

**Conclusions:** the feasibility of early rehabilitation intervention to improve the functional state of the autonomic nervous system is not detected during the year classes on problem-oriented programs.

**Keywords:** postmastectomy syndrome, women, autonomic nervous system, exercise, physical rehabilitation.

## Introduction

Continuous improvement of medical advances in cancer increases the number of patients that are formally due to lack of progression of breast cancer are considered «healthy», but the presence of complications caused by conducted aggressive anticancer therapy increases with the duration of the postoperative period, which requires active intervention by the rehabilitators [1; 2; 6].

Top randomized feasibility studies show early detection and correction of complications of the musculoskeletal system, cardiovascular and nervous systems for the timely overcome them and improve the quality of life of women of this nosology [7–9]. However, the overwhelming focus on the part of medical rehabilitation, the development of modern medical schemes providing, implementing reconstructive plastic surgery, unfortunately, does not pay enough attention to the physical rehabilitation of patients with postmastectomy syndrome, including the improvement of the functional state of the autonomic nervous system.

The above definitely indicates the importance of developing, conducting and determine the usefulness of timely rehabilitation measures to improve heart rate variability in women with postmastectomy syndrome.

**Relationship with the academic programs, plans, themes.** The selected research direction corresponds to the research topic of Zaporizhzhya National University “The development, experimental testing and implementation in practice the measures of physical rehabilitation to improve the health status of different categories of people” (state registration 0114U002653) and Lviv State University of Physical Culture “Basis of physical rehabilitation of women with the postmastectomy syndrome” (state registration 0114U007008).

**Purpose:** to determine the expediency of early application of physical rehabilitation to improve the functional state of vegetative nervous system of women with postmastectomy syndrome.

## Material & Methods

The article used the following methods: theoretical analysis of scientific and methodical literature, analysis of heart rate variability, methods of mathematical statistics.

To evaluate the functional state of the autonomic nervous system using electrocardiographic complex KARDIOLAB (National Aerospace University of electronic medical devices and technologies «HAI-MEDICA», Kharkiv, registration certificate № 6037/2007, conformity certificate № UA-MI/2p-2765-2009). Technology of analysis of heart rate variability (HRV) was based on registration short records (5 minutes) the patient's electrocardiographic signal with further analysis of the mathematical methods rytmoohramy [5]. We investigated the total variability parameters (SDNN, RMSSD, AMo, Si, IVR) and periodic components of heart rate variability (TP, VLF, LF, HF, LF/HF, IC, LF%, HF%, VLF%). The study was conducted on the basis of Zaporizhzhya Regional Oncology Center.

The study involved 135 women with postmastectomy syndrome (50 patients had stationary and clinical stages of rehabilitation, 85 – only dispensary), the average age was 60,27±0,79 years. In the stationary stage, women were divided into two groups: main group (MG), n=25 and the comparison group (CG), n=25; in dispensary stage – the first main group (MG<sub>1</sub>), n=45 and the second main group (MG<sub>2</sub>), n=40 according to its own wishes and encouragements to studies on personality-oriented program of physical rehabilitation. Previously, women had held a conversation in which given a clear explanation of the features sessions on each of them.

The first complex personality-oriented program [4] included: aquafitness (aquamotion, akvabilding, aquastretching), conditioned swimming, recreational aerobics (first main group and main group); second [3] – conditioned swimming and Pilates (second main group and comparison group).

Women of the main groups involved in the relevant programs during the year, efficiency controled in six months. Admission to the sessions provided by oncologist, patients of

Comparison of heart rate variability (M±m) in women with postmastectomy syndrome on dispensary stage of rehabilitation

Index, units	6 months				12 months			
	MG <sub>1</sub> (n=45)	MG (n=25)	MG <sub>2</sub> (n=40)	CG (n=25)	MG <sub>1</sub> (n=45)	MG (n=25)	MG <sub>2</sub> (n=40)	CG (n=25)
SDNN, ms	27,61±1,33	26,04±1,70	23,36±1,07	23,56±1,24	38,34±1,54	36,64±2,03	26,44±1,19	30,16±2,27
RMSSD, ms	22,62±1,60	17,20±1,37*	17,77±1,05	16,64±1,37	30,96±2,04	21,40±1,82**	20,16±1,08	20,64±2,46
TP, ms I	705,77±71,94	697,68±96,84	547,71±50,36	559,24±58,66	1491,80±122,90	1261,96±142,75	722,36±64,02	992,72±155,40
VLF, ms I	174,28±31,69	268,28±50,51	215,61±30,54	154,88±33,73	450,53±52,62	450,92±64,38	216,73±32,46	247,63±63,03
LF, ms I	262,48±26,47	226,24±40,83	191,61±20,50	195,84±21,83	486,40±46,15	500,84±91,04	297,36±36,43	460,00±92,87
HF, ms I	255,07±31,92	184,64±25,32	125,09±14,74	202,88±27,34*	536,08±73,30	278,36±35,43**	202,23±20,65	278,36±43,89
LF/HF, c. u.	1,80±0,22	1,58±0,32	2,39±0,31	3,34±2,24	1,41±0,18	2,05±0,31	1,89±0,22	1,64±0,19
AMo, %	62,20±2,13	64,48±2,74	64,42±1,82	64,04±2,11	50,00±1,64	50,96±1,66	59,72±1,60	60,28±2,68
SI, c. u.	277,75±19,80	379,44±23,86**	290,72±19,86	465,28±32,15***	156,55±11,37	263,56±21,12***	261,05±17,69	378,16±32,80**
VLF, %	25,08±2,38	37,37±4,61*	38,52±3,02	25,60±3,03*	31,16±2,41	36,62±3,18	32,31±3,03	24,22±3,57
LF, %	39,04±2,27	31,24±2,93*	35,96±2,38	36,11±3,38	33,11±2,00	37,70±3,24	38,10±2,15	42,48±3,66
HF, %	33,32±2,78	31,38±4,01	22,72±2,21	38,28±2,57***	33,73±2,41	25,67±2,72*	28,55±2,22	33,26±3,44

**Notes.** \* –  $p < 0,05$ , \*\* –  $p < 0,01$ , \*\*\* –  $p < 0,001$  compared MG<sub>1</sub> and MG<sub>2</sub>; ° –  $p < 0,05$ , °° –  $p < 0,01$ , °°° –  $p < 0,001$  compared MG<sub>2</sub> and CG.

these groups belonged to the third clinical group. At the beginning of the dispensary stage groups were homogeneous in all parameters of heart rate variability.

## Results and discussion

To determine the feasibility of early application of physical rehabilitation to improve the functional state of the autonomic nervous system in women with postmastectomy syndrome on dispensary stage of rehabilitation, we conducted a comparative analysis of HRV in six months and year after classes of personal-oriented program of physical rehabilitation (Tab. 1).

The benefits of early physical rehabilitation, it has not been established in six months of classes on the first personality-oriented program between the main group that began rehabilitation with a stationary phase and the first main group – from the dispensary, as evidenced by the presence of probably the best indicators of heart rate variability in the last.

Specifically mentioned stress index (Si) was lower in women MG<sub>1</sub> at 101,69 c. u. ( $p < 0,01$ ) compared to the MG, and activity level of the parasympathetic regulation higher on 5,42 ms ( $p < 0,05$ ), indicating that lower tension of regulatory systems in women who started on the dispensary stage of rehabilitation. Going on the second personality-oriented program had similar trend benefits to improve the functional state of the autonomic nervous system, including the value of stress index (Si) was lower in women MG<sub>2</sub> on 174,56 c. u. ( $p < 0,001$ ) compared to the CG, and the percentage contri-

bution of a very low range component was higher on 12,92% ( $p < 0,01$ ), indicating a better adaptive capacity of the autonomic nervous system in the second main group of women.

At the end of the study, the level of parasympathetic regulation of heart rate was significantly higher in women MG<sub>1</sub>, as evidenced by higher values of high-frequency component of the spectrum (HF) – on 257,72 msl ( $p < 0,01$ ) and (RMSSD) – on 9,56 ms ( $p < 0,001$ ), the value of stress index was lower on 107,01 c. u. ( $p < 0,001$ ) compared to CG.

A similar was traced when comparing two other groups for the first half, including stress index values were lower in women MG<sub>2</sub> compared to CG on 174,56 c. u. ( $p < 0,001$ ), for the second half – on 117,11 c. u. ( $p < 0,001$ ).

## Conclusions

The results of the study found that developed and tested personality-oriented program of physical rehabilitation of women with postmastectomy syndrome contribute to the improvement of the functional state of the autonomic nervous system of women of all groups, but according to the results of the semi-annual and annual control has been shown to lack feasibility of early rehabilitation intervention on improvement in cardiac rhythm.

**Prospects for further research** include determining whether early use of physical rehabilitation to improve functional status of upper extremity among women with postmastectomy syndrome.

**Conflict of interest.** The author declares that there is no conflict of interests.

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**Анотація.** Одиниць Т. Є., Бріскін Ю. А. Значення раннього застосування засобів фізичної реабілітації у поліпшенні функціонального стану вегетативної нервової системи жінок з постмастектомічним синдромом. **Мета:** визначити доцільність раннього застосування засобів фізичної реабілітації щодо поліпшення функціонального стану вегетативної нервової системи в жінок з постмастектомічним синдромом. **Матеріал і методи:** теоретичний аналіз даних науково-методичної літератури, аналіз варіабельності серцевого ритму, методи математичної статистики. У дослідженні брали участь 135 жінок з постмастектомічним синдромом, що перенесли радикальну мастектомію за Мадденом. **Результати:** наприкінці річного курсу занять значення високочастотного компонента спектру було вірогідно більшим у жінок ОГ<sub>1</sub> порівняно з ОГ на 257,72 msl ( $p < 0,01$ ), а стрес-індексу – меншим на 107,01 ум. од. ( $p < 0,001$ ). **Висновки:** протягом року занять за особистісно-орієнтованими програмами реабілітації не виявлено доцільності у ранньому реабілітаційному втручанні щодо поліпшення функціонального стану вегетативної нервової системи.

**Ключові слова:** постмастектомічний синдром, жінки, вегетативна нервова система, засоби, фізична реабілітація.

**Аннотация.** Одинец Т. Е., Брискин Ю. А. Значение раннего применения средств физической реабилитации для улучшения функционального состояния вегетативной нервной системы женщин с постмастэктомическим синдромом. **Цель:** определить целесообразность раннего применения средств физической реабилитации для улучшения функционального состояния вегетативной нервной системы у женщин с постмастэктомическим синдромом. **Материал и методы:** теоретический анализ данных научно-методической литературы, анализ variability сердечного ритма, методы математической статистики. В исследовании приняли участие 135 женщин с постмастэктомическим синдромом, перенесших радикальную мастэктомию по Маддену. **Результаты:** в конце года занятий значения высокочастотного компонента спектра было достоверно большим у женщин ОГ<sub>1</sub>, по сравнению с ОГ на 257,72 мсI ( $p < 0,01$ ), а стресс-индекса – меньшим на 107,01 у. е. ( $p < 0,001$ ). **Выводы:** целесообразности в раннем реабилитационном вмешательстве по улучшению функционального состояния вегетативной нервной системы не обнаружено в течение года занятий по лично-ориентированным программам реабилитации.

**Ключевые слова:** постмастэктомический синдром, женщины, вегетативная нервная система, средства, физическая реабилитация.

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